The Concept of Planned Change and its Application to
Energy Efficient Local Authority Housing: Theory,
Diagnosis, Development and Evaluation.

Mary Ince

1988

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Summary

The research described in this thesis consisted of the study of the concept of Planned Change, its application in diagnosing a particular problem, the implementation of a programme of planned change and its evaluation.

The particular problem which gave rise to this research was the question of how to bring about a widespread increase in the efficient use of energy in local authority housing. This arose as a result of my membership of a small R & D group (SLCEG), working on local authority housing, where we had previously found that empirical evidence and rational argument was insufficient to encourage energy efficient housing design.

The Concept of Planned Change offered an appropriate framework for investigating the problem as it is oriented towards improving social conditions through non-coercive means and provides for: identifying the various participants in the change process, diagnosis of the problem, setting goals and objectives, choosing strategies and designing a programme of activities and then monitoring their effect.
Diagnosis of the problem identified that a multifaceted approach was required to solve the problem so that the design of the planned change programme included bringing about the formulation of an Energy Policy, creation of awareness of the benefits, practicality and affordability of energy efficient dwellings, identification and utilisation of leverage points and various other educational and facilitative activities.

The Evaluation of the programme included both objective and subjective methods and indicated that a significant movement towards energy efficiency has been achieved but that adoption of this change is not evenly spread and that there are areas of resistance yet to be overcome.

As a result of the evaluation, modifications to the programme of planned change were proposed which will include alterations to the exhibition, further educational activities - courses, workshops, etc. and wider dissemination of the energy savings achieved.
Acknowledgement

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Chapter 1

Introduction

This introductory chapter is divided into two sections. The first (1.1) provides a brief statement of the problem, the background to it and, an indication of the rationale for utilising the concept of Planned Change for its solution. The second section (1.2) outlines the work done in the order it is presented in this thesis, indicating how each chapter relates to others and, briefly, the content of each.

1.1 Statement of the problem

The problem which gave rise to this research project was the question of how to bring about a widespread increase in the efficient use of energy in buildings, particularly local authority housing.

The background to this question contains a number of different threads:

a. I work for a small Research and Development group, known as the SLCEG (South London Consortium Energy Group), involved in all aspects of local authority housing, especially energy.
b. The group is a Consortium of local authorities in South London - Lambeth, Lewisham, Southwark and, since Jan. 1987, Greenwich. These councils pay the running costs of the group and commission us to do work for them.

c. We had carried out research, development and field trials in energy efficient housing and had found that it was both technically feasible and cost effective to design dwellings (both new and rehabilitated) which were energy efficient, i.e. provided thermal comfort whilst using the minimum amount of fuel.

d. Other small groups around the UK (and elsewhere) had carried out similar small-scale work and reached similar conclusions.

e. Reports of these field trials were quite widely distributed, both locally and nationally and there were some articles in both the national and the technical press.

f. There had been several campaigns by central government exhorting people to "Save It" (energy).

g. The majority of designers (architects and building surveyors) continued to not incorporate energy efficiency measures in their designs - indicating that neither the dissemination of the research results nor the exhortations of government were effective in encouraging a change to energy efficient design.

h. The then (1981) SLCEG member authorities had a total housing stock of around 200,000 dwellings, many of which needed very
large quantities of fuel to provide adequate heating (costing up to £800 a year for a two-bedroom flat).

j. We considered it to be socially desirable that the whole housing stock should be made energy efficient in order to alleviate Fuel Poverty - where the poorest people live in the homes which are hardest (most expensive) to heat. There would be other advantages such as reduced incidence of condensation and conservation of the dwindling fossil fuel resources.

There was therefore a need to find a method which would have an effect on the housing design and building process such that energy efficiency would become an integral part of that process.

It was clear that there was a barrier, or barriers, to the integration of energy efficiency into the building process which this research project would need to identify.
The aims of this research were, therefore:

A. To identify the barrier(s) to the integration of energy efficiency in building,

B. To search the literature for a theoretical base from which to develop a blueprint for action,

C. To carry out these actions - designed to lead to improved energy efficiency in building design,

D. To evaluate the actions taken, draw conclusions and identify further action as appropriate.

Initially, I had felt that the main barrier was probably negative attitudes on the part of the designers (and others) towards energy efficiency, but the first stages of the research suggested otherwise. Firstly, I discovered that the existence of positive or negative attitudes towards something did not automatically result in the corresponding behaviour - this was governed more by other elements of the overall situation such as opportunity, appropriate skills, social pressure, etc. Secondly, discussions with councillors, designers and others involved in the building process indicated that the majority either had positive attitudes to energy efficiency or were neutral towards it.

The Concept of Planned Change offered a framework for investigating the problem further and, later, for developing a plan of action. Planned Change is ideologically suited to the problem in hand as it is oriented towards helping to improve social situations through non-coercive means and in a deliberate (planned) manner.
There is a wide body of literature on Planned Change (eg. Lippitt et al, 1958; Bennis et al, 1976 and Zaltman and Duncan, 1977) and also on innovation diffusion which is closely related (eg. Bhola, 1982). There are also closely related subjects such as communication theory, learning theory, personality factors and so on.

The Planned Change framework provides for identification of the participants, diagnosis of the problem, setting goals and objectives, choosing strategies for action, designing a programme of specific activities and monitoring their effect. This thesis describes how I worked through this process and applied the concept of planned change to this specific problem. A brief description of the order and content of the thesis follows:

1.2 Outline of the work

This thesis is divided into three sections. Section A contains chapters 2, 3 and 4 which define planned change, energy efficiency and the participants in the process. Section B covers the implementation of the planned change programme, from diagnosis (chapter 3) to the design of the specific activities of the programme (chapter 8). Section C, chapters 9 to 11, covers the evaluation of the programme, an outline of future action and a critical summary of the research as a whole.
Section A - Definitions

As suggested above, the first step for me was to become better acquainted with the concept of planned change. In order to set the scene for the remainder of the thesis, chapter 2 discusses the concept of planned change, the differences between the views of some of the theorists and practitioners and suggests an omission which I identified – the category of Beneficiaries of the change.

Planned Change is defined as,

Planned Change is a conscious and deliberate attempt, by an individual or group of individuals, who employ social knowledge to modify the behaviour of individuals or the characteristics of systems in order to bring about a specified improvement in one or more aspects of a social system.

In order to round out the picture of why a change was necessary in respect of energy efficiency in housing, chapter 3 describes the meaning of energy efficiency and the reasons why it is desirable and includes a rationale as to why the planned change approach is appropriate. It also gives further details of the background to this research.

Chapter 4 also provides definitions – of the various participants in the planned change process – the Change Client, Potential Change Adopter, Change Agent, Influencers and Beneficiaries and of their roles and interactions.
Section B - the Programme of Planned Change

The chapters in this section deal with the various stages in the process of preparing a programme for change, in (generally) chronological order. The first step is diagnosis of the problem and identification of the factors associated with the problem and those which may have a bearing on the strategies employed in solving the problem. In chapter 5 I have described my diagnosis of the problem from three different, complementary, viewpoints: Zaltman and Duncan's Metatheory and Open Systems Perspectives and Bhola's CLER model. These enabled a clear picture to be built up of the various elements contributing to the problem and indicating directions towards possible solutions.

After the process of diagnosis, the problem itself was clearly defined as:

Measures to improve energy efficiency were not being included in the design of dwellings.

A goal for the planned change process could then be set and, as the causes of the problem are also defined the objectives can be set to overcome each of them. Chapter 6 therefore sets out the goals and objectives which were set for this planned change programme with an explanation of how they relate to the identified causes of the problem. An intermediate as well as a long-term goal was set for this project as the timescale for the eventual goal to be reached (that all housing in the three authorities will be energy efficient) would, barring miracles, be at least twelve years!
The next step in the process is to define the strategies which are appropriate for use in the situation as defined in the diagnosis stage. In chapter 7 I discuss the characteristics of the various strategy types available, and their suitability for use in this project in relation to the goals and objectives. This chapter also includes a discussion of the Phases of Change as defined in the literature and as modified to fit the circumstances of this project.

Within the framework of the strategy types decided upon, the next step is to design the actual activities which make up the change programme. The elements designed and devised for this case are described in chapter 8 together with indications as to the objectives they are aimed to meet and the strategy group to which they belong.

Section C - Evaluation, Looking Ahead and Critical Summary.

Several different ways of evaluating the effect of the change programme were used - objective methods included the use of two-part ("before" and "after") questionnaires and assessment of the levels of energy savings and "take-up" of the Energy Certification Scheme. Subjective assessments were made as a result of my observation of adoptive and resistive behaviours in various individuals and groups and of indicators as to the state of adoption of the change throughout one of the local authorities. Other indicators of change are also suggested which apply to a wider adopter system than the three member local authorities. In general, the evaluation showed that the change is being adopted but, as yet, not throughout the
adopter system and, that there are areas of resistance still to be overcome. Designers who visited the Demonstration Suite were found to have changed their intentions for future behaviour vis-à-vis energy efficiency to an extent of 46% of the overall desired change. Full discussion of the evaluation methods and results can be found in chapter 9.

The evaluation leads directly, in chapter 10, to consideration of how the programme may be improved/supplemented to further the adoption of the change and then to stabilise and institutionalise it. Part of this process will be an improved exhibition, plus further education/training for sub-groups of the adopter system, plus improvements to procedures. One further need which I have now identified is for training for the change agents themselves which does not seem to be considered in the literature.

The last chapter (11) serves to summarise the processes and findings of this research project and also provides my own critique of my work in the field of planned change.
SECTION A: Definitions

Chapter 2.

Towards Planned Change

In order to define Planned Change, some ideas regarding the concept of Change are explored, followed by consideration of various definitions of Planned Change (2.1), leading to a discussion of the various possible reasons why Planned Change may be necessary and/or desirable (2.2).

The definition of planned change involves consideration of the various participants in the process and the roles they play (2.3 & chapter 4). The concept of planned change also incorporates the notion of using various strategies to achieve a particular goal. These are outlined in 2.4 and discussed further in chapter 7.

2.1 What is Planned Change?

Theorists and researchers dealing with the theories of change and planned change start from a perspective of the modern world rapidly changing, with numerous innovations and developments, particularly technological, which create problems and stress in society as individuals and groups fail to adapt sufficiently quickly or appropriately to gain maximum benefit from these changes.
Zaltman and Duncan (1977, p6) suggest that both society as a whole and the behaviour of individuals is continuously adapting and adjusting to changing circumstances but that this is a natural evolutionary process which is generally slow and can hardly be perceived as "Change" by the participants. They therefore feel able to refer to this evolutionary process as the "status quo" and consider that this can be clearly differentiated from, "...a more significant alteration which can be called change... by using the notion of a critical threshold, above which more becomes different".

They suggest that this occurs when there is, "an alteration in the behaviour of an individual, or group of individuals, which results from them redefining the situation." This is, in one respect, a very broad definition as it allows for the change to be brought about (or precipitated) in a variety of ways and for it to be planned or unplanned. It does, however, imply a conscious decision on the part of the individuals concerned to change their behaviour as a result of a conscious awareness that the situation is different to their previous perception of it.

Lippitt's definition of change as, "...any planned or unplanned alteration in the status quo in an organism, situation or process" (cited in Zaltman & Duncan 1977, p8) also allows for a variety of causes and for both planned and unplanned change but does not restrict the change to being a conscious act by the individual(s) concerned, although they do add this criterion elsewhere.
Bennis, Benne, Chin and Corey (1976, p2) consider three distinct processes for social change; the idea of natural development, supporting the laissez-faire doctrine of non-intervention; the Marxist theory of radical intervention - bringing about rapid and extreme change through conflict; and Planned Change which they see as, "the only feasible alternative .... a method which self-consciously and experimentally employs social knowledge to help solve the problems of men and societies."

This definition embodies several separate ideas about Planned Change: first, that it is a self-conscious activity or, as Zaltman and Duncan put it,
"a deliberate effort with a stated goal." (1977, p10)

Likewise Lippitt et al state planned change as being,
"... change which derives from a purposeful decision to effect improvements." (1958, p (vi)).

"Experimentally" suggests that planned change is used in a situation/environment which can be to some extent controlled and where the effects of the method can be observed.

Also incorporated in this definition is the idea of employing social knowledge - similar to Bhola's use of, "manipulating social processes" (1982), suggesting that all the factors which affect the working of society (including personality factors, situational factors and environmental factors) are taken into account and used to bring about the desired change.
The other concept in the definitions of both Bennis et al and Lippitt et al is that of planned change being aimed at solving problems or effecting improvements within society. Lippitt added that this would be achieved, "with the help of professional guidance." These professional helpers may come from a variety of disciplines and are termed "change-agents." Their role is discussed more fully later (4.3).

Bennis et al also added to their definition (1976, p4) that planned change should be, "a collaborative effort" between all the individuals involved in the process. However, this requirement excludes many activities which are intentional and directed at bringing about change, such as the efforts of pressure groups, where those to whom the actions are directed are certainly not collaborating in the change process. Other authors (such as Zaltman and Duncan (1977)) include such activities within the scope of planned change. In the present case, where the desired change requires, in part, an alteration in the behaviour of building professionals (to incorporate energy efficiency in their designs) their cooperation cannot be assumed, at least in the initial stages, due to various factors such as lack of awareness of the problem, resistance to any change, etc. (see further discussion in chapters 5-8)

Zaltman and Duncan elaborate their definition of planned change as, "a deliberate effort with a stated goal on the part of a change agent to create a modification in the structure and process of a
social system such that it requires members of that system to relearn how to perform their roles" (1977, p10)

This definition suggests that the efforts of the change agent are directed at a social system, be it a group, organisation or society, rather than at individuals or the individual members of the system and, that changes in the performance of individuals would follow changes in the system. This reflects their concern that the individual may be overemphasised, with less attention being paid to the effect of other individuals and environmental factors as influences on him. An opposite definition is provided by Bettinghaus in relation to the use of persuasive communication, "... a conscious attempt by one individual to modify the attitudes, beliefs or behaviour of another individual or group of individuals through the transmission of some message." (1973, p12)

From the discussion above, there is clear agreement that planned change is an interventionist activity with a specified goal which is to improve human society (or some part of it) by speeding, reversing or altering the direction of, the natural processes of social development. Also, that it utilises knowledge of man and society to alter the attitudes, beliefs or behaviour of individuals or the characteristics of a social system in order to achieve this goal. There is not full agreement as to the necessity for collaboration between the change agent and the system to be changed, but the change agent is universally accepted as a necessary part of the process.
For the present purpose, the definition of planned change which will be utilised is an amalgamation of much of the foregoing:

Planned Change is a conscious and deliberate attempt, by an individual or group of individuals, who employ social knowledge to modify the behaviour of individuals or the characteristics of systems in order to bring about a specified improvement in one or more aspects of a social system.

This description of Planned Change allows for the intervention of external change agents as well as collaborative activity, incorporates the ideas of planned change aiming for improvement and of the change being brought about by manipulation of social processes and accommodates the possibility of modifying either individuals or systems, or both, as may be appropriate in a given situation. Later discussion of the roles of the various participants in the process of planned change will add to this definition (2.3).
2.2 Why Planned Change?

The concepts and methodology of Planned Change differ in several important respects from other scenarios for either studying or bringing about change. In this section therefore, I consider how and why the concept developed and in what circumstances its use is of value.

The concept of Planned Change is originally American, although it derives much of its base and methodology from work on attitude and behaviour change, innovation diffusion, learning theories, communication and persuasion which stem from European as well as American psychologists, sociologists and educators. Much of the methodology has been adopted elsewhere, including the U.K., within such disciplines as O & M and CPD (Continuing Professional Development).

Benne, Bennis and Chin (1976, pp 13-22) attribute the development of the concepts and methodology of Planned Change in America to two main factors; firstly American history from 1900, particularly the setting up, in the 1950's, of a "brains trust" of professors to initiate/formulate Government change programmes (part of the "New Deal"), and the emergence to a prominent position of civil rights and other liberation movements in the 1960's; Secondly, the effects of the Vietnam War in raising questions as to the efficacy as well as the desirability of using force and advanced technology to attempt to mould other societies who utilised human power, generated by belief in their cause, to effectively resist this force. They
have identified a reaction to this failure in the use of force, coupled with a reduction in the belief in technology as the panacea for all the ills of society as leading to a desire for "more collaborative, less destructive ways of managing desired changes."

Lippitt et al suggested that, "the natural dynamic processes of change do not occur fast enough to keep pace with the very rapidly changing conditions of our world today". (1958, p10)

and that therefore a deliberate effort to bring about change is required in order to speed up the process.

Implicit in most work on Planned Change is another use: to alter the direction of the natural process of change or to bring about a shift in the orientation of the status quo.

As stated earlier, Bennis et al (1976, p2) see Planned Change as the only feasible alternative to the other two counterposed methods of change: natural development and radical intervention.

Chin and Benne (1967, in Bennis et al 1976, p22) identify a further need for Planned Change - to assist the adaptation of human systems to the introduction of new technologies - thus the similarities with innovation diffusion.

Planned Change is seen by its proponents to be necessary in order to maximise the desirable qualities in societal life (and minimise undesirable qualities) and to assist human systems to adapt to new technologies and innovations and new goals.
In the present case, Planned Change is needed to bring about an increase in the Energy Efficient design of houses because the natural change towards this is not progressing fast enough to keep pace with society’s requirements for lower fuel bills, increased comfort and conservation of fossil fuels, all of which are felt to be desirable. The reasons why this movement is slow are explored in chapter 5 but can be briefly summarised as: the techniques and materials for achieving energy efficiency are either not yet within the normal repertoire of the building designers, or the use of them is not fully understood. In addition, there is a lack of appropriate procedures and of motivation to encourage energy efficient design.

Ethical questions arise throughout the field of planned change, not least the question of whether it is ethical to manipulate people in any manner, however benign, and for whatever purpose, however good this purpose is seen as being for society as a whole. This leads also to consideration of the ethics of manipulating people without their express permission and/or knowledge and as to who is qualified to decide which purposes are "good". Bennis et al (1976, p7) consider, from both an ethical and a practical viewpoint, that effective planned change relies on collaboration between the change agent and the individual/system to be changed. Warwick & Kellman, (1976, in Bennis, Benne, Chin and Corey, 1976, p470) in their discussion of ethical issues, suggest that ethical decisions should not be made arbitrarily in line with traditional values but that the conflicting values involved in the proposed change should be weighed
up so that an optimum balance can be achieved between, for example, the desire to preserve traditional culture against the need for modernisation.

In the present case, the desired change would involve intervention in the professional practice of building designers which could be seen as interfering with their personal freedom. However, this was felt to be relatively minor, in terms of their overall activity, and therefore of low personal impact (depending on suitable methodology being used) and had to be weighed against the perceived improvement in the quality of life for a considerably larger section of society.
2.3 Participants in the process of Planned Change

Three major groups of people are identified by most authors as being involved in the process of Planned Change:

- change agent
- change target/potential change adopter
- change client

The change agent or change agency is a person or group of persons (such as a social development agency, pressure group or government) who design and implement strategies in order to bring about a change in another person or group or society. The change agent may be a subdivision of the target system as in the case of OR professionals or R & D groups within a commercial organisation or may be totally separate as in the case of an agency like UNESCO working in the Third World.

The change target/potential change adopter may be an individual, group or society as a whole which the change agent is attempting to alter in some respect. The second label - potential change adopter - is preferred by most authors and is used from now on in this thesis as I feel that "change target" suggests too passive a role and also suggests a rather militant, dictatorial role for the change agent.

The change client plays the role of initiating the change process and is the individual or group who initially perceives the need for planned change and calls upon the expertise of the change agent to
meet this need. The client can be part of the change target system, such as a company manager who wishes to introduce a new stock control system, or the client may be the change agent/agency in that the need for change is first perceived by them and they then utilise their professional expertise to bring about the change. The third alternative is that the client is a separate entity from both the change agent and target systems, for example, where a group of council tenants employ an independent professional (change agent) to report on, say, structural faults on their estate, with the aim of changing the council (adopter) approach towards remedying these.

Many authors tend to focus on close collaboration between the change agent and the adopter system and assume the client to be a part of the adopter system. However, this view ignores the many and varied instances where a change agent is attempting to influence an adopter system which is highly resistant to the change and perceives no need for it.

The change client, potential change adopter and change agent are discussed further in 4.1, 4.2 and 4.3 respectively.

A number of authors also draw attention to another group in the planned change process - those whose influence will affect the process. They will include individuals or groups who interact with the potential change adopter and where elements of competition or pressure to conform may exert a strong influence on the change process, either facilitating it or making it difficult (or even impossible). Zaltman & Duncan (1977 pp 21,62-89) also identify
situational factors, including cultural values, social framework and organisational structure, as having influence on both the techniques to be used and the effectiveness of planned change programmes. The factors which must be considered in relation to planned change are similar to those relating to attitude change as set out by Kahle (1984) who sees the most viable approach as being a consideration of the interaction between persons and situations (including the social and physical environments). These "Influencers" are further described in 4.4.

In applying the concept of planned change to the present problem, I have identified a need for a further category to cover individuals or groups of individuals who may benefit from the change but are not directly involved in the process either in the roles of client or of adopter/target. This category would need to include those who benefit merely as a side effect of the change but, more importantly, those whom the change was intended to benefit. In this instance this would primarily be the group of householders who would benefit by improved thermal comfort and reduced fuel bills as well as society as a whole which benefits (in the long term) from conservation of fossil fuels. The primary group of beneficiaries (building occupants) have not, as a group, identified the need for change, nor have requested it and are not therefore the client.

Likewise, although some individual members of the group could be the adopters/targets of a planned change programme (so that they improved the energy efficiency of their own dwellings) they are not the potential adopters/targets of this study which is aimed at
designers. This fifth group is therefore distinct and will be termed the **Beneficiary** (or potential beneficiary) of the Planned Change. (see 4.5)
2.4 Towards Strategies for Planned Change

Planned change requires the development of one or more strategies (techniques/procedures) which will encourage the change to take place. However, before these strategies can be developed it is necessary to analyse (diagnose) the existing situation in depth in order to set the parameters within which the change agent has to operate and which will therefore define the types of strategy which can be employed in a particular case. Specific activities may then be designed within the overall strategy group and implementation commenced but modifications or radical alterations may need to be made after evaluation/experience of using them. There is much in the literature regarding stages or phases of change but most of this relates to the stages through which the change adopter passes and this is discussed more fully in chapter 7 (7.3). However, it is necessary to briefly consider this subject here in order to set the scene for the next few chapters.

Lippitt et al (1958) suggest seven stages through which the change agent needs to pass. These are:

1. Perception/Development of a need for change
2. Establishment of the change relationship
3. Diagnosis
4. Setting Goals/Objectives
5. Actual change efforts
6. Generalisation and Stabilisation of change
7. Achieving a terminal relationship
The first four of these stages are the ones which concern the change agent prior to implementation of the specific activities of the change programme. In my view, the change agent can pass through stages 1, 3 and 4 either independently or in collaboration with the Client/Potential Change Adopter. However, where these stages are carried out independently, Stage 2 - establishment of the change relationship - would have to follow later. For this particular case I, as the change agent, had to work independently and therefore would modify the order of these first four stages. In addition, I would add two further stages to cover what I see as discrete activities - the choice of appropriate change strategies and, the design of the specific elements and activities of the change programme. I would then include the establishment of a change relationship within the objectives and activities of the change programme.
My resultant eight stages for this specific project are:

1. Perception/Development of a need for change (see chapter 3)
2. Diagnosis (see chapter 5)
3. Setting goals and objectives (see chapter 6)
4. Choice of change strategies (see chapter 7)
5. Design of elements and activities of the change programme including establishment of the change relationship (see chapter 8)
6. Actual change efforts (including evaluation and modification by the change agent) (chapters 9 and 10).
7. Generalisation and stabilisation of change (chapter 10)
8. Achieving a terminal relationship (chapter 10)

Within each of these stages there are numerous factors/elements which have to pre-exist, be developed, be defined, taken into account, built upon or overcome. For the first five stages which I have identified as being mainly the domain of the change agent in this project, these factors can be organised into three categories:

A. Necessary conditions for embarking on a planned change process
B. Factors relating to Definition/Clarification/Diagnosis of the problem and the solution and, the setting of Goals and Objectives.
C. Factors affecting choice of change strategies and the design and development of the specific activities of the change programme.
Some factors/elements may be common to more than one of these categories, such as available resource or ethical considerations and many of the factors will be interrelated. Types of factors include the existing conditions - societal/environmental, organisational and personal, resources available and potential for further resource -both for the change agent and to support the change programme, the strategies and activities available - depending on ethics, resource, skills, time, etc. Figure 2.1 attempts to indicate graphically some of the interrelationships between these elements. Sources for this analysis include the literature on attitudes and attitude change, motivation, learning theory, persuasion and communication as well as planned change itself. And all the various factors suggested here are discussed in the following chapters.

Section A of Figure 2.1 suggests that there are several prerequisites for initiating a planned change programme. These are, that someone should perceive a problem or need and also that there is, or is likely to be, a solution to that problem or need. Additionally, that there is resource available to pursue the issue and that it is ethical to do so. In a number of cases, it is symptoms which are first identified, rather than the underlying problem so some diagnosis would be required to identify the problem. Once these requirements have been met (at this stage, by the change agent with the client or by the change agent alone) it is possible to progress to section B for Diagnosis and Setting of Goals and Objectives. In this stage, a large number of diverse factors come into play such as, the characteristics of organisations, of society
and of individuals. These factors also affect the stages in section C. Again, available (or acquirable) resources and ethical considerations also affect these decisions.

<table>
<thead>
<tr>
<th>Necessary conditions for embarking on planned Change Process</th>
<th>Factors relating to Definition/Classification of the Problem &amp; the Solution &amp; to the Setting of Goals and Objectives</th>
<th>Factors affecting choice of change strategies and activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource (for change agent, for solution, for process of change)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available Resource</td>
<td>Definition of Resource Required</td>
<td>Available or Acquirable Resource</td>
</tr>
<tr>
<td>Perception of symptoms of problem/need</td>
<td>Diagnosis</td>
<td></td>
</tr>
<tr>
<td>Definition of problem/need</td>
<td></td>
<td></td>
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<tr>
<td>Start Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perception of solution/remedy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition of problem/need</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set Goals &amp; Objectives</td>
<td></td>
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</tr>
</tbody>
</table>

Figure 2.1. Some relationships between factors and elements involved in the early stages of the Planned Change process
Chapter 3

Towards Energy Efficiency in Buildings:

The need for Planned Change; The scope of this study

In the previous chapter Planned Change was discussed in general terms whilst the need for Energy Efficient building was mentioned but without any justification of its desirability. Before proceeding with further discussion of the processes of Planned Change it is necessary to state briefly what energy efficiency is, why it is seen as desirable and also, why change was seen as necessary and how the concept of Planned Change may be appropriate in this context.

3.1 What is Energy Efficiency?

In general terms Energy Efficiency denotes the optimum use of fuel. In terms of buildings this means that the building structure itself and the services within it (heating systems, lighting etc) are so organised that the smallest possible proportion of the energy entering the building is wasted.

The degree of efficiency theoretically achievable is modified by factors such as cost-effectiveness, practicality, the health of the environment and the quality of life of the building occupants.
This study relates particularly to housing in the UK and an energy efficient house is taken to be one where:

(a) The fabric (structure) is highly resistant to the passage of heat,

(b) The rate of transference of heat to the outside air by means of ventilation is reduced to the minimum consistent with retaining an acceptable air quality - freshness, dispersal of odours and moisture, etc.,

(c) The space heating and water heating systems are the most efficient currently available.

(d) These standards are achieved at minimal extra cost and without compromises in aesthetics or lifestyle.

("house" is used as a generic term to also denote flat, bungalow maisonette, etc)

In practice this means that an Energy Efficient house will consume between 30% and 75% less fuel for space heating (depending on whether the house is an existing building which is rehabilitated or is newly built) than if it had been built to current UK Building Regulations thermal standards whilst providing equivalent, or better, thermal comfort.

A number of organisations, including my own (South London Consortium Energy Group (SLCEG) see 3.4), had, prior to the commencement of this study, designed and built both new housing and refurbishments
which had achieved such savings. The houses were found to be thermally comfortable and whilst a few of them appeared odd or futuristic in design the majority clearly showed that standard designs could be utilised. Likewise, it was not necessary for the occupants to adopt a different lifestyle in order to benefit from the design.

For example, six houses were designed by SLCEG and built, as part of a larger contract, as "low energy" houses utilising a standard timber frame construction but with some changes to the plan layout and with higher insulation levels and standards of airtightness plus maximisation of solar gain and an efficient heating system. These three-bedroom family houses were monitored and the average fuel cost for space heating for a year was found to be £71.36 (in 1982/3) whilst the average temperature maintained was 20°C. This indicated a 70% saving over a house of equivalent size/overall design but with insulation etc. only to the standard prescribed by the Building Regulations (Nos. 8 - 18 Wingfield Street, L.B.Southwark. see Appendix V, pp6&7).

The term "energy efficiency" has replaced "energy conservation" because the latter term was found to have connotations of frugality which were felt to be counter-productive to adoption of the concept.
3.2 Why Energy Efficiency?

It was stated above that Energy Efficiency denotes the optimum utilisation of fuel. The 2 main purposes of this are:

(a) to extend the supply of fossil fuels, which are a finite resource.

(b) To reduce the cost of fuel to the user (whether fossil fuels, nuclear energy or derived from "renewable" sources - solar, wind, wave, tidal, biomass etc).

There are additional benefits, both direct and indirect, to be gained from energy efficiency, for example:

c) Improved thermal comfort
d) Reduced atmospheric pollution
e) Reduced condensation problems
f) Money freed for other purposes

In the context of local authority housing, the major motivation is probably (b), to reduce the fuel cost to the user (whilst also improving comfort levels). The main reason for this can be summarised by the term, "Fuel Poverty" which denotes the circumstances where the least well-off families live in the homes which are hardest to heat and which are so poorly equipped in terms of heating systems that the choice of fuel is limited to the most expensive - electricity and calor gas.

The second main purpose of energy efficiency - to extend the fossil fuel supply - is more remote, more of a global issue and
consequently of less immediate interest to local authorities (although individuals within the authorities may be very interested). There are some political motivations in, for instance, reducing the demand for fuel and consequently strengthening the arguments against nuclear power. However, these political motivations may vary considerably according to local preoccupations. In South Wales for example, Energy Efficiency is seen by many as a direct threat to the coal industry and therefore their livelihoods.

Much could be written (and has been elsewhere) on this aspect of the subject, but for the present purpose it is sufficient to have briefly pointed out the main reasons why the efficient use of energy is generally accepted as socially desirable.
3.3 The Need for Planned Change

It can be stated with reasonable certainty that this society, as a whole, views Energy Efficiency as desirable. However, it can also be stated, with equal certainty, that Energy Efficiency is not being implemented on a wide scale or as a general rule. This is due to other factors which come into play and may include personal factors such as values, attitudes and beliefs, existing knowledge and previous experience, as well as situational factors such as the prevalent values, attitudes and beliefs within an individual's social groupings; the availability of appropriate techniques and materials and of knowledge about them; the resources available (time, money, tools) etc.

Each of these factors is discussed more fully later (see chapter 5) but for the present is should be stated that, whilst some of the conditions for implementation have been met, i.e. would indicate that energy efficiency will be implemented, others, which on a superficial level may appear to have been met, are in fact lacking. (See further discussion of the problem - chapter 5).

For example, whilst an individual may believe that Energy Efficiency is desirable, s/he may not have the necessary knowledge to implement an energy efficient design. Or, designers may have access to the necessary information but be resistant to change itself and therefore not start incorporating energy efficiency in their design.
The need for change in this field becomes clear when the following six points are analysed:

1. Energy Efficiency is socially desirable.

2. The techniques for achieving Energy Efficient dwellings exist (and are cost-effective).

3. There are very few Energy Efficient dwellings in the UK.

4. The rate at which the number of Energy Efficient dwellings is increasing is extremely slow.

5. There have been advertising campaigns regarding the benefits of Energy Efficiency measures and (minimal) incentives to install them (eg. loft insulation grants).

6. The level of Energy Efficiency which is currently achievable is far in advance of the requirements of the National Building Regulations (1985).

Taking a rationalistic view, points 1 and 2 together should result in a definitive movement towards Energy Efficient dwellings but point 3 indicates that there are still very few such buildings in existence. As stated in point 4 there is a movement, or change, but it is extremely slow. There is therefore a "status quo" (as Zaltman and Duncan defined it) of a very slow rate of change from inefficient to efficient use of energy in buildings. At the same time there are clear ideological arguments for the social desirability of energy efficiency plus the practical ability to
achieve it. This indicates that change is not only desirable but possible. Point 5 indicates the efforts that have been made to increase this rate of change but these have clearly not been sufficient. Likewise, (point 6) the Building Regulations lag far behind a requirement for real Energy Efficiency.

The scale of the problem can be seen if a comparison is made between the number of energy efficient dwellings which could be designed by my group (SLCEG) in a year - say 100 as a generous estimate - and the existing housing stock of the three member boroughs - around 150,000 dwellings. At that rate it would take us around 1,500 years before they were all energy efficient! However, each year some 5,000 to 15,000 of these dwellings have some major work carried out on them (including a small number which are replaced with new) so that there is a potential for installing energy efficiency measures in all of these, thus reaching the whole housing stock in ten to fifteen years.

This may be a somewhat simplistic expression of the need for change in this field but it shows that, if energy efficiency is to become widespread, within a reasonable period of time, then everyone involved in any work on buildings will need to play their part and this is where the change is required. This change has not been brought about by previous efforts such as the exhortations of the "Save-It" campaign or by the example of the (few) existing energy efficient designs. Therefore, an alternative approach is needed to speed up the rate of change towards Energy Efficient dwellings.
Planned Change is an appropriate approach for this for a number of reasons. Firstly, because it is a problem solving, diagnostic approach and is concerned with the whole range of personal, situational and institutional factors which may, individually or through their interaction, act for or against the desired change. Planned Change is also broad-based rather than being restricted to, say, changing attitudes or providing motivation. As has frequently been demonstrated, (Kahle, 1984; Insko, 1967) the latter approaches may not result in the corresponding behaviour change, due to interaction with other factors (see chapter 5).

The concept of Planned Change also incorporates the facility to use multiple strategies and to use different strategies with different (related) groups and/or at different times. (see chapter 7).
3.4 The Background to and Scope of this Study

This study considers the concept of Planned Change and its application for a specific purpose, namely, to increase the rate at which Energy Efficient dwellings are designed and built with the consequent benefits for individuals and society (see 3.2).

I am a member of the South London Consortium Energy Group (SLCEG) - an R + D group which serves 3 South London Local Authorities (Lambeth, Lewisham and Southwark) who together own some 150,000 dwellings which they replace, refurbish or add to at the rate of between 5,000 and 15,000 per year. The SLCEG had researched, developed and "proved" Energy Efficient housing over a number of years, but found that this was not adopted to any great extent in the 3 authorities and therefore perceived the need to find techniques to encourage a change to take place. The opportunity to do so arose when the SLCEG obtained grants (from the UK Dept of Energy and from the EEC) for a Demonstration Project - to "demonstrate" Energy Efficient housing (both rehabilitated and new-build). This Demonstration Project (described in Chapter 8) provided both the focal point and the basic resources to implement a programme of Planned Change.

The scope of this study is therefore the development, implementation and evaluation of a programme of Planned Change aimed at significantly increasing the proportion of Energy Efficient dwellings within 3 London Boroughs.
However, access to the Demonstration Project was open to anybody so that, although the full programme was addressed to the 3 boroughs, parts of it had also to be addressed to a wider audience (target) - especially as this was the purpose so far as the funding bodies were concerned.

It should be noted here that both the UK Dept. of Energy (1979) and the EEC (1979), when inviting applications for Demonstration projects, did not envisage the demonstration aspect in quite the same way that we did, although their purpose was broadly similar. They had (separately) identified that the carrying out of field trials followed by the publication of a report, with limited circulation, was not resulting in widespread replication of energy saving techniques. They further identified that one reason might be lack of conviction that a technique was commercially viable in a "normal" situation as opposed to a field trial or laboratory test. They therefore proposed to fund such innovations (to the tune of 25% and 40% respectively) to encourage their use, but also to monitor their effectiveness in detail and disseminate the results more widely and to specific audiences. One drawback, particularly to the UK scheme, was that it was designed for commercial/industrial applications (eg. more efficient plant and processes) and was not as directly applicable to buildings.

However, when the SLCEG put forward proposals to incorporate a Demonstration Suite in our proposed project we were able to persuade these funding bodies that this would enhance the project by allowing for direct experience of the energy efficient buildings, so that
they approved funding specifically for this aspect of the project as well as the normal aspects of monitoring and reporting.

Diagnosis of the problem (see chapter 5) led to a multifaceted programme of Planned Change of which the Demonstration project and Suite were only part, albeit the most vital in that they provided the framework and focus for most of the other activities and also aided the credibility of the SLCEG in our change agent role (see chapters 4 and 6).
Chapter 4.

The participants in the process of Planned Change.

The Planned Change process involves a number of participants who are divided into categories for ease of definition although members of one category may also be members of another, either simultaneously or consecutively.

The three categories generally delineated by authors in this field are:

- Change Client
- Potential Change Adopter/Change Target
- Change Agent

Another category described but less formally defined is one I have termed, "Influencers" and a new, fifth category, the Beneficiary, has already been defined in Chapter 2.

The roles and characteristics of each of these categories of participants, as described in the literature of planned change, will be considered in detail in sections 4.1 to 4.5 below. The characteristics of each group as they relate to the present study will also be discussed later, in the context of diagnosis of the problem. (Chapter 5)
4.1 The Change Client

Whereas Lippitt et al (1958, pp71-89) identified the Client completely with the Target/Adopter, other authors (eg Zaltman & Duncan, 1977) separated these roles thus allowing for the Change Client role to be played by a separate entity, a part of the adopter system or even the Change Agent, as well as being synonymous with the adopter system. Despite these differences in delineation between Client and Adopter there is a good agreement on the role of each.

The Client is an individual (or group) who perceives that there is a need for change and seeks help to meet this need. He may or may not have accurately defined the problem but merely be aware that there is one and he may hope or suspect that there is a solution without knowing its nature. Alternatively, he may have identified the problem and the solution but lacks either the knowledge, experience or resource to implement the change. For any one or more of these reasons he decides to call on the help of a professional (a Change Agent) to devise and implement a change programme.

4.1.1 Motivation to Seek Change

Lippitt et al (1958, p71) considered the motivational forces acting on the Client. They divided these into two categories:

- Initial forces towards change
- Emergent forces towards change
Initial forces are those which cause the Client to seek help in the beginning and four types were described. The first being dissatisfaction with the current situation and a consequent search for improvement such as where an organisation seeks to improve its efficiency. The second is the perception that there is a discrepancy between what exists and what is possible. A third type of motivation is brought about by external pressure – competition or expectations of certain behaviour or standards. The fourth type of motivation is described as an "internal requiredness" i.e. that some force within an individual causes him to seek change.

In the present case, the change agent (SLCEG) acted in the client role in the early stages, in identifying that there was a problem and seeking a solution. In this role, the initial motivating forces fell within the first two categories, i.e. dissatisfaction with the lack of energy efficient buildings and, perception that there was a discrepancy between that status quo and the practical possibilities for energy efficient design. Later in the process, these same motivations came into play for some key parts of the adopter system, chiefly Councillors, when they took over this Client role.

Emergent Forces are those which develop as a result of the first steps in the Change process. One such emergent force is the need to complete a task/process which has been begun. A second arises as a result of the developing relationship between the change agent and the client - the client system learns that the change agent expects certain actions from it and this creates a force for change whose intensity is relative to the esteem in which the client holds the
change agent. (If the change relationship is developing negatively however, the force created will be a resistance force rather than a change force.)

Once Councillors and Chief Officers had adopted the Client role in the Planned Change process, the main emergent force acting on them was the desire to complete the process.

Thirdly, the change process may produce qualitative changes in part(s) of the adopter system which then permit or require adaptive change throughout the rest of the system. This interdependence between sub-parts of the system can also cause resistance forces to be set up - readiness for change in one sub-part may be negated by unwillingness or inability of other, interdependent, parts to change. These questions, of resistance to change and the effects of interdependent sub-parts are really applicable to the change adopter role rather than the client role and are discussed further in the next section (4.2).
4.2 The Potential Change Adopter/Change Target

Both the above terms are used in the literature but I feel the first is preferable as the second suggests an attitude towards the potential adopter which is at variance with the basic tenets of the Planned Change concept - that the change agent plays a helping role, is sympathetic towards the problems and needs of the adopter, that the change programme is designed to avoid the use of coercion, etc.

The potential change adopter may be an individual, a group, an organisation or society as a whole. Where the adopter is a system, the individuals who make up the system must be considered as well as the system as a whole. A system may also have a number of subparts whose functions (or location) differ but which are interrelated and interdependent. The Adopter system may also be, or include, the Client and may include the Change Agent or part or all of the change agent team. The Adopter system may also be the Beneficiary of the Planned Change but the Beneficiary may be some other individual or system.

An individual as the potential change adopter is a special case - of relevance primarily in psychotherapy and in self-awareness and self-development programmes - and is not considered here as this study is concerned with organisations and groups and with individuals as components of these systems.

The change agent has to carefully study the characteristics of the potential adopter system in order to first diagnose the problem,
then to develop appropriate goals and objectives, devise a relevant change programme, recognise and guide the phases of change and make provision for the change to be maintained. It may appear obvious to state this and to stress that the adopter system is the most critical participant in the change process but it is possible for change agents to become so involved in their own role and the activities of the change programme that the adopter system, as an entity in its own right, is correspondingly reduced in importance in the perception of the change agent. This may lead to failure of the programme as the objectives, activities and procedures proposed may then be inappropriate and there will be an unsatisfactory relationship between the change agent and the adopter system.

The characteristics of Individuals are considered first (4.2.1) followed by Organisations (4.2.2.)

4.2.1 Individuals as Potential Change Adopters

As suggested above, individuals as potential change adopters fall into two categories. This study is not concerned with the first group, those who are seeking change, or for whom change is sought, on a purely individual basis as in therapy situations, personal development courses etc., but is concerned with individuals who are seeking change or exposed to change efforts in relation to their membership of a group or organisation. Although, the characteristics and motivations to be considered are similar for either case.
Consideration of the characteristics of individuals within the change adopter system also affects the types of activities to be included in the change programme. For example, if a large number of the individuals concerned (or a small number if they are key personnel) are known to hold values, attitudes or beliefs in direct opposition to the goals or even to the procedures of the proposed change it could be necessary to take steps to attempt to modify these before proceeding further with the change programme, (or as an integral part of the programme.) If it is not possible to modify them, specific strategies may be required to counteract them.

In addition to values, attitudes and beliefs a number of other characteristics come into play such as; needs, life-position, openness to change, perception of the problem, existing knowledge and skills. Each of these factors is discussed below. A combination of these factors also contributes to deciding the time which an individual may take to adopt the change - ie. whether he/she is a potential early-adopter or late-adopter.

4.2.1.1 Values

Values are defined as, "...an enduring belief that a specific mode of conduct or end state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence." (Rokeach, 1973, quoted in Reich and Adcock, 1976, p.18)

Rokeach's value lists include such items as Freedom, Equality, Wisdom, An Exciting Life, Inner Harmony (Terminal/End values) and
Ambitious, Imaginative, Logical, Polite, Self-controlled

(Instrumental values/Mode of conduct). The values which individuals rate most highly are related to their attitudes and beliefs though there is some doubt as to whether values influence attitudes or vice-versa. Values are less specific than attitudes and are either held or not - they cannot be held to some extent. However, some values can be rated as more important than others and are used as standards which we try to attain in our own behaviour and against which we measure the behaviour of others.

A single value is likely to have a number of attitudes associated with it but does not necessarily result in the logically appropriate behaviour. Neuman (1986) surveyed 376 households and found that there was only a very weak relationship between actual behaviour and values which could have been expected to exert a strong influence on commitment to and behaviour in respect of energy conservation. He therefore concluded that, conversely, personal values would not be a significant obstacle to energy conservation. (He further suggests, as a result of this work, that governmental promotion of energy conservation should focus on providing resources and services (ie. facilitative strategies) rather than appealing to values.

However, I have found instances where values appear to have been the root of considerable resistance to Energy Efficiency activities - in the specific context of local authority housing: Certain individuals appear to value Equality rather lowly (or not at all) and have a deeply entrenched negative orientation towards local authority
tenants which appears as an unwillingness to provide more in their housing than the very basic amenities. Within this framework the concept of Energy Efficiency is seen as an add-on luxury and therefore inappropriate. This may be overcome by appealing to some other value which these individuals hold (and rate more highly) or by creating an environment in which Energy Efficiency is the norm, in which case other factors may cause them to change their behaviour in order to conform.

4.2.1.2 Attitudes

There is a wealth of theory and research on attitudes and the relationship between attitude change and behaviour change. Some consensus has been reached on a definition of attitudes which can be summarised as; Attitudes have three components: cognitive, affective and behavioural and, are a predisposition or tendency to act in a certain way towards an object - idea, person(s) or thing;

The cognitive component is one or more beliefs about the object, the affective/emotional component is a liking/disliking of the object and the behavioural component includes the actions which the individual is predisposed to use as a result of the other two components.

Early theories of attitude change (Osgood's Congruity Model(1957), Heider's Balance Model(1958), Festinger's Cognitive Dissonance Theory(1957)) assumed behavior change to be consequent on attitude change. Others (Classical Conditioning Theory and Skinner's Operant Conditioning) were later seen to involve the shaping of behaviour
alone and not changing attitudes. (unless one reverts to the very early use of the word to describe bodily posture and stereotypic motoric responses (Darwin, 1872))

Kahle (1984, p35) states that, "most of the theories ..... probably are partially right, probably capture part, but not all, of how attitudes change. Assuming that attitude change is complicated and multiply-determined seems highly justified at this point in time ..." and points to the interaction of situational and personal variables both in influencing attitudes and in determining behaviour - as experimental work has shown, attitudes do not always result in related behaviour (and likewise, attitude change does not always lead to behaviour change) due to other factors such as lack of skill or opportunity for the behaviour or social pressure to act in an alternative manner.

4.2.1.3 Beliefs

Beliefs are the cognitive component of attitudes - the beliefs that an individual holds about an object contribute to the formation of their attitude towards it. For example, if one believes that someone is physically strong and also likes physical strength (the affective component), a positive attitude towards the strong person will be developed. In relation to energy efficiency in buildings there are many beliefs which may be held.
The following example belief statements have been made to me by individuals involved in the building process:

- that energy conservation measures are very costly to install.
- that energy conservation measures are effective.
- that energy conservation measures can improve the occupants' comfort.
- that energy conservation measures can increase the risk of condensation.

The converse of each of these beliefs may also be held. In general, an individual's beliefs about an object are related to each other and therefore lead to a clear attitude to the object. However, where an individual holds, for example, a number of negatively oriented beliefs, leading to a negative attitude, and is then brought to believe that there are some positive aspects to the object then dissonance is set up and the individual must either modify his/her attitude (and other beliefs) or find a way to discount (or ignore) the dissonant belief.

During the course of this study it has become apparent that some of the (erroneous) beliefs held by individuals about energy efficiency may be one of the stumbling blocks to its implementation - that whilst the most common attitude is that energy efficiency is desirable, some beliefs, such as that the measures are too expensive or may cause other problems, prevent the appropriate behaviour being implemented. Many of the questionnaires completed by visitors to
the Demonstration Suite (see chapter 9) indicated that such beliefs
had been held, and had been modified by exposure to the exhibition,
seminars etc. Likewise, discussions with individuals have shown
that a belief - particularly that energy efficiency measures are
expensive - can be a barrier to action and that when it has been
clearly demonstrated that, for example, spending £100 per dwelling
on draught proofing (0.3% of the total building cost) can result in
savings of 30% of the fuel bill (say, £100 p.a.) and improved
comfort for the occupants, the individual is likely to then act to
include energy efficiency measures.

4.2.1.4 Needs

The needs of individuals are one of the main motivating factors for
them to follow a particular course of action. They may have a need
for power, for money, for self-respect, for acknowledgement by
others, for job satisfaction, independence etc. They will be
inclined to behave in the way that appears to meet their strongest
needs and therefore, if a change in behaviour is desired it should
ideally be presented as being able to meet the appropriate needs, at
least as successfully as the existing behaviour.

4.2.1.5. Life Position

This is another factor which is felt by some to influence the
likelihood of an individual changing his/her behaviour. It refers
to a conglomerate of factors such as geographical location, age,
marital status etc.
4.2.1.6 Openness to Change

Individuals may be more or less open to change depending on their motivation to change, previous experiences of changing and beliefs as to the practicalities/benefits of the proposed change. Most individuals (as well as groups, institutions, society) appear to be naturally resistant to change and this resistance can be enhanced by bad previous experience of change, or can be reduced by positive previous experiences. This resistance can also be overcome by strong enough motivation to change, whether this stems from forces/needs within the individual or from external forces.

Some researchers have attempted to classify individuals in terms of the speed at which they are likely to adopt a change/innovation as it appears that, after exposure to the change/innovation, a few individuals will adopt it very quickly and are classed as innovators, some others are very late in adopting and are classed as laggards and the majority are between the two. Some authors have made further distinctions but the reasons why an individual may fall into a particular group are not yet fully understood. (Zaltman and Duncan, 1977,p.228)

4.2.1.7 Perception

Perception of both the need for change and the practical possibility for change is required before the change is adopted. The change agent may need to demonstrate the need for change to members of either the client system or the potential adopter system or both, or the need may have been recognised but the means of meeting it may
not have been perceived. Zaltman and Duncan (1977, p. 228) point out that the change agent should take care not to impose his perceptions on the potential adopter but to discover their existing perceptions and, if necessary, work to modify them.

4.2.1.8 Existing Knowledge and Skills

The existing knowledge and skills of the individuals within the potential adopter system need to be explored when a change is proposed as they may not have the necessary knowledge or skill to implement the change even if they are motivated to do so. If attempts are made to introduce the change without ensuring that the potential adopter system is equipped to implement it, the change cannot be adopted and the exercise will fail. This will also build up a history of failure which will add to resistance to future change efforts. Therefore, if the individuals are found to have insufficient knowledge or skill to implement the proposed change, some training programme must be devised to provide this and/or the change programme must be modified so that this lack does not result in failure of the programme. In the present study, two complementary methods of dealing with this problem were devised: exhibitions and seminars were set up to enhance the knowledge of individuals about energy efficiency and at the same time, the change agency (SLCEG) has provided a consultancy service to assist the individuals in implementing energy efficient designs, with detailed explanations of the reasoning behind each suggested measure and detailed calculations of costs, effectiveness and payback periods, whilst leaving the final decision-making to the designer. Thus
there is an on-going educational process at the same time as the change is being adopted.

Some of the relevant characteristics of individuals within the potential change adopter system have been discussed above. The following section (4.2.2) describes characteristics of organisations as potential change adopter systems.

4.2.2 Organisations

In considering the characteristics of organisations which may affect the process of planned change, Zaltman and Duncan (1977, pp248-280) consider the Environment of the Organisation, the Characteristics of the organisation in terms of Complexity, Formalisation and Centralisation and, Factors which affect the organisation’s Capacity to Change such as, conflict between sub-parts, interpersonal relations, the ability of the organisation to change its structure for different stages of the change process and to institutionalise the change.

4.2.2.1 The Environment of the organisation

This includes all the physical and social factors which affect the change-adoption processes of individuals within it and is made up of both the Internal environment - the various sub-groups/departments and personnel - and the External environment - groups /individuals with whom the organisation interacts.
Zaltman and Duncan (1977, p.251) present a list of possible components of an organisation's internal and external environments:

<table>
<thead>
<tr>
<th>Internal Environment</th>
<th>External Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational Personnel Component</strong></td>
<td><strong>Customer Component</strong></td>
</tr>
<tr>
<td>A. Educational and technological background and skills</td>
<td>A. Distributors of product or service</td>
</tr>
<tr>
<td>B. Previous technological and managerial skill</td>
<td>B. Actual users of product or service</td>
</tr>
<tr>
<td>C. Individual member's involvement and commitment to attaining system's goals</td>
<td>Suppliers Component</td>
</tr>
<tr>
<td>D. Interpersonal behavior styles</td>
<td>A. New materials suppliers</td>
</tr>
<tr>
<td>E. Availability of manpower for utilization within the system</td>
<td>B. Equipment suppliers</td>
</tr>
<tr>
<td><strong>Organizational Functional and Staff Units Component</strong></td>
<td>C. Product parts suppliers</td>
</tr>
<tr>
<td>A. Technological characteristics of organizational units</td>
<td>D. Labor supply</td>
</tr>
<tr>
<td>B. Interdependence of organizational units in carrying out their objectives</td>
<td><strong>Competitor Component</strong></td>
</tr>
<tr>
<td>C. Intrastit conflict among organizational functional and staff units</td>
<td>A. Competitors for suppliers</td>
</tr>
<tr>
<td>D. Interunit conflict among organizational functional and staff units</td>
<td>B. Competitors for customers</td>
</tr>
<tr>
<td><strong>Organizational Level Component</strong></td>
<td><strong>Socio-political Component</strong></td>
</tr>
<tr>
<td>A. Organizational objectives and goals</td>
<td>A. Government regulatory control over the industry</td>
</tr>
<tr>
<td>B. Integrative process integrating individuals and groups into contributing maximally to attaining organizational goals</td>
<td>B. Public political attitude toward industry and its particular product</td>
</tr>
<tr>
<td>C. Nature of the organization's product service</td>
<td>C. Relationship with trade unions with jurisdiction in the organization</td>
</tr>
<tr>
<td><strong>Technological Component</strong></td>
<td><strong>Technological Component</strong></td>
</tr>
<tr>
<td>A. Meeting new technological requirements of own industry and related industries in production of product or service</td>
<td>A. Meeting new technological requirements of own industry and related industries in production of product or service</td>
</tr>
<tr>
<td>B. Improving and developing new products by implementing new technological advances in the industry</td>
<td><strong>Technological Component</strong></td>
</tr>
</tbody>
</table>

Although this list obviously relates to an industrial or commercial organisation, many equivalent components can be found in the Local Authority situation being considered here. For example, for local authority housing, the "Customer" component of the external environment would incorporate:

A. Housing Management staff including Estates Officers, Caretakers etc.

B. Tenants

On the other hand, at least until very recently, the "Competitor" component would not have been relevant but the 1987 Housing Act has introduced this element by providing for the sale of council housing to other landlords thus requiring the councils to be seen to provide a superior service.
Certainly the socio-political component is of great importance as there are widely differing orientations towards local authority housing both between political parties and socio-economic groups. Throughout the course of this study, there was a Central Government (Conservative-Thatcherite) stance to encourage private ownership and reduce public housing, with associated reductions in funding for public housing. At the same time, the local authorities concerned were Labour-controlled, with the opposite aim of providing high quality public housing for an increased number of people.

The Environment may affect the change process in two ways - either to initiate the change process (for example when external pressure for change causes the organisation to perceive the need for change) or by reacting to the change - either supporting it or resisting it. Where the impetus for change comes from the external environment, individuals in the organisation may feel coerced and therefore resist the change.

If the environment of the organisation is complex, with many demands for change on the organisation, it may respond only to whichever demand is strongest. There may be conflicting pressures for change requiring the organisation to choose which to meet at any given time or to be able to achieve compromise solutions.

4.2.2.2 Characteristics of the Organisation: Complexity, Formalisation and Centralisation

Zaltman and Duncan (1977,p261) suggest that the more complex an organisation - in terms of diversity of occupations, professions and
job structures - the more likely it is to have more internal pressures for change, but less likely to be able to implement change because of conflicting needs of different, equally authoritative, members. This certainly seems to pertain in local authorities where departmentalisation and competition for resources exacerbate the problems. In some cases the change agent may be able to alter the effective complexity of the organisation - by, for example, setting up an inter-professional group in the initial stages to generate new ideas and later concentrating on team-building exercises to de-emphasise the complexity of the normal working relationships.

Formalisation describes the emphasis the organisation places on performing jobs in accordance with specific rules and procedures. Rigid rules and procedures are likely to inhibit perception of a need for change and may also become constraints upon the change process. On the other hand, during the implementation of a change, formalised procedures may be very necessary in order to clarify to the individuals concerned the techniques and procedures to be used and, that these do not conflict with other, established, procedures.

Centralisation concerns the locus of authority and control within the organisation. Highly centralised organisations are likely to perceive less need for change, partly because feedback has to travel through a strict hierarchy and ideas for change may be screened out if they are contrary to the needs of any of the individuals or groups on the way. Greater participation in decision making processes can increase proposals for, and receptivity to, change. However, when the change is being implemented, a clear
hierarchy of authority and responsibility is needed to overcome the problems inherent in influencing a number of semi-autonomous sub-groups who may have widely varying priorities.

4.2.2.3 Capacity to Stimulate and Implement Change

Having concluded that the organisation should, ideally, be complex, less formal and decentralised in order to stimulate change, and more formal and centralised but less complex to implement change, Zaltman and Duncan (1977, pp 267-272) suggest that the change agent should encourage the organisation to "switch" its structure between these two stages. In order to do this, they found that the organisation needs four capabilities which may need to be developed by the change agent if they do not already exist:

A. The ability to deal with conflict
B. The ability to maintain effective interpersonal relations.
C. The ability to create adequate switching rules for utilizing different structures.
D. The ability to institutionalise the dual organisational structure changes.

A. Conflict may occur within the organisation as a result of the change being initiated by one sub-group whereas the implementation is to be by others (as in a manufacturing organisation where a change in process is initiated and developed by an R & D group but has to be implemented by the shop-floor personnel). The
time-horizons, goals, procedures etc of the second group may be very
different to those of the first.

Lippitt et al (1958, pp77-89) point out that interdependence between
various sub-parts of the adopter system has many implications for
the change process and that this interdependence can create both
forces for change and resistance. They described various mechanisms
that operate:

1. Expectations held by one person or group about the
behaviour of another are an important determinant of behaviour
so that, if one group is ready to change their behaviour but
the expectations of their interdependent group(s) have not
changed, the behaviour change is unlikely to take place, or
will quickly revert to the status quo. It is therefore
important to address the expectations of interdependent groups
as well as initiating changed behaviour in the primary adopter
group.

2. Simultaneous satisfaction of different needs - where an
adopter system has a number of sub-parts and all are required
to implement the change (or some components of it) it is
necessary that each sub-part sees the change as meeting at
least some of its own needs which may be entirely different to
those of another sub-part. For example, one part of an
organisation might see the introduction of a computerised
accounting system as enabling it to fulfil a need to do its job
more efficiently whilst another found its need for power
satisfied by having readily available information for
decision-making but another group might find its jobs made less
interesting and therefore the need for job satisfaction
unfulfilled - in which case this group would be in conflict
with the others and resist the change.

It is therefore clear that the change agent should include in the
change programme elements which will satisfy different needs in the
various sub-parts and to ensure that these benefits are drawn to the
attention of the appropriate groups.

A similar potential problem exists with each individual in the
adopter system in terms of their various attitudes, beliefs, values
and needs. One individual may accept a change because it meets
his/her need for job satisfaction, another because it will bring an
enhanced salary and another because the objectives fit his/her value
orientation. Similar reasons can result in resistance and again, the
change agent may need to ensure that the change programme can meet
many different needs and is seen to do so.

In addition to attempting to minimise/avoid conflict as suggested
above, the organisation may need to develop methods of dealing
positively with conflict when it does arise. Zaltman and Duncan
(1977, p.269) suggest that of the various strategies available,
confrontation is often the most effective as it legitimises the
conflict and then provides a framework for resolving it. This
process frequently requires the change agent (or another individual)
to liaise between the conflicting groups.
B. Maintaining effective interpersonal relations.

When the impetus for change comes from one sub-group and then other sub-groups are expected to implement the change, it is vital that each party is able to communicate its enthusiasms, aims, concerns and reservations to the other. If this cannot happen then there is likely to be a build-up of resistance to the proposed change. Zaltman and Duncan (1977,p270) suggest that the change agent may need to provide training for personnel in dealing with interpersonal issues and/or to initiate team-building activities to assist in dealing with them.

C. Switching rules for differentiating the structure.

Zaltman and Duncan (p.270) propose three rules for deciding the importance of altering the structure between the initiation and implementation stages:

1. The greater the need for change, the more the organisation needs to differentiate the structure between the two stages.

2. The greater the uncertainty associated with the change situation, the more the organisation needs to differentiate its structure between the two stages.

3. The more radical the change, the more the organisation needs to differentiate its structure between the two stages.
D. Institutionalising this dual organisational structure

By this, Zaltman and Duncan mean the integration of the two structure styles and the switching procedures into the organisations' ongoing activities so that it is seen by members of the organisation as legitimate and as the best way to deal with change. To achieve this, the top level decision makers and managers must support the process both by their own behaviour and their expectations of others' roles so that a climate is developed in the organisation which supports this process.

I would suggest that, although Zaltman and Duncan discuss this differentiation of structure as if it pertains to the total structure of the organisation, it may be appropriate, as well as easier, to utilise the differentiated structures in a more restricted manner - focusing only on the areas which are related to the particular change situation. For example, in relation to the present study, it is conceivable that, in the initiation stage, special activities can be set up to provide less formal, de-centralised situations for information exchange on the particular subject of implementation of Energy Efficiency - workshops, seminars, detailed discussions between the change agent and various levels of personnel, the introduction of inter-divisional working parties, etc., without altering the basic overall structure of the local authority which tends towards formality, centralisation and simplicity.
Then, at the implementation stage, the normal structure can be allowed to reassert itself. This was in fact done, to some extent, in one of the three authorities, where the top management have sympathy with this type of activity - the other two authorities were more rigid, with less interrelationship between departments and a weaker overall leadership (at least on this issue) so that the basic organisational structure was highly resistant to switching.

The organisational structure of local authorities (and their sub-parts) as it relates to this study, is considered further in chapter 5.
4.3 The Change Agent

Both Lippitt et al (1958, pp91-126) and Zaltman and Duncan (1977, pp186-224) draw on the reported experiences of Change Agents themselves to describe their role and characteristics and deduce the qualifications needed for a successful Change Agent. (Zaltman and Duncan say that they found little research work on this aspect of the subject.)

This section first attempts to define a Change Agent and to outline the role of a Change Agent (4.3.1). This is followed by more detailed consideration of the various aspects of the change agent's role, i.e. defining the problem, selecting the change objectives, choosing the appropriate helping role, establishing and developing the change relationship, selection of change strategies and design of change activities, recognising and guiding the phases of change and maintaining the change (4.3.1.1 to 4.3.1.8).

Section 4.3.2 deals with the motivations of change agents and the characteristics needed for success.

4.3.1. What is a Change Agent?

Zaltman and Duncan (1977, p186) take, "a broad view of the Change Agent, to include both individuals within and outside the client system who are attempting to create change in that system, whether it is sanctioned or not." There are some difficulties with this description in that it implies that the client is synonymous with the change adopter - if this is so, surely the change (or at least
the idea of change) must have been sanctioned by the client (as previously described (4.1), the client is the individual/group who asks for help from the Change Agent in the first place.) This description also appears to limit the Change Agent to individuals but their later discussion considers Change Agent groups/teams as well and they also differentiate between internal (i.e. part of the client and/or adopter system) and external Change Agents and also between homophilous and heterophilous Change Agents. This last comparison focuses on the relationship between Change Agent and client/adopter system and how similar (homophilous) the latter sees the attitudes, beliefs etc. of the Change Agent to be to their own.

Franklin (1969) has identified some "...common characteristics of change agents...":

a. They are trying to use themselves and their skills as intervenors to foster intentional change within a social or natural environment.

b. They are seldom in positions of power, but depend on "influence" (knowledge, persuasion, personal interaction, charisma, experience, diagnostic skills) to effect change.

c. They customarily get paid for their efforts.

The third point is open to some disagreement as it severely limits the variety of individuals or groups who could be termed change agents by precluding all voluntary work and also the charismatic individuals such as Martin Luther King.
Benne (1976) describes change agents as, "social practitioners and action leaders" and compares their cognitive worlds with those of behavioural scientists who, "deal with theories, generalisations and abstractions from reality" whereas practitioners deal with realities, individual cases and situations and operate in real time. The various aspects of the cognitive worlds of change agents which Benne puts forward can be summarised as:

Change agents are concerned with helping to improve particular cases, situations or practical problems. They are committed to certain values and use data to serve these values. They work in "field" settings where multiple interacting variables are at work and they need to understand their effect on the situation and susceptibility to manipulation.

He further suggests that change agents tend to use an holistic, intuitive understanding of the situation which is frequently necessary in order to act within the realtime situation - perhaps a justification for the lack of importance often given to diagnostic techniques.

From study of various descriptions of the Change Agent’s role and behaviour it is clear that a Change Agent may be:

(a) An individual or a group/team (then termed a change agency)
(b) Part of the client system,
    part of the adopter system
    or a separate entity
In any combination of these, the Change Agent role is similar and, in very simple terms, may be expressed as being: to define the problem or need, select change objectives, select an appropriate role for himself, establish the change relationship, design strategies for bringing about and maintaining change, deal with resistance to change and recognise and guide the phases of change.

Kotler (1973, pp175-178) looks at change agents from a slightly different perspective, starting with a very broad definition of a change agency as, "...an organisation whose primary mission is to advance a social cause...(and)...might be an informal group,...a formal organisation...or a political unit..." and that those who "...serve in some relationship to the change agency can be called change agents." Kotler goes on to classify change agent roles within two overall groups - leaders and supporters. In the leaders group are included directors, advocates, backers, technicians, administrators and organisers. The supporters group includes workers, donors and sympathisers.

Considering the present case in Kotler's terms, the Cause would be the improvement of energy efficiency in homes and the change agency, the SLCEG, would be a formal organisation. Within the SLCEG it is possible to identify some of the change agent roles, most being shared amongst us in varying proportions at various times. The backers are the three councils who support/own SLCEG (plus the Dept. of Energy and the EEC to the extent that they funded particular projects). So far as the supporters group is concerned, the cause of energy efficiency certainly has supporters nationally (or
internationally) but none could be specifically identified for this specific initiative.

Zaltman and Duncan differentiate between Change Agents and "non-agents" of change - those who can bring about change but without a conscious, planned effort (e.g. opinion leaders and innovators). The term Change Agents then refers to conscious intervenors in situations or processes with the intent to bring about socially desirable change.

In the following discussion of the various aspects of the Change Agent's role it will become clear that Change Agents themselves need to have specific characteristics and to develop special skills in order to be successful. These are considered in the subsequent section.

4.3.1.1 Defining the problem

Lippitt et al identify two questions which need to be asked by Change Agents in order to diagnose the problem:

"What is the trouble?" and

"What is causing the trouble?"

They state that, as well as different approaches to answering these questions, there is a wide difference in the degree to which Change Agents formalise the diagnostic process.
Zaltman and Duncan (1977, p.215) suggest that it is necessary to collect information from a sample (not just one or two) of the client and/or adopter system members concerning their perception of five factors:

a. The change issues
b. The need for change in the system
c. The openness to change in the system
d. The resources available for change
e. The commitment of members of the system to the change process.

They feel that, because of the importance of communication at the diagnostic stage, homophilous Change Agents have an advantage, except that the client is also looking for expert help and therefore care is needed that the Change Agent's expertise is not hidden by his effort to identify with the client/adopter system. Team Change Agents have a definite advantage over individuals at this stage as division of labour can result in gathering of more data but there are equal advantages for internal and external Change Agents.

Careful diagnosis of the problem is essential whether it be carried out by the Change Agent alone or in cooperation with the client and/or adopter system. Without an accurate diagnosis fundamental errors may be built into the Planned Change programme. This is likely not only to lead to a wrong result but also, consequently, inhibit future change programmes. Also, the Change Agent needs a detailed picture of the overall existing situation before he can design the change programme and the diagnostic process will
inevitably furnish at least some of this knowledge as well as highlighting potential difficulties which may arise during the change process.

There are a number of models or frameworks which can be used for diagnosis of the problem. Zaltman and Duncan (1977) suggest the use of the "Metatheory perspective" and/or the "Open Systems Perspective".

Briefly, the Metatheory perspective looks at the problem in terms of symptoms, causes, relationships between causes and reasons for these relationships whereas the Open Systems perspective looks at the environment and past history of the change adopter, the structure and process of the adopter system and the characteristics of the individuals involved.
The CLER model (Bhola, 1982) can also be used to provide another perspective for problem diagnosis. It is a model (originally for innovation diffusion) which states that:

Change = f(C,L,E,R) where:

C stands for the network of Configurational Relationships which include the change agent system and the change adopter system;

L stands for the Linkages within and between the change agent and change adopter systems;

E stands for the Environment(s) surrounding the change agent and change adopter systems;

R stands for the Resources available to the change agent for promoting change and to the change adopter for adopting/incorporating the change being offered.

4.3.1.2 Selection of Change Objectives

Lippitt et al (1958, pp.99-104) identified two separate approaches used by Change Agents to select objectives. In the first, the Change Agent concentrates on the process of change, working through the situation with the adopter system in the expectation that a desirable goal will be reached naturally as a result of this process. In the second method, the Change Agent concentrates on defining the end goal and then devising a programme of steps for reaching it. The particular situation, type of client and adopter (individual or group) and, whether the Change Agent is part of the
adopter system or a separate entity will help to determine which of these two approaches is used, as well as the Change Agent's personal preferences. For instance, it is probably more appropriate and certainly easier to use the first method (working through the process with the client/adopter) in a one-to-one relationship than where the adopter is a system, maybe containing a number of subsystems, and particularly if the Change Agent is external to the system. In the latter case, the discrete setting of goals and objectives (which may still delineate several stages in the process) and then developing strategies and activities for meeting these may be more appropriate.

In either case, the Change Agent has to consider a number of issues in determining the change objectives. Zaltman and Duncan (1977, p218) suggest some of these:

What is the nature and scope of the change programme going to be? Who are the people who will be affected by the change? What exactly is the change programme trying to change - attitudes, values, beliefs or behaviour?

At the same time as identifying change goals and objectives, Lippitt et al (1958, p100) suggest that the Change Agent needs to identify "leverage points" which can be used to start the change process. These may either concern the use of particular persons or sub-groups who are in key positions, more susceptible to change, or simply more accessible to the Change Agent or, may refer to the starting point of a sequence of changes to the structure or function of the adopter
system which, step by step, will eventually lead to the ultimate change goal.

There are at least two considerations governing the choice of leverage point;
1. Accessibility: it should be sufficiently accessible to the Change Agent to allow the change process to begin and must also be open to change.
2. Linkage: there must be a possible line of change process from the leverage point to the change goal.

4.3.1.3 Choosing the appropriate helping role

Ideally, the Change Agent should choose an appropriate role for a particular situation although Lippitt et al (1958,p104) reported that many Change Agents specialize in one role type which they use for all situations although others did find it necessary to assume many different roles during the course of one change project. They categorised five types of helping role:

a. Intermediary - where the Change Agent helps the adopter system to make new connections between its sub-parts or re-organize old ones.

b. Expert on procedures - offering services to improve procedures so that these may facilitate the achievement of the goals.

c. Provider of internal resource/strength - where the change agent joins the adopter system as an autonomous sub-part - eg a
community worker who joins the tenants on an estate to fight the landlord for improved conditions. Or, in order to provide necessary resources the change agent may join the adopter system permanently or temporarily.

d. Provider of special environments - where the change agent sets up special environments/situations which will encourage the adopter system to learn new processes, techniques, attitudes or patterns of behaviour - the theory being that "home" environments reinforce existing behaviour, attitudes etc., whilst an especially created environment can allow freedom from these existing patterns and thus allow change to take place. The special environment may be physical, psychological or both and may be either an active ingredient in the change process or a necessary background condition. This role will frequently be adopted together with one or more of the other roles.

e. Supportive - in addition to diagnosis of the problem and planning and implementing a change programme, the change agent generally needs to give active help to the client and/or change adopter during the change process. Initially, this may entail reassurance that the intended change and the change process itself is both feasible and not dangerous to the adopter system. Later, encouragement to try something new or the development of special procedures to encourage the client or adopter to continue with the change process. Towards the end of the change process the change agent may need to reassure the client and/or the adopter system that his help can be called upon again if the need arises, or at specified intervals in the future.
In their consideration of appropriate helping roles, Zaltman and Duncan (1977, pp217,218) suggest only three categories: expert, catalyst/advocate and process consultant.

Their Expert category corresponds directly with Lippitt's description and their Catalyst/Advocate role overlaps roles c, d and e - provider of internal resource/strength, provider of special environments and supportive as it covers any activities designed to create or strengthen the desire for change.

The Process Consultant role is to assist the client/adopter to perceive, understand and act upon, events that occur in the system and is similar to the Intermediary role described by Lippitt.

As well as playing any one or more of the above roles the change agent also plays his basic role as expert in the field of planned change although, as Zaltman and Duncan point out, an internal change agent may have some difficulty in establishing this role in the perception of other members of the system as they will tend to see him in the role he normally plays within the system.

4.3.1.4 The Change Relationship

In order to fulfil his role(s) the change agent needs to establish a working relationship with the client system and with the adopter system – which Lippitt terms the "change relationship" and describes as encompassing, "the joint plans, shared experiences and mutual expectations which over a period of time the change agent and the client system have developed together" (1958,p.115).
Both Zaltman and Duncan (1977, pp. 212-215) and Lippitt et al. (1958, pp. 117-122) have identified three components of this relationship:

a. the client system must see the change agent as a competent and legitimate person/team whose task is to help change the adopter system.

b. Expectations about the change process and the intensity and quality of the change relationship must be clarified.

c. Adequate sanction must be given by the client and/or the adopter and sometimes by other groups.

For the first component, Zaltman and Duncan found that it was more difficult for an internal change agent to establish himself as a change expert because of his other roles within the system and also because the external change agent is often seen as being more objective. Also, team change agents are likely to have more credibility due to the assumption that they will have more skills and expertise within the team than would be possible for a single change agent. A heterophilous change agent is more likely to be seen as an expert simply because he is seen as being different.

Clarifying expectations on both sides relies on good communications between the change agent and the client. Different situations determine whether this two-way communication takes place with all members of the client or adopter systems or with selected individuals or subgroups. The type of matters which need to be clarified are: the frequency and procedures of progress meetings,
allocation of responsibilities, the type of activities involved in the change process, the emotional content of the change relationship, the length of the relationship and whether the change agent will play a dominant role or encourage self-help. For this component, Zaltman and Duncan found that an external, homophilous change agent had an advantage but there was no particular advantage to either team or single change agents.

On the third component - sanction - Lippitt et al (1958, p116) state that most change agents found a change relationship satisfactory only if it was based on voluntary cooperation between all participants. This view is expressed, however, within the framework of the client and the change adopter being the same entity - where they are separate entities it may be seen as acceptable for sanction to be obtained only from the client system (provided that the normal human rights of the adopter system are safeguarded). This is another of the ethical questions which arise in the study of planned change. Lippitt et al do suggest that this requirement/preference does not necessarily mean that all members of the client/adopter system enter into a direct change relationship with the change agent, nor that they are required to all agree to the change, either specifically or in principle. They also state that change agents vary in their idea of what constitutes this sanction. For example, that the client/adopter should agree to making some change, either clearly specified or in principle or that the client/adopter should merely enter into a relationship with the change agent on a trial basis.
In a given situation the change agent has to decide the level of commitment necessary and from which individuals or parts of the client/adopter systems. This is likely to be closely related to the choice of leverage point(s) as the parts of the systems which meet the criteria for leverage points – accessibility, openness to change, in a position to transfer the change process – are most likely to be the appropriate sectors with whom to set up a change relationship.

4.3.1.5 Resistance to change.

Resistance to change is inevitable and may stem from a number of sources such as, reluctance to admit weakness, fear of failure, expectation of failure, fear of losing current assets (Lippitt et al, 1958, pp180,181). In order for the change process to proceed, the change agent must first identify the source(s) of the resistance and then try to reduce their effect by, for example, involving members of the client or adopter system in the determination of the change objectives, correcting misunderstandings/false perceptions, or stressing long term benefits and how they outweigh immediate difficulties (Zaltman and Duncan, 1977, p219).

4.3.1.6 Selection of change strategies and design of change activities

The change agent is responsible for developing the change programme - a series of steps leading to the change goal - and has to select the (broad) type of strategy to use, generally in conjunction with the client, and also design the various activities which will form
or create the steps in the change process. The overall strategies available, which are well defined by many authors (eg. Chin and Benne, 1967, Zaltman and Duncan, 1977), are:

a. Empirical - Rational
b. Normative - Re-educative
c. Power-coercive
d. Persuasive
e. Facilitative

(A full discussion of each and their implications and use in this study will be found in chap. 7)

In any one change programme several different strategy groups may be used together, or consecutively, or at the same time but for different sub-parts of the adopter system.

Within the framework of the overall strategy type, the change agent has to design/invent/develop special activities, situations or procedures which will lead the adopter along the path of change towards the goal and these have to be individually developed for each specific situation, taking into account factors such as the existing attitudes, beliefs, values, history, knowledge and skills of the members of the adopter system; the environment surrounding the change effort and the resources available. (The particular activities, situations and procedures developed in the course of this study are described in chapter 8)
4.3.1.7 Recognising and guiding the Phases of Change.

The phases, or stages, of change are discussed in 7.3. Lippitt et al (1958, p.121) suggest that it is important that the change agent monitor the stages and recognise when each occurs so that s/he can modify the programme to, for example, take account of stages being reached faster or slower than anticipated or not being reached by some individuals or sub-groups. It is also vital that s/he recognise when the last stage is approaching so that s/he can take the necessary steps for consolidating and maintaining ("re-freezing") the change. Thus, monitoring the phases/stages of change would seem to be a necessary part of any planned change programme and was incorporated in this project - see objective 6.2.2 and discussion in 8.10 and 9.5.

4.3.1.8 Maintenance of change

Zaltman and Duncan (1977, pp220-222) identify two main methods for ensuring that the change, once achieved, is maintained:

1. Institutionalisation of the change - the change is adopted as a permanent part of the structure of the adopter system together with expectations that individuals within the system will perform their roles accordingly.

2. The change agent remains in touch with the client and/or adopter system - to a greater or lesser extent - and provides support during the continued use of the changed process, procedure, technique, etc.
4.3.2 Motivations and Characteristics of change agents

Zaltman and Duncan (1977, pp190-197) discuss the characteristics they feel to be necessary for a change agent to be successful, including their attitudes, values and motivation, their knowledge and skills, interpersonal skills etc. Some of their conclusions are noted here together with my view of myself as a change agent and my group (SLCEG) as a change agency within the context of this study. (4.3.2.1.to 4.3.2.4)

4.3.2.1 Technical abilities

Zaltman & Duncan suggest that change agents should be technically competent in the specific tasks of the change project but also be imaginative and able to apply their expertise to the solving of simple problems. They should also have institution-building skills. It can be important for change agents or, in a change agent team, the team leader, to hold academic degrees, recognised professional qualifications, or authoritative occupational titles in order to establish credibility.

At the beginning of this project I was aware that I had much to learn about the ways and means of bringing about change. At that time the SLCEG only consisted of three other technical staff - the head of the unit and two others. We were all technically competent in the field of energy efficiency in buildings and were seen to be so by the potential change adopter system. We did feel it necessary to increase our credibility by acquiring more authoritative titles - Director, Deputy Director, Principal Energy Advisor, etc., and also
to draw attention to our academic qualifications. None of us had previously acted as change agents in the conscious and deliberate manner involved in Planned Change. (Subsequently, the group has grown and some newcomers have needed training in a number of the technical aspects of energy efficiency.)

4.3.2.2 Administrative ability

The most basic requirement, according to Zaltman & Duncan, is a willingness to allocate time to details so that a change programme does not go awry because materials or situations are not fully prepared or are completed late. Planning skill is also required, especially contingency planning - to allow flexibility when something unexpected occurs. The change agent needs the ability to work with others outside the change situation such as other agencies working in the same area and bureaucracies. S/he must be able to tolerate "red-tape" whilst being creative at overcoming its problems. This also applies to other constraints - time, money, lack of skills etc.

In respect of administrative and planning skills, I am better at planning than at ensuring those plans are adhered to, but others in the team assisted with this. However, I would say that this was our weakest area and we were perhaps over-flexible in responding to altered circumstances before considering the overall effect. Also, there were numerous times when other necessary aspects of my job interfered with the change activity - this must always be a problem
where a change agent has other responsibilities outside the planned change programme.

4.3.2.3 Interpersonal Relationships

Change agents need an ability to empathize with members of the client and adopter systems (and with members of their own teams) and also to transmit sympathy and concern when participants in the change process are experiencing stress and anxiety. (Zaltman & Duncan, 1977)

I feel that this area is one of my personal strengths, shared by some of the other members of the group. Others become very frustrated and impatient when rational arguments do not lead to the desired effect. (As suggested in chapter 10, I now feel the necessity for us to train ourselves in the role of change agents.)

4.3.2.4 Job Orientation

Zaltman & Duncan state that change agents should be aware of their own motives and biases and that they need to feel personal responsibility for achieving the objectives of the change programme. They need to use initiative in diagnosing the problem and in bringing about changes on the periphery of the main activity if these will help the objectives to be met. They should also be committed to the development of the skills and resources of the adopter system and to be prepared for credit for the change and for enhanced skills to be allocated, at least in part, to the adopter system rather than to themselves.
Kotler (1973) suggests four possible motives for "participating in a cause" which could equally be motives for becoming a change agent. They are, Affiliation - the need to belong to a particular group, Power - the opportunity to exercise it, Faith - belief in the particular cause and Status - belief that being involved in a particular cause will confer a desired status in society.

I would suggest that most change agents are primarily motivated by Faith although they may also be subject to any or all of the other motivations as well. In my own case I have a strong motivation to further the cause of energy efficiency because I believe it is socially desirable and practical (Faith). I am further encouraged by the desire to be affiliated to that sector of society which cares about such things (a broad grouping of those who may be termed "conservationists") and, I am also not averse to any increase in status which may result. However, I believe I am not motivated by a need for Power.

In summary, a change agent should be a person who is concerned with both the welfare of the adopter system (and the ultimate user/beneficiary) as well as of society as a whole, with a respect for the beliefs and values of others and for existing institutions; who has the necessary knowledge and skills about both the process of planned change and the specific tasks within the change project; and who has the motivation and confidence to carry out the change programme.
4.4 Influencers

Influencers are individuals or groups who affect the change situation whilst not being directly involved in it. They include those whom Zaltman and Duncan term "non-agents" of change to distinguish them from the change agent. The actions of the change agent are deliberately designed to bring about a specific change in a specific situation whereas the actions of Influencers are not directed towards the specific situation although they may be directed at the same or similar change or, indeed, contrary to the desired change. Alternatively, their actions may be directed towards entirely different goals/objectives but can still exert pressure on the potential change adopters.

Influencers can include individuals seen as opinion leaders, innovators and individuals/groups in positions of power affecting, for example, the provision of resources to the change adopter system.

4.4.1 Opinion leaders

These are persons who can influence the change situation where it becomes known that they are either for or against the proposed change. Where opinion leaders can be found to support the proposed change, the change agent can utilise this to advantage by, for example, screening a video-recording of a speech supporting the change. Fund raising charities make good use of this idea when they utilise show-business personalities to support their aims - most successfully, where it is clear that the personality has a genuine
involvement (eg Harry Secombe and the Diabetic Association). Also, care has to be taken that the personality involved is an opinion leader for the particular adoptor system involved as different individuals/groups clearly look to different sources as their opinion leaders.

4.4.2 Innovators

Innovators can be influencers by virtue of their providing a new tool or process which can be utilised to bring about change and although they may have defined the need as well as providing the means for meeting it they may be unable or unwilling to enter into the process of implementing the change. Their effect can also be counterproductive. For example, an organisation which is attempting to change to a computerised management system may find this change made easier if a new product becomes available which simplifies data entry and therefore the innovation will have assisted the change process. Alternatively, whilst implementing the change programme, the company may hear of another innovation which is designed to tackle the same problems/needs but in an entirely different way. This is likely to halt the change programme, at least whilst a change of policy is considered, and may then result in no change taking place because the impetus has been lost.

4.4.3 Power Holders

The third type of influencers - those wielding power - may be more effective than the other two. Again, their influence may be either in support of the desired change, or against it. For example, in
terms of energy efficiency in buildings, the resources allocated by both central and local government (and by inference, the relative importance of the subject) can have a direct effect - for individual householders, the low level of grant-aid available is a disincentive to consider action and, for housing designers in local authorities, lack of specific funds allocated for this purpose has the same effect.

4.4.4 Other Influencers

There is a fourth group of influencers, who may in fact also be considered as part of the overall environment of the change situation. This group includes organisations and individuals, unrelated to the adopter system, whose actions affect, generally indirectly, a part of the change process. For example, the so-called "energy crises" of the early 1970's were precipitated by certain actions of oil-producing countries which then caused the concept of energy efficiency to be taken seriously and created a climate conducive to change in this field. At the present time, the oil glut is having somewhat of an opposite effect whereas, at the same time the Chernobyl nuclear disaster is creating a force for further energy efficiency activity (as well as renewed activity in looking at alternative energy sources). These two opposing influences, neither of which are directly related to the change situation nor under the control of the change agent, can affect different parts of the adopter system in different ways and the change agent needs to be aware of the possible effects and how to capitalise on the appropriate ones.
4.5 Beneficiaries

As suggested earlier (2.3) this category of "participants" in the change process does not appear (to the best of my knowledge) in the literature, other than being alluded to occasionally in descriptions of specific change projects. I identified a need for this category in the present project and subsequently that there was a more general need for this category.

In the literature it is generally assumed that the Client who instigates the change and/or the adopter of the change will benefit by the change in terms of a problem being solved or a need met. This is most frequently the case, especially if the most classical definition of planned change is adhered to - such that all the participants are working together to solve their problem.

However, I believe that the majority of the principles, processes and techniques of Planned Change can also be utilised in other situations and it is then that the Beneficiary of the change may cease to be synonymous with the client or adopter.

An example of this is the project described by Spiers (1985) where a school was brought to recognise the need for change in its approach to pupils with special educational needs (SEN) and then to develop a "whole school approach" to meeting this need. In this case, the initiator of the change programme was Spiers herself after her appointment as Special Needs Coordinator. She subsequently took on the role of change agent. Further impetus for change was provided
by a DES White paper (1980) encouraging the education of children with SEN together with pupils without these needs.

The potential adopters of the change were chiefly the teachers whilst it is clear from the report that the planned change was intended to primarily benefit the pupils - particularly those with SEN. This is a clear case where the beneficiaries did not instigate the change and nor were they the adopters - they were not subjected to any requirement to change.

In other situations there may be various groups of beneficiaries, some of whom are involved in the change process in one of the other capacities whilst others (merely) benefit. An example of this might be the programmes in the Third World to encourage male sterilisation where the men themselves (who are the change adopters) may benefit from the change due to having smaller families to support. However, other beneficiaries could be the women who will have fewer children, with all that entails, the (smaller number of) children who will have more resources available and so on.

Where the Beneficiaries are separate to the other groups they have not initiated the change (ie. acted as clients) for one or more reasons such as, that they are not fully aware of the problem or, cannot see a solution to it or, are not in a position to wield influence or power. Their needs may be the motivating factor for the change but someone else has to play the Client role on their behalf.
In the same way, there are situations where the beneficiaries could not themselves make changes to improve the situation, due to lack of skills or knowledge or power.

In this study, the Beneficiaries are the local authority tenants who will benefit, in terms of improved comfort and/or reduced fuel bills, by a change towards energy efficient design. Lack of power and appropriate knowledge renders them unable to precipitate the change themselves. However, elected councillors, acting on their behalf, are able to act as Clients and start the change process - although in the initial stages, the change agent (SLCEG) had to bring about a change in the councillors so that they perceived a discrepancy between the existing situation and the possibilities for improving it. Similarly, the tenants cannot, in the majority of cases, make their own homes energy efficient due, for example, to lack of resource, knowledge, skills or because they are not allowed to make significant alterations. Therefore it is the designers and others, responsible for the building and upkeep of these homes who must adopt the change.

Beneficiaries can therefore be defined as those individuals, groups or organisations who will benefit and/or are intended to benefit from a planned change but may or may not be directly involved in the process, either as clients or as potential adopters.

Having defined/clarified the various participants, the next stage is diagnosis of the problem, which is dealt with in the next chapter (5).
As suggested in the previous chapter, the first stage in developing a planned change programme must be a careful diagnosis of the problem by the change agent, preferably in consultation with the client and with the involvement of the potential change adopter though this is not always possible. Without this diagnostic process, incorrect assumptions may be made about the causes of the symptoms which have been observed and, some of the interacting factors which contribute to the problem and may influence the outcome of the programme are likely to be overlooked. In the worst case this could lead to a result which is the direct antithesis of that desired, but is at least bound to result in the programme being less effective and more difficult to run than would otherwise be the case.

The subject of diagnosis is not addressed in any great detail by the authors in this field - surprisingly there is little on the subject included in any of the three editions of what may be termed the
"standard work" on planned change - "The Planning of Change"
(Bennis, Benne, Chin & Corey, 1969-1976). Where it is discussed,
for instance by Jayagaram (1976), the emphasis is on an interactive
process between the change agent and the client or adopter which he
calls "Open Systems Planning". This process could be adapted for
use by the change agent alone as a route to another perspective on
the problem. The basis of this approach is that a "present
scenario" is constructed which describes the present status of the
situation. This is then extended over time but with no other change
to provide a "realistic future scenario". Then an "idealistic
future scenario" is developed. The differences between these then
point the way for the change efforts.

Lippitt et al (1958) state that change agents tend to have their own
individual approaches to diagnosis but that there are always two
basic questions that need to be answered, viz:

"What is the trouble?" and
"What is causing the trouble?"

When considered carefully these deceptively simple questions cover a
multitude of relationships between individuals, organisations,
established practices and procedures, personal characteristics, the
social and physical environments, etc.

Zaltman and Duncan (1977,p29) suggest two perspectives which can be
used to diagnose a problem (ie to answer the two questions posed by
Lippitt) - a "Metatheory Perspective" and an "Open Systems
Perspective". I suggest that, whilst not primarily intended for this purpose, Bhola's CLER model (1982) is another tool which can be usefully employed for diagnosis and I have therefore adapted it as a third perspective. These three perspectives enable the problem to be looked at from different viewpoints and are therefore complementary in aiding a full understanding of the problem.

These three diagnostic tools (which are discussed further in sections 5.1, 5.2 & 5.3 below) all presuppose a clear description of the symptom(s) of the problem, leading to definition of the problem itself. In the present case different symptoms were perceived by various groups. For example, from the viewpoint of the occupants of dwellings the symptoms were cold and draughty homes which were difficult and expensive to heat or homes which suffered from condensation and mould-growth. The symptom perceived by councillors was "Fuel Poverty" (although this term was not yet in common usage at the beginning of this project) - which sums up the phenomenon of the poorest people living in the homes which are most expensive to heat and having to make choices on whether to spend their (inadequate) income on fuel or food or paying the rent. From the point of view of some building professionals the symptom was the deterioration of the building fabric due to condensation whilst central government saw the symptom of high/increasing expenditure on fuels.

For me (and for SLCEG) all these symptoms (of Fuel Poverty, condensation, waste of money/fuel resources etc) could be attributed to inadequate building structures and inadequate/expensive to run
heating systems. Our own experience and that of other practical researchers in the field had shown that it was practical, affordable and cost-effective to provide Energy Efficient Housing - which was warm and comfortable, inexpensive to heat and free from condensation and which would, therefore, deteriorate slower and help to reduce the waste of fuel resources.

5.1 Diagnosis from a Metatheory Perspective

The Metatheory Perspective seeks to define the problem in terms of causes, the relationships between causes and the reasons for these relationships. Its starting point is to define the nature of the phenomenon (problem). From the above discussion of symptoms the problem can be defined as:

Measures to improve energy efficiency were not being included in the design and construction of dwellings.

This applied whether the dwellings were being newly built or where old buildings were being refurbished/rehabilitated.

The causes for the problem can then be explored. To do this it was necessary first to identify the various individuals/groups/forces acting on the design of dwellings.
Concentrating on the local authority housing sector, the following individuals and groups are involved in the design and building process:

The Designer - Architect or Building Surveyor - heads the design team, generally most powerful individual/group involved, generally has ultimate responsibility.

The Client - Ultimately the tenant, but in most cases they have little direct input in the process - the client role being played by the Housing (management) Department which prepares (or should prepare) a Brief for the Designer stating requirements and preferences - frequently very simple in practice - size of dwellings etc. (NB. "client" as used here refers to the end user of the house design - not to be confused with the client for planned change).

The Design Team - May include any combination of: Quantity Surveyors, Structural Engineers, Services (Heating, Ventilating, Plumbing) Engineers, who advise the Designer.
The Council - Council policies affect designs; designs have to be approved by Housing Committees; both the Designers and the Client Departments are Council employees. Council raises cash for funding building works. Contractors (Builders) are employed by The Council.

The Contractor - For any development there will be a main Building Contractor and may well be a number of specialist subcontractors.

Building Work

Supervisors - Clerks of Works supervise the day to day building process on behalf of the client (Council). The designer inspects at regular intervals.

In addition to the people involved in the design and building process there are other external factors/pressures which may affect the ultimate outcome such as:

Building Regulations and Local Byelaws which cover many aspects of building and which, whilst clearly intended to provide minimum standards are generally treated as maximum standards - ie the tendency is to fulfil their requirements but not to exceed them.
Statutory Undertakings - such as Gas and Electricity Boards, Water Authorities etc. All have their own Byelaws and preferred practices to which the designer has to adhere.

Then there are more generalised forces such as the overall social climate and media coverage as well as the personal characteristics of the individuals concerned (see 4.2.1).

Having identified the components of the design and building process, it is possible to consider various hypotheses as to the causes (x1, x2 ......xn) of the problem/phenomenon (Q).

The following hypotheses were proposed as a result of numerous discussions with members of the various groups mentioned above, including the pilot set of interviews with representatives of these groups (see Appendix I). Each hypothesis is either, a distillation of reasons they gave for the lack of energy efficient housing (eg. A,B,H) or, my suggestions as to possible personal or societal biases which might result in a lack of energy efficient design activity (eg. D,K,L).

Hypotheses:

That energy efficient housing was not produced because:

A. It was impractical in terms of building techniques.
B. It was impractical in terms of availability of appropriate materials.
C. It was impractical in terms of cost or of a cost-benefit ratio.
D. The values/beliefs/attitudes of designers, and/or others involved in the building process, precluded support for the principles of energy efficiency or, perhaps, for the provision of energy efficient homes for council tenants.

E. That those involved in the design process did not believe that energy efficient housing was a practical proposition.

F. That those involved in the design process did not possess the necessary skills/knowledge to design energy efficient housing.

G. That those involved in the design process were not sufficiently motivated to design energy efficient housing.

H. The principles of energy efficient design were contrary to some established practices and therefore rejected.

J. Sufficient practical assistance was not available for both the design and implementation of energy efficient housing.

K. The social climate was not conducive to production of energy efficient design.

L. The client(s) were not demanding energy efficient designs.

M. Existing Regulations, Byelaws, Codes of Practice etc. did not encourage energy efficient design.

N. Councils did not have energy efficient policy(ies).

P. Limited resources (eg time, money) created a climate in which innovation was stifled.

In considering these hypotheses, A, B and C could be rejected immediately as the SLCEG and other researchers had demonstrated, to their mutual satisfaction, that a high level of energy efficiency was a practical proposition on all three counts - of available
techniques, available materials and cost/cost-benefit. On the other hand, it was clear, from numerous discussions (both formal and informal) with building designers that hypothesis E was true - ie. that designers and members of the design team were extremely sceptical about either the practicalities of energy efficiency or its low cost, or its cost-effectiveness - or indeed, all three.

Considering hypothesis D, it was found, in formal interviews and semi-formal discussions, (and later through questionnaires - see 9.1) that attitudes and value/belief systems were variable amongst the various professions involved in the design/building process. The designers (architects/surveyors) generally had positive attitudes towards energy efficiency in general terms and an inclination towards incorporating it in their designs related to their professional pride in producing "the best" designs. This was however overlaid by concerns about cost, practicalities, and lack of the relevant knowledge and skills.

Quantity Surveyors - the financial advisors of the design team - are by nature extremely cautious and tend to assume that any deviation from the "norm" (whatever that may be at any given moment) will inevitably add to the costs of the project. However, on several occasions it was possible to persuade individual quantity surveyors to develop a more positive attitude by proving that some specific energy efficient measures actually cost less than their traditional equivalents. In the case of services (heating) engineers, their professional training is oriented towards the provision of specific standards of heating (room temperatures) under all possible climatic
conditions and the concepts of energy efficiency are simply the opposite of their training and practice - it is naturally therefore difficult for them to re-orientate their view even when they may believe energy efficiency is desirable.

Some individuals were found in all the groups concerned whose value/belief systems appeared to preclude voluntary incorporation of energy efficiency measures - views expressed and actions taken indicated a belief that housing for local authority tenants should be to minimum standards, with no added "frills" such as central heating, trees in gardens or energy efficiency measures - suggesting underlying value judgements about the relative merits of different groups of people.

It was found that the attitudes of Councillors (in the three local authorities concerned) were extremely positive towards energy efficiency (as would be expected with their value/belief systems - all Labour councils) as they saw it as being of direct benefit to their tenants for whom they feel a strong responsibility to provide the best possible living conditions. Nevertheless, none of the three authorities had an energy efficiency policy and this seemed, in the main, to be due to lack of knowledge about the level of efficacy of energy efficiency measures and about the costs and practicalities involved. They also needed to be convinced that any policy could be translated into action.

Hypothesis D, that values/beliefs or attitudes precluded energy efficient design, was therefore found not to be true in the majority
of cases, but also that, conversely, neutral or positive attitudes
did not necessarily result in energy efficient designs. This
therefore leads on to a need to identify other reasons why energy
efficient design was not occurring.

Neuman (1986) studied the relationships between values and energy
conservation beliefs and behaviour (in 376 Californian households).
He concluded that, "personal values do not exert a major impact on
personal commitment to conserve" and that therefore they did not
constitute a major obstacle and that other factors, personal and
contextual, were far more influential. Values were found however,
to be fairly closely related to beliefs about conservation.

Van der Pligt (1985) states that, "...the bulk of the
research....indicates the poor predictive power of attitudes in
relation to energy conservation (behaviour)." Results of his study,
in the Netherlands, showed that neither general environmental
concern nor specific attitudes (regarding home energy conservation
measures) were directly related to behaviour. The study also
supported his contention that such dissonant behaviour can be
tolerated due to the mediating effect of "false consensus bias" and
an unwillingness to relate non-conservationist behaviour to adverse
personality traits. This meant that people could excuse themselves
from behaving in accordance with positive conservationist attitudes
by saying, "everyone acts the same as us" and, "not conserving
energy doesn't mean I'm a bad person". Van der Plight therefore
concluded that there is little to be gained by engaging in
activities designed to change attitudes alone, without also dealing with these questions.

It was clear, from my own experience during Architectural training and from discussions with other designers that professional training normally incorporated only minor reference to any of the principles of energy efficient design, such as the thermal behaviour of materials and constructions, relative benefits of different measures, cost-benefit analysis etc. Thus, without strong motivation to investigate the subject on a personal level, it was clear that most designers would lack the necessary awareness, knowledge and skills to produce energy efficient designs. In addition, at the time this project commenced (1981/82) there were virtually no "tools" easily available to designers in this field - such as computer programs to analyse the thermal performance of buildings. A report on the 1985 "Design for Energy Management" competition (Energy in Buildings, 1985) confirms both the lack of energy design training and the (resultant) lack of high standard design. The assessors judged the majority of entries as being "mediocre" and found a "marked lack of ability to integrate technology and architecture" and a "marked lack of numeracy". They also found a "tendency to deliver an endless conglomeration of design cliches.....without any feeling for their meaning or significance". With the exception of the winning entry the standard was apparently so poor that the second and third prizes were not even awarded! Thus hypothesis F, that those involved in the design
process did not possess the necessary skills/knowledge to design energy efficient housing, could be taken as true.

Hypothesis G suggests lack of motivation as a possible reason for the lack of action on energy efficiency. For designers there are several possible motivating forces for designing energy efficient buildings: increased status, higher salary, winning awards, professional pride, adding interest to routine jobs, philanthropy, etc. It was not possible to investigate the existence or importance of the three latter, personal, motivations amongst the groups of designers but it could be assumed that some or all of these could be activated in the majority of individuals. However, no steps had been taken, in any of the three authorities, to provide any of the first three motivations. At that time there was no developed environment of approval of energy saving activity and, with a low level of awareness of the potential in terms of job-interest, benefits to occupiers, etc. it would seem that there was insufficient motivation for designers to overcome the other obstacles in the way of energy efficient design although there was potential for providing various forms of motivation.

Hypothesis H - that the principles of energy efficient design were contrary to established practice(s) and therefore rejected - has been found to apply to a majority of heating engineers - as mentioned earlier, energy efficient principles require them to re-orientate their traditional outlook by 180°. It also applies in some measure to some architects and surveyors. For example, those
who have been taught that the cavity in a cavity wall needs to be kept open to prevent the ingress of water to the inner leaf are extremely resistant to the idea of filling the cavity with insulation. Certain, exceptional, problems which have occurred with specific cavity fill materials or in specific situations have served to reinforce this resistance, despite the very great improvement to be gained from a thermal point of view.

Hypothesis J - that sufficient practical help was not available to designers - was also found to be true. For example, if designers had gone so far as to decide that it would be desirable to draughtproof the dwellings being designed, they would then discover that there were a very large number of materials and types of draughtstrip available (over 100) with nothing but the advertising literature from the manufacturers to guide them in choosing the optimum material for the particular application. There were a limited number of researchers working in this area but their results were not disseminated to designers and, particularly, not in a form which could be easily interpreted by them.

For research/innovation to be diffused/ transferred to practitioners it is necessary to take account of the requirements and normal modes of working of the recipients of the information. In some respects architects and surveyors differ both in their perception of the design process and their modes of carrying it out - architects generally being more oriented toward aesthetic considerations whilst surveyors tend toward the practicalities of structural stability
etc. However, both are concerned with aesthetics, light, form, use of space, structure, construction details, properties of materials, future maintenance needs, cost, etc. For many aspects of their work they rely on "rules of thumb" such as, that adequate daylighting and ventilation of a room will generally be achieved by providing glazing of an area equal to 20% of the floor area and openable windows of 10% of the floor area. No such guidelines existed for energy efficient design.

The remaining hypotheses (K,L,M,N and P) were all found to be true and are interrelated, all being factors of the environment in which the designers were working. Whereas, during and immediately after the "oil crises" of the mid-70's, there was a general awareness of a need to conserve fossil fuels, this had considerably abated as soon as North Sea Oil was fully on-stream.

The national Building Regulations did introduce a requirement for roof insulation in 1975 (2") and further requirements for increased thermal efficiency of the building structure were introduced in 1981. However, there were three drawbacks to the effectiveness of even these minimum measures:

Firstly, the regulations apply only to new buildings, leaving untouched all the existing housing stock, even when full refurbishment/rehabilitation was being undertaken.

Secondly, in the opinion of R & D workers in the energy field, the requirements were far lower than the standards which could be
achieved (easily) and ignored some elements altogether, notably floor insulation and ventilation control.

Thirdly, the Building Regulations did not apply to the Inner London area in which the three local authorities are situated. Inner London was subject to the London Building Act which had no requirement at all for the provision of energy efficiency measures. (From Jan. 1986 Inner London did become subject to the National Building Regs. but the other two drawbacks still remain.)

At the same time, the Councils did not have an Energy Policy and the Client departments were not including energy efficiency criteria in their briefs to the designers - in both cases mainly due to their uncertainty that such a policy or requirement could be met from a practical point of view.

There was also an awareness of limited resource, both in terms of design time and of building finance, which served to reduce the likelihood of designers attempting to include anything "extra" and it was clear that energy efficiency measures were definitely viewed as add-ons to the original design. (Although this can be true to some extent, a high level of saving can be achieved at no cost or marginal extra cost, particularly if energy issues are considered at an early stage in the design process.) This phenomenon was again attributable to lack of knowledge and to lack of dissemination of information by researchers so that the energy measures which had the highest profile were solar energy and double glazing, which carry
the highest capital costs of all measures and show the lowest level of savings! Ideas such as designing-in fewer *openable* windows, which saves both capital cost *and* energy, had not yet reached the public domain.

In considering these various causes of the problem from the Metatheory perspective, the relationships between various causes and how one may reinforce another are explored. For example, the designers' lack of appropriate knowledge and skills reinforces the politicians' reluctance to formulate a policy which they see is unlikely to be implemented; both these factors discourage the clients from asking for energy efficient designs; the lack of special funding for energy measures (even if not strictly required) reinforces the view that they are not a practical/affordable proposition and therefore discourages the designers from acquiring the necessary knowledge and skills. Likewise, policy-makers could have formulated a policy which included provision for training and for the necessary design tools and specialist knowledge to be made available but they first required "proof" that energy efficiency was not only desirable but also practicable.

The conclusions reached from this analysis will be found in section 5.4.
5.2 Diagnosis using an "Open Systems Perspective"

The Open Systems Perspective presupposes that the Potential Change Adopter System has been identified and then considers this system in terms of its past history, environment, organisational structure, organisational process and the characteristics of the individuals within the system.

In this case, the Metatheory Perspective suggested that there were several groups of potential change adopters - a number of which were within the local authority organisation and some outside. As, for the most part, the Change Agent in this case was not in a position to directly influence the outside organisations/individuals (central government, media, regulation-makers, statutory authorities, building contractors, etc.) the groups concentrated on were those within the local authorities - designers, design teams, client departments and policy-makers. The open systems perspective could then be applied to first, local authorities and secondly, the various groups, within the local authority, involved in the housing design process.

A. Local Authority Organisations

A1. Past History: The three local authorities under consideration (the London Boroughs of Lambeth, Lewisham and Southwark) are traditional Labour strongholds with the attendant, somewhat paternalistic, concerns for the welfare of their constituents,
particularly in terms of improving their quality of life. They are particularly concerned to provide sufficient public housing to meet the needs of the local population and that this should be of high standard. Between them, the three authorities own and manage some 150,000 homes and spend up to £180 million a year on building new homes and maintaining and refurbishing existing ones. Historically there has been greater emphasis on quantity than quality though this appears to be changing as the implications of the failures of buildings which are only 15-20 years old are appreciated. Also, there is an increasing understanding that more than mere shelter from the elements is required of housing.

A2. Environment: Local Authorities are subject to increasing criticism from the media, central government and the public and under severe pressure to cut expenditure, which is translated into reduction of services. In this climate, any proposal that even hints at the need for finance is unlikely to be seriously considered, however admirable the cause.

The emergence of the concept of Fuel Poverty, which really entered the consciousness of the main body of local politicians between 1982 and 1985, helped in overcoming this resistance due to the theory that if fuel poverty was overcome, money would be released for other uses which would benefit the local community - such as reducing rent arrears (a very serious problem in these authorities) or simply boosting the local economy.
A3. Organisation Structure: There is total separation of function between the elected Councillors, who formulate policy and make major decisions - for instance on prioritising expenditure - and the Officers who implement these decisions and policies although in recent years, councillors have also been taking an increasingly active interest in the day-to-day running of departments.

Technical functions related to housing are distributed differently in the three boroughs: Lambeth has a Directorate of Development (which includes architects, building surveyors, services engineers and quantity surveyors) which deals with both new-build and rehabilitation works on housing and on public buildings whilst the majority of repair/maintenance works are carried out by the direct works department (DCS) which also acts as contractor for some of the schemes designed by the Development Directorate. The Housing Department deals with management only and briefs the other two departments.

In Lewisham, the Housing Department has some technical staff who deal with some repairs and maintenance and, in its management role, briefs the Architects Department on all other work. The direct labour organisation is much smaller than those in Lambeth and Southwark. The Architects Department also includes building surveyors, services engineers, quantity surveyors and is also responsible for the maintenance of the public buildings.

In Southwark, the Housing Directorate has its own Technical Services Department with both building surveyors' division and engineering...
services' division which deal with all repair and maintenance and the rehabilitation of the existing housing stock. Housing Management Division briefs the separate Architects Department on new-build housing schemes. The Architects also deal with the maintenance of the public buildings. There is a large Direct Labour Organisation which carries out most of the repair works and some capital works.

A study by the University of Bristol School for Advanced Urban Studies (Bishop, Currivan & Jones, 1984) found some problems in local authorities particularly related to energy conservation. For example, there was "general pressure" to go for quick, easy and visible benefits; pressures to reduce expenditure created a reluctance to embark on programmes without an immediate payback; architects and engineers lacked training in interdepartmental management and the career structure did not encourage such initiatives; where energy efficiency activities did exist, they tended to be "owned" by one department and other departments resisted any encroachment on their territory.

A4. Organisation Process: The National Council for Voluntary Organisations identified some general characteristics of local authorities (Blaber, Hedges and Wilson, 1982) which are of relevance here:

Interdepartmental rivalry is common,

Functions are highly compartmentalised,
The organisational framework is often rigid and slow-moving - inhibited by procedural and/or political factors,

Lack of flexibility to depart from standard procedures,

Despite the political orientation of some authorities towards providing a service, they have developed along system-oriented rather than consumer-oriented lines. "While lip-service may be paid to improving services, actions are often directed more to perpetuation of the bureaucracy."

Communication between departments is generally minimal, co-operation is rare. Some steps are being taken to improve this situation and also to improve communication between different groups within departments where again, rivalry is widespread and pressures resulting from increasing uncertainty about employment prospects is tending to increase conflict between related disciplines.

Communication styles vary between boroughs and between departments. All Chief Officers (Departmental Heads) have regular meetings; some departments have regular management meetings and occasional seminars and a few even have a CPD (Continuing Professional Development) policy, whilst others tend to rely on directives and memos to deal with both policy and procedures.
B. The potential change adopter groups.

As previously suggested, there are five main groups of potential change adopters:

Designers: Architects and Building Surveyors

Other members of Design Team: particularly Quantity Surveyors and Heating (services) Engineers

Client Department: Housing Management Dept.

Policy/Decision Makers: Councillors

Building Work Supervisors: Clerks of Works

The points made in (A.) above on the local authority structure and history naturally pertain to these various groups within the organisation but there are some further observations which can be made which are specific to each group:

B1. Past History: Designers, particularly Architects, have developed a role as the "head" of the design team. Both Architects and Building Surveyors have been allocated full responsibility for their designs for ever - this responsibility can even devolve to their heirs! In recent years the architectural profession has been subjected to considerable criticism due to failures of previous "innovative design". These factors serve to create resistance to innovation.
The training of architects concentrates on aesthetics, space planning and structural stability whilst that of surveyors concentrates on structural stability and knowledge of building techniques and materials. Past practice of both has assumed fuel cost to be cheap/irrelevant and such problems as condensation to be due simply to poor management on the part of the occupants.

Quantity surveyors, responsible for the financial aspects of the design, advise the designer. There is always a requirement to keep within pre-set cost limits (set by central government) and, at the early design stage, most quantity surveyors estimate the likely eventual tender/contract cost on the basis of recent tenders for "similar" work, rather than carrying out a detailed cost analysis. Their role has gradually developed more power so that, in the majority of cases, the architect will accept the quantity surveyors' assessment of costs and of which items can be afforded and which cannot. As quantity surveyors tend to regard any change to usual practice as an extra, they frequently advise designers that energy efficiency measures cannot be afforded as they do not do the full analysis which can show that savings in capital cost may even be made – for instance, that a smaller heating system might be used which would cost less to install, thus freeing money to pay for the insulation.

The training and traditional practice of Heating Engineers renders them, almost automatically, opposed to energy efficiency, in practice if not in principle. It requires a "U-turn" in their approach to system design – instead of providing a system which will
provide the desired temperatures with scant regard to running costs (a legacy from days of cheap fuel) they were being asked to keep running costs to a minimum but still provide comfort conditions. This requires more careful consideration of the type of system installed and location of heat emitters, a re-think of the necessity for "over-designing" to allow for the "two coldest days" in the year and co-operation with the building designers and clients.

One example of the change required is that it is traditional in some places to install central heating systems with a Back Boiler - one fitted into a fireplace with a gas fire in front - perfectly adequate in terms of providing heat to the radiators but the extra ventilation required for this type of boiler as opposed to a "balanced-flue" type means that more heat is lost from the dwelling.

The Client Departments have traditionally concentrated on their management role and the briefs produced for designers tend to concentrate on the number of bedspaces and types/sizes of dwellings required rather than specifying those matters which directly affect the lifestyle and life quality of the future occupants. They are, however, concerned with the needs of their tenants and reluctance to change is due, at least in part, to perceived shortage of time and the habit of relying on the building professionals for advice on these matters.

In the past, Councillors, having made policies, tended to delegate much of the decision-making regarding their implementation to their chief officers who used this power to select those policies with
which they were in accord for implementation and delay others. In recent years there has been a shift towards greater involvement of councillors in implementation and daily processes.

The role of the Clerks of Works is to represent the Client (the Council/Housing dept.) vis-a-vis the building contractor. They closely supervise works on site and report to the client and the designer. As they are only infrequently in their offices and may be supervising work on a number of sites they tend to be separated from the mainstream of the organisational process.

B2. The environment

The main environmental pressure on designers is from current low public opinion of their past designs. They are also made wary by increasing unemployment in the profession as elsewhere. Increasing levels of rent arrears, due at least in part to rising unemployment, together with reductions in public spending particularly affect councillors and housing management but cuts in public spending also affect all the groups in terms of lack of job security and lack of incentive to improve standards.

There was also, in the general culture of society, a prevalence of views such as, "fresh air is good for you" and, exposure to cold makes you stronger (Spartanism). Fuel was generally still felt to be a cheap commodity and this view gained encouragement from news of oil surpluses throughout the world. Those sections of the community
who know from their own experience that these general beliefs are not true did not have the resources to express this.

B3. Organisational structure and process

Architects and surveyors in local authorities tend to work in groups of 5-8 people, under a more experienced "Group Leader". They head the design teams, working to a brief from the client department and calling on the expertise of other professionals (services engineers, QS's etc) as required. They are responsible to their department head and ultimately to the elected councillors but make many decisions themselves. Designs have to be approved by either a committee of councillors or a group of senior officers (dependent on the scale and type of project). They also supervise the construction process and certify payments to contractors.

Councillors delegate responsibility to chief officers but retain the final approval of (some) designs.

Client departments prepare briefs for designers, based (ideally) on feedback from previous schemes, current needs and current policies. They allocate and manage the properties after completion.

Clerks of works represent the client's interests on the building site - in practice this is the Council's interest in general rather than the client department as the clerks of works are most often attached to the main design departments. They can assert power by persuading designers that particular techniques, materials or details are not practical or by paying more attention to some
aspects of the building work than others, even ignoring omissions of items they do not feel to be important.

B4. Individual characteristics

Although it is obviously difficult to generalise the characteristics of the various groups, some comments can be made which (I believe) would be supported, if not by the group itself, by the members of the other groups which interact with it.

Architects and Surveyors tend to be very confident of their professional abilities, conscious of and defensive of their role as "the designer". Despite a lowering of public opinion of their work they retain a good self-image and tend to be complacent and not open to change. Younger designers, particularly architects, are more receptive to innovation but mainly in terms of space planning and aesthetics - their main preoccupations. They are particularly resistant to external innovations i.e. from non-architects or non-surveyors. They think in visual and tactile terms and are frequently not very numerate. They also tend to feel over-burdened by the numerous statutory requirements they have to incorporate into a design and therefore resistant to adding another. Their capacity for imaginative design tends to become dulled after a while by the rigours of actually running building contracts.

Housing (management) officers are concerned with the well-being of their tenants although again, after a while, the frustrations of the job tend to turn this into a concern to reduce the number of
complaints and need for repairs so as to make their own lives easier. They tend to be overwhelmed by imperative problems such as leaking roofs so that they are resistant to consideration of a "new" facet of housing. They also worry that new techniques or materials may cause future problems which they will have to deal with.

Policy makers (Councillors) are open to change - for many the need for change is one of their driving forces as they are seeking to improve conditions in their area. They are generally very willing to commit their own time to considering new ideas and to following them through. They are also willing to commit (scarce) resources to a particular cause if it is ideologically desirable and they are convinced it is practical. However, it has to be remembered that there are many competing causes requiring both time and resource.

The Clerks of Works (CoWs) are seen as having an important role to play in the incorporation of energy efficiency measures as they are in the position of being able to ensure that the measures are actually installed and installed correctly. It was found during this project (particularly through seminars) that whilst the CoWs in two of the boroughs were fairly receptive to both the principles and the techniques of energy efficiency and to their responsibility in aiding its implementation, those in the third borough were totally opposed to the idea - to the extent that they were not even prepared to discuss it. Their resistance seemed to stem from two strongly held views - first, that they felt that basic design and construction standards were poor and that these should be improved before trying to add any further disciplines and secondly, there was
a strongly expressed view that far too much was already provided for council tenants and they could not see any good reason why energy efficient houses should be provided.

Counter-arguments, from a practical rather than an ideological viewpoint, such as that energy efficiency reduces condensation risk which in turn reduces damage to the structure, came up against an absolute stonewall of resistance. It was therefore clear that some means would have to be found for either overcoming this resistance or, more probably, circumventing it.

The conclusions reached from this analysis are given in 5.4.

5.3 Diagnosis using the CLER model.

The CLER model is described by Bhola (1982) as one of eight elemental models which together make up a Mega Model of Planned Change. He sees the use of the CLER model to be in, "inventing, planning, implementing and evaluating planned change in education and development."

As Chiapetta (1982) observes in his critique of Bhola's paper, the CLER model can perhaps not truly be seen as a model in the sense in which the term is used in mathematics or physical science because it does not ascribe mathematical or functional relationships between the elements of C, L, E and R. (Configurations, Linkages, Environment and Resources.) However, Chiapetta also recognises the value of CLER as it will be used here - to provide a framework within which
the change agent can organise the information regarding a particular problem.

Chiapetta also observes that to use CLER requires, "enormous knowledge and skill in the social sciences.....requiring the entire body of information about the target (country)...". Whilst this may be so in the sphere in which both he and Bhola work - educational/development change in "developing"/"Third World" countries, I feel that this is not necessarily so in other situations and that the use of the Cler model can cause change agents to consider sufficient interrelated factors (from their own knowledge, experience and awareness plus as much information as they can gather) as to enable them to obtain a useable understanding of the problem and increase the probability of selecting appropriate strategies and activities for the planned change programme.

The CLER model is represented as:

\[
\text{Change} = f(C,L,E,R) \text{ where,}
\]

C stands for the network of Configurational relationships that includes the change agent system and the change adopter system;

L stands for the Linkages within and between the change agent system and the change adopter system;

E stands for the Environment(s) surrounding the change agent system and the change adopter system;
R stands for the Resources available to the change agent system for promoting the change and to the change adopter system for adopting and incorporating the change being offered.

Bhola suggests that to increase the probability of change there needs to be a "strategic and synergetic optimisation of these variables....".

There are three main differences when analysing a problem from this viewpoint as against the two perspectives used earlier: the CLER model brings into sharper relief the relationships between different aspects of the problem; it brings the change agent system with its attendant relationships, environment and resources, into the picture; and, it draws attention to the question of available resources which, using either of the other two approaches, could be virtually ignored until a much later stage in the planning of the change programme.

Each of the four CLER elements are now considered in relation to the particular problem of energy efficiency in local authority housing:

5.3.1 The network of Configurational relationships (C)

This describes the relationships between any two of the four social configurations - individuals, groups, institutions, cultures. Both the change agent and the change adopter may belong to any one or more of these. In the present case, the change agent system is a (small) group (SLCEG) and the potential change adopter system contains a number of groups of professionals within the
institutional configuration of the local authority. These groups are also linked together by other institutional configurations such as trade unions and professional institutes and through other groupings such as leisure activities, where the individuals live etc. Some individuals within the change agent system also belong to the same trade union and the same professional institutes as some members of the change adopter system. The change agent system is also part of the local authority structure though with a slightly more autonomous role.

Figure 5.3.1 indicates these configurations and some relationships between them:

![Diagram](https://via.placeholder.com/150)

**Fig. 5.3.1 Configurational Network for Local Authority Housing Design.**

The Local authority institution (I₁) contains various groups (G₁⁻⁵).

G₅ - the Design Team - can be further subdivided into G₅.₁ -
Designers and Gs.2 - Consultants. Each of these can be further subdivided to give Gs.1a - Architects, Gs.1b - Surveyors, Gs.2a - Quantity Surveyors and Gs.2b - Heating Engineers. These second and third-level groups also exist within G4 in some authorities. The change agent system exists partially within the local authority institution but has a semi-autonomous role and also falls within another, somewhat nebulous, configuration involving other R & D groups/institutions and government research-funding bodies (I3). Individual members of Gs and of the change agent system belong to common professional institutes (I2).

The relationships between the various configurations are that:
Gs formulate housing policy in response (partially) to the needs of G2 (tenants). G4-6 are responsible for carrying out these policies. G4 prepare briefs for Gs in response to policies (from G1) and knowledge of local needs (G2). Group G3 supervise works on site on behalf of the client (G4 acting for G1/I1). Within Gs, Gs.2 acts in an advisory role to Gs.1.

5.3.2 Linkage (L)

Linkage is described by Bhola as the "potential for communication (personal and impersonal) between the change agent system and the change adopter system and within the change adopter system."
Four types of linkage are possible:

a. Existing linkages

b. Dormant linkages which could be energized

c. Linkages which may need to be created

d. Linkages which may need to be severed (to isolate resistance to change)

Linkage types a and b can be assessed as part of this analysis/diagnosis but it is probable that, whilst some ideas might present themselves regarding the need for new linkages or for severing old ones, full consideration of these can only be made once the goal(s), objectives and strategies of the change programme are at an advanced stage of planning.

a. Existing linkages within the change adopter system follow the same lines as the relationships between the configurations described above (5.3.1). The change agent system had some existing linkages with \( G_2 \) (Design teams) and with \( G_1 \) (Policy makers) but it was clear that these would have to be reinforced and also extended to the other groups as part of the change programme. At the start of the project, the change agent system did not have a specified role within either the local authority institution (I\(_1\)) or as an integral part of the design process. The linkages which existed were with small subsets of either \( G_1 \) or \( G_2 \). At the same time, it
was felt necessary (by both policy makers and the change agent) to maintain the perceived "independence" of the change agent.

Most of the existing linkages between the various groups were seen to be virtually unidirectional - the ideas and proposals were not freely exchanged - for example, the client (Housing Department) would send a "brief" to the Designers who would make up a proposal to a fairly advanced stage before sending it to the client for approval. Rejection of the proposal or required alterations could be discussed at a meeting but not always. Often communication would be only by 'phone or memo.

Where schemes were presented to Committees (of elected Councillors) for approval, there could sometimes be detailed discussions but not always. Large numbers of housing projects did not have to be approved in detail by Committee. There were no formal channels for feedback of information from tenants or housing managers to designers or policy makers and few if any, formal or informal forums where members of the various groups would be able to interchange ideas within a wider context than where one particular scheme was under discussion. Again, there is no facility for generalised feedback from occupants to designers - individual complaints are dealt with by Housing Management and only if they perceive a pattern in these may there be some feedback to the designers. Designers who deliberately attempt to check on the efficacy of their designs are extremely rare.
b. Dormant linkages could be perceived in the system. For example there were theoretical, formal, linkages between policy makers and the other groups but these were seldom utilised, except sometimes with chief officers of departments. Informal contact was very limited, except to the extent that a number of councillors are also local authority officers (in other authorities) and this does provide them with some insight into both facets - where they allow it to do so.

Linkages between the change agent and the policy makers also existed but were to a great extent dormant and needed to be energized.

c. Linkages which need to be created cannot be fully defined at the diagnosis stage except that it was clear that linkages between the change agent and the various change adopter groups needed to be created. Even where some existed, for example where the change agent had worked with a design team on a specific building project, they needed to be broadened both in terms of linking with whole groups rather than individual members and by diverse routes so that there might be interpersonal linkages plus impersonal linkages via other groups or various media - for example articles in professional journals.

d. Linkages needing to be severed are again sometimes difficult to identify at the diagnosis stage but in this case there was at least one linkage which it appeared desirable to weaken or alter (rather than sever) and this was the working relationship between designers and their consultant quantity surveyors and heating engineers. The
theoretical relationship is that the designers decide what they would like to do and then take advice as to the details of how it can be achieved (or not) and the cost involved. In practice however, designers have allowed (encouraged?) their consultants to take on more powerful roles so that the tendency now is for the consultants to impose their preconceptions and prejudices on the designer as well as providing their technical expertise.

As designers are notoriously inadequate in these spheres, they in turn tend to accept the consultants advice unquestioningly. So, perhaps, it is not that this linkage might need severing but that it might need re-orientating so that designers were in possession of sufficient knowledge/understanding to treat their consultants advice critically.

5.3.3. Environment (E).

Bhola defines Environment as comprising the physical, social and intellectual conditions and forces that impinge continuously on a configuration. Zaltman and Duncan's Open Systems perspective also encourages consideration of the environment - both the overall social environment and that within the group or organisation and their Metatheory perspective likewise requires environmental factors to be considered (see 5.1 & 5.2). Here again, however, Bhola draws attention specifically to the change agent environment as well as the change adopter environment and points out that they may be different, at least in some respects.
In the present case it is true that whilst the change agent shared many of the same environment factors with the change adopter system there were differences - for example, physically, the change agent system is located in a small independent office building rather than in a town-hall or equivalent complex. Also, the intellectual conditions were entirely different in that the raison d'etre of the change agent system was to be innovative and to discover solutions to specific common problems encountered by the member local authorities. In terms of interaction with society, the fact that the change agent system had fully embraced the concept of energy efficiency meant that it had different relationships with other bodies (outside the local authorities), different reactions to existing Regulations, Bye-laws etc and received different responses from other groups in return.

5.3.4. Resources (R)

Both the change agent and the potential change adopter have some existing resources available to them and may need others in order to promote change or to adopt and maintain change.
Bhola identifies 6 types of resource:

a. Conceptual
b. Influence
c. Material
d. Personnel
e. Institutional
f. Time

a. **Conceptual resources** are the cognitive and technical skills within a configuration and may be personal skills such as literacy, planning, message design or, concrete resources such as databanks and software.

In this case, the change agent possessed skills in understanding energy efficient design, materials and techniques and communication skills and had also developed software for analysing the energy usage and for comparing alternative methods of improving the energy efficiency of buildings. The designers possessed the necessary cognitive and technical skills to embrace the concepts and techniques of energy efficiency (provided that they could be brought to a state of readiness to do so and that the information was presented in appropriate formats). Support material, such as books, trade literature, computer software, could be made available to them.

b. **Influence resources** include persuasion, inducement, use of threats etc. In this case the change agent had no power over any of
the groups of potential change adopters and so the only available
direct influence resource was the use of persuasion. This could be
used however to cause some part(s) of the potential change adopter
system to exert other forms of influence over the rest of the
system. The obvious target for this would be the policy-makers
(councillors) who hold a position of power over all the other groups
and could exert this through the adoption of particular policies,
rejecting designs which were not energy efficient, providing
inducements etc. However, not all of the possible power strategies
would be ideologically acceptable or even useful. (see further
discussion of power strategies in 7.1.3) The change agent could
also utilise persuasion in relation to the other groups directly,
but only once an operational framework was established - i.e close
contact between the change agent and the groups would have to be
initiated and legitimised.

c. **Material resources** includes adequate funding, but this is not
sufficient if the appropriate goods or services are not available.
In the present case, the main material resource was required by the
change agent in order to fund time spent on the project plus modest
resources for development and production of information packages to
be used by the potential change adopter system. Material resources
required by the potential change adopter system were few - mainly
the expenditure of a (maximum) 0.5-1% extra on each housing scheme.
At some stage there might be a need to acquire computer hardware and
software but this would enhance the change rather than being crucial
to it.
d. Personnel resources. The change agent system had the necessary manpower to carry out a change programme - the only "problem" was to convince its employers (the 3 local authorities) that this was a desirable activity! This was achieved mainly by obtaining external funding for a specific project (the Lawrie Park Road Demonstration Project - see 8.1) which could be used as the nucleus of the planned change programme. It was not envisaged that the change adopter system would require additional manpower, except to the extent that energy efficient design might use more time, at least in the early stages of the programme.

e. Institutional resources. The main need in this case was the creation of links between the change agent and the organisation. This was seen to be likely to be achieved only if any policy regarding energy efficiency included distinct reference to a role for the SLCEG (change agent) or, a concrete role for the SLCEG could otherwise be established.

f. Time resources. This does not refer necessarily to the allocation of extra manpower time to the project, but rather to the necessity to allow a sufficiently lengthy timescale for the programme as a whole in order to allow for gradual change rather than a "crash programme". In the present case, the major part of the programme was envisaged as being spread over 3-4 years because it was linked to funding from an external source which required this time (see (d) above). It was however envisaged by the change agent that this was an open ended programme where the speed of response of the change adopter system would dictate the eventual timescale.
5.4 Conclusions

Having considered the problem from three viewpoints, some conclusions can now be drawn regarding the nature of the problem (5.4.1) and these then provide a framework (5.4.2) in which to set goals and objectives for the change programme (chap 6) identify appropriate strategies (chap 7) and design the specific activities of the change programme (chap 8).

5.4.1. The Problem

Returning to the two questions posed by Lippitt et al (1958):

"What is the trouble?"

The trouble/problem that was identified was that local authority housing, whether new or existing was not energy efficient. This is a problem for various reasons - waste of fuels, uncomfortable living conditions, expensive to heat etc. (see 5.1).

"What is causing the trouble?"

Using the Metatheory Perspective (5.1), the nature of the problem was seen to be that measures to improve energy efficiency were not being included in the designs of dwellings (whether new-build or rehabilitation or during major maintenance schemes). A number of different groups, within the local authority organisation, are involved in the design/building process and other groups and organisations also affect it (by way of regulations, government policies etc). In considering the causes of the problem, a number
of hypotheses were proposed. Consideration of these suggested that
the problem was not due to lack of appropriate techniques or
materials or to excessive cost or to a poor cost-benefit ratio but
to a variety of other factors, many of which interrelate and which
may be termed "non-technical barriers to energy efficiency". These
are:

a. That those involved in the design process did not believe that
energy efficient housing was a practical proposition.

b. The designers did not possess the necessary skills and
knowledge to design energy efficient housing.

c. That those involved in the design process were not
sufficiently motivated to overcome their lack of knowledge and
skills.

d. The principles of energy efficient design were contrary to
some established practices and therefore rejected.

e. Sufficient practical assistance was not available to assist
with the design and implementation of energy efficient
housing.

f. The social climate was not conducive to energy efficient
design.

g. The client(s) were not demanding energy efficient design (due
to lack of belief, knowledge and appropriate social climate).
h. Existing Regulations, Bye-laws and Codes of Practice did not encourage energy efficient design.

i. The councils did not have an energy efficiency policy - due again to lack of sufficient knowledge of the realistic possibilities.

j. Limited, and reducing, resources (time/money) created an adverse climate for innovation.

From this analysis it is clear that the change programme would have to include elements to increase the knowledge and skills of designers (b), provide a framework of policy and social pressure to motivate the designers (i & c), provide for practical assistance in both the design and construction processes (e) and demonstrate the effectiveness and practicality of energy efficient design to overcome disbelief, resistance and prejudices (a, g & d). It would also be desirable to influence existing Regulations (h) and the social climate (f) and to provide for increased resources (j) but these were areas beyond the scope of the change agent, except that any change achieved within the three authorities would, indirectly and in the long-term, be likely to also influence these more remote factors.

The Open Systems Perspective (5.2) provided for consideration of the characteristics of the organisation (the local authority) the relevant groups within it and the individuals within them, giving insight into the historical, organisational and environmental factors which might work for or against the proposed change. For
example, in the case of the three local authorities in question, their historical political stance of providing a high level of service for their constituents is conducive to adoption of energy efficiency but at the same time they are under pressure to cut services.

Organisationally, there is total separation of function between policy/decision making (councillors) and implementation (officers), interdepartmental rivalry is common, functions are highly compartmentalised, there is a lack of flexibility and openness to change and a high level of bureaucracy. In addition, recent severe problems with the "radical" housing designs of the 1950's and 60's have increased resistance to any innovation in housing design, public criticism of both (Labour) local authorities and of designers also adds to resistance to innovation but growing awareness, amongst councillors, of fuel poverty and the need to stimulate the local economy makes them receptive to proposals which can be shown to have benefits in these areas.

Communication between departments is minimal and within departments various different styles of communication are utilised, though most hierarchical communication is rather formal. Designers work in small teams, dealing with their own specific group of projects so that there may be rivalry between teams and individuals which could perhaps be used to advantage in motivating some designers to adopt energy efficient design because others are gaining acknowledgement through doing so. Likewise, if one department adopted the idea of energy efficiency, then another might do so in order not to be at a
disadvantage, although care would need to be taken that energy efficiency did not appear to be "owned" by one department as this would reduce the likelihood of it appearing to have any relevance to another.

Due to the hierarchical nature of the local authority structure plus the interrelation of the factors considered under the Metatheory perspective, it is clear that the Planned Change programme needs to be addressed to a number of different points in the structure - the policy/decision makers need to change - to create policies and a climate which will encourage the adoption of the change by departments, groups and individuals. But, in order for the politicians to be prepared to make an energy efficiency policy, they need to be convinced that the relevant knowledge and skills and other resources are available to implement the policy as well as being convinced of the practicality of energy efficiency.

Designers, on the other hand, need not only the appropriate knowledge and skills, but support from their department, clients and policy makers before they will be prepared to change.

The individual characteristics of the various professions also have to be taken into account, including their values, attitudes and beliefs, preferences for different formats for information and existing knowledge and skills.

Consideration of the elements of change as defined by the CLER model (5.3) give further insight into the problem - or, more particularly, into areas which will need attention if a solution to the problem is
to be found. The major conclusions from this analysis relate to the relationship between the change agent and the potential change adopter system and to the resources which are available or may be required for the change to take place. (Resources existing in and needed by the potential change adopter system were considered also from the Metatheory perspective and the Open Systems perspective but here those resources existing in and required by the change agent are also considered).

In looking at the network of configurational relationships (C) and the linkages (L) within the potential change adopter system and between it and the change agent, it was clear that there would be a need for role of the change agent system and its relationship with the potential change adopters to be clearly defined and for existing linkages to be built on and strengthened. There was a need to develop linkages between different groups - particularly to alter uni-directional linkages so that they become bi-directional and less formal. Dormant linkages, between policy makers and other groups and between the change agent and the change adopter groups needed energizing. Some linkages were identified which it might be desirable to sever but it was felt to be beyond the scope of the change agent to do more than, perhaps, weaken these - for instance, to provide designers with sufficient knowledge to be critical of advice (contrary to energy efficiency) from their consultants, rather than try to inhibit them from taking this advice at all.
On the question of resources, it was clear that the change agent needed to obtain material resources to provide for man-power to carry out the change programme and also that the change agent had no direct influence resource and would therefore have to develop the use of indirect influence by firstly bringing about a change in the policy making group who could then use their (considerable) influence resource on behalf of the change agent.

Because this first potential change adopter group were also the group who allocate material resource to the change agent system, it seemed unlikely that resources could be obtained from them before the change had been brought about in them and therefore "outside" funding was sought to enable the change programme to be initiated. This funding was obtained partially from the UK Department of Energy and partially from the EEC specifically for a "Demonstration project" - to design, build and monitor some energy efficient housing and report on the results. This project was then used as the core of the planned change programme as described in chapter 8.

5.4.2 Towards a Solution

The preceding analysis of the problem points towards the necessary ingredients of a solution, as well as indicating some of the difficulties and areas of resistance which may arise.

The problem was defined as;

Measures to improve energy efficiency were not being included in the design of dwellings.
The solution to the problem is then that:

All housing designs incorporate the principles and practice of energy efficiency.

To achieve this requires, primarily, a change in the behaviour of the building designers but for this to be brought about, the variety of causes which have contributed to the problem need to be addressed. Therefore, the second stage in developing a Planned Change Programme is to set Goals and Objectives based on the analysis of the problem and its causes. The next chapter deals with this stage.
Chapter 6

The Goals and Objectives of the Planned Change Programme

As suggested in chapter 4, the setting of discrete goals and objectives is of greatest importance where the potential change adopter system is complex and where the change agent is external to the adopter system as is the case in this study. Lippitt et al (1958, p100) also suggest the need to identify "leverage points" for starting the change process. At the same time, the role(s) for the change agent need to be considered.

6.1 The Goals

The long-term goal, or aim, of the Planned Change Programme was to achieve Energy Efficiency in all housing within the three local authorities concerned. This has to be a long term goal as there are some 150,000 existing dwellings owned by the three authorities and, finances and practical considerations are such that replacement and upgrading can only affect between 6,000 - 12,000 of these each year - the minimum length of time for achieving this goal would therefore be 12 years. Therefore there is a need for an intermediate goal - which could be that:
All dwellings which are newly built, rehabilitated or have any major maintenance/refurbishment work carried out shall be energy efficient.

Both the intermediate and long-term goals as stated above include assumptions regarding the meaning of 'energy efficient' and in practice it is inevitable that this will have a slightly different meaning in different circumstances. For example, a major maintenance job may be simply re-roofing a block of flats. There is scope within this to include a high level of roof insulation (one energy efficiency measure) but to add in other energy conservation measures to this contract could make their cost disproportionate to the benefits.

On the other hand, when a building is being fully rehabilitated, there is considerably more scope for including energy efficiency measures and even more in the case of new buildings where energy efficiency can be built into the space planning and the design of every element of the building from the very first stages of the design process.

The intermediate goal can usefully be split into two parts:

a. That the behaviour of designers and others involved in the process of providing local authority housing is changed so that designs for new-build, rehabilitation and major maintenance schemes will incorporate the optimum level of energy efficiency measures.
b. That behaviour, procedures and practices are changed to ensure that the energy efficiency measures will be successfully implemented during the building process.

This separation is necessary in order to clarify the two-stage nature of building works as it is quite usual for changes to be made to the design during the actual building process, for various reasons, so that the completed building may differ quite considerably from the design. Typical reasons are that a cost-cutting exercise has to take place if the tender price for the job exceeds the cost limits/estimates, where particular details are found to be impractical on site or where the specified materials or appropriate skilled labour are not available.

For as long as energy efficiency measures are perceived as 'add-on luxuries' they are susceptible to cost-cutting and, so long as their implementation is not fully understood or the appropriate materials and skills are neither easily available nor within the repertoire of most building contractors, they will be susceptible to alteration or omission during the building process. Architects and surveyors, if they are not fully convinced of the need and viability of energy efficiency, will generally succumb to arguments from the contractor that the designed energy efficiency measures are impractical.

This second component also requires 'successful' implementation - it is possible for energy efficiency measures to be installed in a manner which renders them ineffective. For example, draughtstrip
can be fixed to a window both neatly and securely but, be positioned 2mm away from the gap it is supposed to seal!

Thus, a hierarchy of goals has been set:

Long Term Goal - that all public housing in the 3 local authorities shall be energy efficient.

Intermediate Goal - that all dwellings which are newly built, rehabilitated or subject to major maintenance shall be energy efficient.

Two components of Intermediate Goal.

(i) That designs for such schemes will incorporate the optimum level of energy efficiency measures.

(ii) That the designed energy efficiency measures will be successfully implemented during the building process.

The characteristics of the potential adopter system and the likely causes of resistance to energy efficiency were discussed in the previous chapter. From this, it is clear that in order to meet the goals, it is necessary to address each of the causes of resistance and find ways of overcoming, or circumventing, them, including any necessary changes to the structure or process of the local authority organisation. For this purpose it is necessary to set a number of objectives. It should be noted that the Goals refer to the behaviour of the potential change adopter system whereas the Objectives are a blueprint for action by the change agent. This is partially a function of the discipline of Planned Change (although,
where the change agent and the potential adopter are working more interactively the objectives may refer to action by each or both of them) and partly due to the characteristics of this specific situation.

If the diagnosis is correct, then dealing with the identified causes of the problem, as reflected in the objectives, will achieve the goals. Whether this is so can only be established by evaluation and, as will be seen in chapter 9, the various forms of evaluation were all aimed at discovering whether (or to what extent) the goals had been met. Once the objectives are set, the next stage, of selecting appropriate strategies and activities for the change programme, can commence.

6.2 The Objectives

The diagnosis/analysis carried out in chapter 5 led to the identification (5.4.1) of a number of necessary elements of the change programme, to overcome the "non-technical barriers" to energy efficiency. In order to meet the goals, the objectives must therefore deal with these elements. In addition, there are a number of further necessary elements which apply to any change programme.

The objectives set for this project are listed below, followed by the rationale for each. The objectives are divided into two groups, (A) general objectives of a planned change programme and (B), specific objectives for this specific case. This second group is further divided into three sections, differentiating between
objectives aimed at the overall long-term and intermediate goals (B1) and those aimed at each of the two components of the intermediate goal (B2 & B3).

A. General Objectives for a Planned Change Programme.

6.2.1 To select the appropriate change agent role(s) and to establish the change relationship.

6.2.2 To monitor the phases of change and adapt the change programme as necessary.

6.2.3 To institutionalise the change.

6.2.4 To resolve the change relationship.

B. Specific Objectives for this Planned Change Programme

B1. To meet overall long-term and intermediate goals:

6.2.5 To identify and utilise leverage point(s).

6.2.6 To bring about the formulation of an energy efficiency policy in each of the 3 local authorities.

6.2.7 To create awareness of the benefits, practicality and affordability of energy efficient dwellings.

6.2.8 To develop an environment more conducive to energy efficient design.

6.2.9 To provide for the allocation of the necessary resources to allow for energy efficient design and building.
B2. To meet component (i) of the intermediate goal:

6.2.10 To provide designers with the necessary knowledge, skills, procedures and help to design and implement energy efficient dwellings.

6.2.11 To develop the awareness and expectations of client departments so that they include energy efficiency in their briefs to designers.

B3. To meet component (ii) of the intermediate goal:

6.2.12 To provide assistance and help to develop procedures to allow implementation of energy efficiency measures during the building process.

6.2.1 To select the appropriate change agent role(s) and to establish the change relationship

In addition to the basic role of expert in the field of Planned Change, change agents can play a variety of roles - intermediary, expert on procedures, provider of internal resource/strength, provider of special environments or supportive. Several of these roles may used together or consecutively in a specific situation and should ideally be selected with regard to the characteristics of the situation. In this project, the first roles played by the change agent system were as a provider of special environments and of resources but all the roles were utilised at various stages of the change programme, as be described in chapter 8.
The establishment of a change relationship (see chapter 4) between the potential change adopter system and the change agent system is a prerequisite for the change process. It involves agreement between the parties as to the pattern of co-operation between them, their roles, expectations and responsibilities. It may be an implicit agreement and may be made between the change agent system and the whole potential adopter system or between the change agent system and selected individuals or groups within the potential adopter system (those who can act as leverage points).

Lippitt et al (1958) report that the terms of this relationship can be explicitly agreed but this can only apply either, where the agreement is between client and change agent system or, where the potential adopter system and the client are, wholly or partially, synonymous. i.e. a potential adopter system which is not the client may not perceive either the need or possibility of the proposed change and would therefore be unable to enter into such a relationship explicitly. This was the case in this project where a few individuals and one sub-group (councillors) had a partial perception of the need for the change but were not convinced of the practicalities. At the same time, some form of change relationship needed to be set up to enable the change process to begin.

This could be developed more explicitly at a later date once some sub-part(s) of the potential adopter system had adopted the change. The change agent system (SLCEG) already had a working relationship with a small number of individuals in the three authorities as a result of both its management structure and previous work on various
housing/building issues and its interest and expertise in energy was known, though not widely. It would also be important to demonstrate the competence of the change agent system and to legitimise its role in helping to change the potential adopter system.

6.2.2 To monitor the phases of change and adapt the change programme as necessary.

The change programme must be kept flexible so that it can respond to different factors which may arise during its implementation such as that the chosen leverage points do not fulfil their expected function or, some sub-groups adopt the change faster or slower than expected or, environmental influences alter for some external reason.

Lewin's three phases of change (Unfreezing, Moving and Freezing) have been sub-divided by Zaltman and Duncan (1977) into eight stages for individuals and five stages for organisations and by Lippitt et al (1958) into seven stages. I have adapted these to give eight stages specific to this project (for further discussion see 7.3). The development of these various stages needs to be monitored in order to respond to movement, or lack of it, between the stages, by implementing the next step in the programme, adding in another activity or strategy or reinforcing current activities so as to provide the optimum opportunity for the adoption of the change.
6.2.3 To institutionalise the change

Once the change has been adopted it is necessary to institutionalise it, so that the change is maintained and the change agent may withdraw without the adopter system reverting to previous practice. This means that the change has to be incorporated fully into the policy, structure, procedures and resource allocation of the organisation as a whole and of the sub-groups. It has to become one of many normal components in the system rather than the subject of special attention. Lippitt et al (1958, p217) see this as the main test of the change agents effectiveness and suggest that a necessary prerequisite for this process is that the change adopter system has evaluated the change favourably. They also point out that care needs to be taken that the internalisation of the new practices does not result in resistance to further change in the same area (see also 10.3).

6.2.4 To resolve the change relationship

Part of establishing the change relationship is a mutual agreement on the length of time the relationship will last but specific processes have to be used, at around the time the change is being institutionalised, to either, end the relationship, allow it to alter so that a relationship continues but in a different form (usually this means a significant reduction in input by the change agent) or, to provide for continued high-level involvement of the change agent but directed at a different problem. (see 10.2)
6.2.5. To Identify and Utilise leverage points

The use of leverage points is proposed by Lippitt et al (1958, p100) to start the change process, particularly where the potential adopter system is large and complex. It involves identifying persons or sub-groups who are accessible to the change agent, open to change and in a position to influence other persons, sub-groups or events so that the process of change develops towards the goal.

In this project, a small number of Councillors, known to the change agent, were identified as appropriate leverage points as they were accessible, were at least partially convinced of the need for change in this area and open to persuasion that the goals were both worthwhile and achievable. They were also in a position to influence other groups and to assist in the change process by, for example, making appropriate policies, questioning existing practice and procedures and allocating resource.

6.2.6. To bring about the formulation of an Energy policy in each of the three authorities.

At the start of this project, none of the authorities had a policy regarding efficient use of energy. This very specific objective was felt to be necessary in order to raise the profile of energy efficiency within the organisation and provide a framework for the planned change. It would also consolidate the support of the councillors themselves for the change programme as they would identify more closely with its goals having formulated and agreed their policy statement on the subject.
In the event, when this objective was met, it was possible to extend its use further than had at first been envisaged to include a specific procedure aimed at improving compliance with the policy which also helped in legitimising the role of the change agent (see 8.3 & 9.2).

6.2.7. To create awareness of the benefits, practicality and affordability of energy efficient dwellings

As was discussed in chapter 5, there was a widespread lack of awareness of these matters within the potential adopter system and although there were other reasons for the lack of energy efficient design, it would be necessary to create/develop awareness in tandem with other activities (such as those referred to in 6.2.10). This would involve 'proving' that energy efficient design had desirable effects and was practical - in terms of time, cost and availability of materials/techniques.

Due to the resistance displayed by the potential adopter system it would be necessary for this 'proof' to be as clear and unassailable as possible and, able to be disseminated widely and to be "high profile" so as to command attention.

The achievement of this awareness might then be sufficient, in some cases, to change beliefs about energy efficient design and even to change behaviour. In particular, it was expected that the sub-group of councillors would be prepared to formulate policy once they were fully aware of both the benefits and the practicalities. This would then assist the change process in the other sub-groups.
The medium used for creating this awareness was an energy efficient building project (Lawrie Park Road), fully documented and monitored and with full dissemination of its details and results. (see chapters 8 & 9). It was necessary to obtain funding for this from an "outside" body rather than through the potential adopter system, for two reasons. Firstly, that the potential adopter system was not committed to the idea of energy efficient housing and therefore would not finance such a project, although there was sufficient open-mindedness for them to co-operate in the project once the financial support was secured. Secondly, for the project to be used to develop awareness and demonstrate the viability of energy efficient housing, there needed to be both detailed monitoring and communication of all information to the potential adopter system. Funding for this was also needed and could not have been raised from the same source to which it would be directed.

At the time that the need for this planned change programme was identified by the change agent system (SLCEG), both the UK Dept of Energy and the EEC Directorate General for Energy had identified a need for "Demonstration Projects" with broadly similar goals and it was therefore possible to obtain funding from these bodies to cover the additional resources needed for this key part of the planned change programme. (see 8.4)
6.2.8 To develop an environment more conducive to energy efficient design.

In chapter 5 it was shown that there were numerous environmental influences on the potential change adopter system, and its sub-groups, which militated against energy efficient design. Whilst some of these, such as societal beliefs regarding the cheapness and availability of fuels, could not be fully addressed by the change agent system, the more localised influences could be considered.

For the environment within and around the potential adopter system to be conducive to energy efficient design would require increasing awareness of its benefits and practicality (6.2.7), an overall policy encouraging energy efficiency (6.2.6) and active encouragement to comply with this policy, by means of exhortation, incentives or procedures. In effect, steps to meet all the other objectives would tend towards meeting this objective. In addition, efforts needed to be made to increase positive media coverage of energy efficiency, influence fuel boards to support energy efficiency, influence changes to the building regulations and draw society's attention to the problems of scarce fossil fuels, fuel poverty etc. so as to affect, to some extent, the wider environment also.

6.2.9. To provide for the allocation of the necessary resources to allow for energy efficient design and building

Although energy efficient design does not, generally, lead to significant extra capital cost for the buildings themselves, some
extra design effort is required, at least until the principles and practices become fully absorbed into the normal design process. Therefore, extra design time would need to be allowed for. Also, in order for other objectives, such as the raising of awareness, to be achieved, time would need to be allocated for designers to attend seminars, exhibitions, courses etc. Resource would also be needed to provide for help, advice, appropriate literature, computer facilities etc. to assist designers in producing energy efficient designs. However, as one of the sources of resistance to energy efficiency was the fear that it would require resources to be provided from an already over-stretched resource-bank, it would be necessary, at least in the early stages of the programme, to keep the demand for resources to a minimum and/or find alternative or additional sources of funds.

As the three local authorities already supported (financially) the change agent system it was possible to devise various means whereby the change agent system provided the majority of the resource required (with the assistance of the outside funding referred to in 6.2.7). The only immediate resource required directly from within the potential change adopter system was a small amount of time for each sub-group to be exposed to the awareness-developing activities (see 8.1 and 8.4).
6.2.10 To provide designers with the necessary knowledge, skills, procedures and help to design and implement energy efficient dwellings

It was clear that one of the major impediments to energy efficient design was that designers had not acquired the necessary tools in terms of knowledge and skills nor were there procedures which required them to even consider the energy characteristics of their designs. Likewise, there was no outside help clearly available should they have wished to use it.

Any procedures would have to be introduced through each departments' management structure, requiring a change of behaviour of the Chief Officers, which could result from policy decisions or from a raising of their awareness, or both.

The provision of knowledge and skills would have to take place within a climate of stretched resources and lack of motivation and against resistance forces resulting from incorrect beliefs and insecurity. The acquisition of the necessary knowledge and skills would therefore have to made as easy and as quick as possible.

Various activities and procedures were devised to deal with this problem and meet this objective, with the change agent first providing a service whereby the designers could produce energy efficient designs whilst not having to consciously expend additional time and effort on learning new facts and skills but acquiring them gradually. It was accepted that internalisation of the knowledge and skills would be a lengthy process with the corresponding need
for the support service to continue over a number of years. (see 8.5)

6.2.11 To develop the awareness and expectations of client departments so that they include energy efficiency in their briefs to designers.

Client departments did not include energy efficiency in their briefs for a number of reasons such as lack of awareness of the benefits and practicality of energy efficiency and doubt that the requirement would be met. It would therefore be necessary both to increase their awareness, as with designers and other sub-groups and also to demonstrate that there were available skills, knowledge and procedures so that such a requirement could be met. They would also need assurance that energy efficient design would not result in increased management or maintenance problems. In this last respect, time was likely to be an important element as many individuals would feel that they needed 'proof' that energy efficient dwellings had been trouble free for a number of years before they would commit themselves fully. Some attempt would therefore need to be made to find a method of shortening this period if the objective was to be met. A possibility presented itself after the start of the programme when it became apparent that a large number of existing management and maintenance problems could be attributed to lack of energy efficient design. Application of the principles of energy efficiency to these 'problem' dwellings clearly demonstrated significant improvements in a short space of time which was found to significantly speed up acceptance of the desired change (see 8.7).
6.2.12 To provide assistance and help to develop procedures to allow the successful implementation of energy efficiency measures during the building process.

The role of the Clerks of Works as supervisors of the building process was described in chapter 5 together with an indication that some members of this sub group were unlikely to be persuaded of the value of energy efficiency. In addition, the supervision of energy efficiency measures requires different procedures to checking other building components. The designers also supervise the building works but are susceptible to persuasion by the clerks of works and by the contractor that certain techniques, details or materials are impractical on site.

Building contractors had not developed either awareness of energy efficiency or expertise in energy efficient building techniques and were therefore generally unsympathetic towards incorporating energy efficiency measures.

There was clearly little point in instigating change to energy efficient design if it was unlikely to be realised in practice and the points made above indicated that this was a real risk. Therefore it would be necessary to develop procedures aimed at ensuring, on one hand, that there was supervision/checking of installation of energy efficiency measures on site, both for their existence and their effectiveness and, on the other hand, that expertise in installing energy efficiency measures was available (see 8.9).
Having established both goals and objectives, the next stage in developing a Planned Change Programme is to consider the types of strategy available and select those which may be appropriate within the framework of the total situation as defined during the diagnosis. Within the overall strategy types, specific activities can then be designed, directed at meeting one or more of the objectives. Strategies are discussed in the following chapter (7) and the specific activities developed for this Planned Change Programme are described in chapter 8.
Chapter 7

7. Choice of Appropriate Change Strategies and Consideration of the Phases of Change

The type of change strategy, or strategies, chosen for a particular situation provides the framework for the design of specific activities which will form the change programme. The choice is governed by the characteristics of the situation, the goals and objectives of the change programme and by the change agents' own ideology. More than one strategy type may be utilised in a particular change programme - different strategy types may be required for different sub-parts of the change adopter system or at different stages of the change process.

The change agent needs to monitor the phases/stages of change, as experienced by the potential change adopter, in order to identify when to introduce different strategies or activities.

In this chapter, the different strategy types available are first discussed (7.1) followed by the reasoning for the choices made for this particular project (7.2). The Phases or Stages of Change are discussed in the third section (7.3).
7.1 The Strategy types available

Chin and Benne (1967) identify three groups of strategy types:

- Empirical - Rational strategies
- Normative - Re-educative strategies
- Power - Coercive strategies

However, Zaltman and Duncan (1977) identify four strategy groups:

- Facilitative Strategies
- Re-educative Strategies
- Persuasive Strategies
- Power Strategies

Re-educative and power strategies appear to be common to both lists but if the definitions are compared then Zaltman and Duncans' definition of Re-educative strategies matches Chin and Benne's Empirical - Rational strategy description. Zaltman and Duncan therefore omit the nomative - re-educative group and add two further categories: Persuasive and Facilitative. Benne and Chin would probably include persuasion within the power-coercive category and do not mention facilitative strategies as such. However, I consider that both persuasive and facilitative strategy groups should be separately delineated as discussed below and therefore there are
five possible strategy types:

   Empirical - Rational strategies
   Normative - Re-educative strategies
   Power - coercive strategies
   Persuasive strategies
   Facilitative strategies

which are considered in sections 7.1.1 to 7.1.5 below.

7.1.1 Empirical - Rational Strategies

Chin and Benne state that there are two fundamental assumptions underlying this strategy group. These are, that man is rational and is self-interested and therefore will follow his rational self-interest once this is revealed to him. It therefore follows that, if a change is proposed which can be rationally justified and which can be shown to benefit the potential adopter in some way, then the proposed change will be adopted.

In the present case, this could mean, for example, that if a rational case is made for energy efficient housing and it is demonstrated that designing energy efficient housing would benefit the designer in some way (eg. enhanced status, improved self-image, salary increase) then, designers would proceed forthwith to designing energy efficient housing.

A number of strategies are placed within this group by Chin and Benne, most of which are concerned more with the rationality element than with the question of self interest, although one strategy,
"Utopian Thinking," suggests the use of a picture of a "better" future to encourage adoption of a proposed change. Two of the strategies, "Basic Research and Dissemination of Knowledge through General Education" and "Applied Research and Linkage Systems for Diffusion of Research Results" relate to transference of knowledge and research results from academics and researchers to the general population, the first by diffusion through the general education system and the second by setting up specific organisations and/or procedures to provide for two-way communication, with researchers receiving feedback on the practical implementation of their research.

Two other strategies, "Personnel Selection and Replacement" and "Systems Analysts as Staff and Consultants" suggest that the barrier to change (in organisations) is that the persons responsible for improving practice within the organisation are not equipped to do so - in the first case, because they are psychologically unsuited to this role and in the second because they have not developed techniques in problem solving, consideration of the total system etc. The solution would therefore lie in either, appointing psychologically suitable personnel to these positions or, in employing systems analysts to analyse the organisation and propose more effective processes and procedures.

The last strategy type included by Chin and Benne in this group is "Perceptual and conceptual re-organisation through the clarification of language," which they see as overlapping into the normative-re-educative category because it emphasises the
communication process. This strategy is based on the idea that purification of language would lead to more effective reasoning, (through more adequate communication and conceptualisation) and thus enable the presentation of a more effective rational appeal for change.

Zaltman and Duncan define what they call a "re-educative" strategy as

"...one whereby the relatively unbiased presentation of fact is intended to provide a rational justification for action."

This definition clearly matches Chin and Benne’s description of empirical - rational strategies and this impression is enhanced by their statement that these strategies assume rationality and ignore other barriers to change. Zaltman and Duncan do, however, appear to see more value in such strategies than do Chin and Benne. They suggest that the use of such strategies can be appropriate where the acquisition of extensive information or skills is needed to implement the change or where resistance to change is based purely or mainly on inaccurate information. They also suggest that such strategies may be of use (presumably together with persuasive tactics) in obtaining financial support and long-term commitment to change programmes and to create an awareness of the need for change before the change is proposed. They also indicate that these strategies can be used after other strategies - to support the adopter in maintaining the change and to reduce dissonance.
Chin and Benne suggest that it is rare for any one of the strategies in this group to be sufficient, by itself, to bring about change, because, "patterns of action and practice are supported by sociocultural norms......(which)......are supported by the attitude and value systems of individuals..." They also hint at the need to develop new skills, relationships and procedures as part of the change process. They also point out specific drawbacks to some of the individual strategies, such as that dissemination of knowledge through basic education may only lead to the desired change where there is an existing state of readiness for accepting the new knowledge.

I would point out that some of these strategies are by their nature, very long-term and would thus only be useful as adjuncts to other strategies where a change was desired within a shorter time-scale. Also, that the use of "systems analysts" seems to be another way of describing the role of a change agent, especially in regard to diagnosis of the problem(s) and this is therefore not a strategy in the same sense as others in the group.

7.1.2. Normative - Re-educative Strategies

Chin and Benne describe this group as being strategies which encourage potential change adopters to participate in their own change process - to change their normative orientations to existing patterns of action and practice and develop commitments to new ones. This involves changes in attitudes, values, skills, relationships as well as aquisition of knowledge and information. This approach does
not exclude rationality but indicates that there are a variety of other factors which govern behaviour.

One of the major contributors to the development of normative re-educative strategies was Kurt Lewin and the ten principles of re-education which he formulated (in 1945) are discussed by Benne (1971) in relation to subsequent experiences and developments in the field. Benne considers that these experiences have confirmed Lewins view that the "whole person" must be involved in the process of effective re-education, that correlated changes are required to his/her cognitive structure, valutative structure and behavioural/motoric patterns. Although Lewins philosophy, and much of the work by others based on it, is related to change in individuals, many of the principles can also be applied to change in groups and organisations, although the methods for utilising these principles will necessarily be different.

Chin and Benne identify five common elements among the strategies in this group - that there is emphasis on the involvement of the potential change adopters in working out change programmes for themselves; the problem is not assumed to be one which can be met simply by more adequate technical information - it may require alterations in attitudes, values, norms, external and internal relationships,; the change agent must learn to intervene collaboratively with the potential change adopter in diagnosing the problem; non-conscious elements which may impede change must be brought into consciousness, examined and reconstructed; change agent
and adopter use the methods and concepts of the behavioural sciences as resources.

Benne and Chin see this strategic approach as the most desirable as they feel that the interaction of change agent and adopter allows for change without manipulation and indoctrination. They identify two sets of strategies within the group - the first focuses on improving the problem solving processes used by the adopter system, the second focuses on helping members of the adopter system become aware of their attitude and value orientations and relationship difficulties and thus foster personal growth, leading to changes in the system. Both approaches are to some extent therapeutic in nature as they can be used to help individuals or systems adapt to change as well as being used to foster change.

Both approaches within this strategy group require that the potential adopter perceives either the need for change or the need for help in coping with change - because of the interactive nature of these strategies they cannot be utilised where the change agent is attempting to bring about change in a system which does not recognise the need for it and/or cannot conceive the practicality of the proposed change. This latter condition occurs where the client is not congruent with the potential adopter system - a situation not apparently considered by Chin and Benne (or a number of other writers on Planned Change).
7.1.3. Power - Coercive Strategies

Zaltman and Duncan (1977) state that "Power may be defined as the ability to change the probability of the target performing some behaviour by manipulation, or threat of manipulation, of the target's outcomes." In other words, the use of rewards and/or punishments (or the threat thereof) to force the potential adopter (target) to adopt the desired change. Chin and Benne (1967) make it clear that both rational - empirical strategies and normative-re-educative strategies will involve some use of power, particularly knowledge based power, but they see this as legitimate as the purpose is to transfer the knowledge and consequently the power.

McClusky (1975) also argues that the use of a particular type of power strategy can be of value. This is one which is liberating rather than debilitating and aims to improve the adopter's self-identity, independence/autonomy and efficacy/competence by means such as setting an example (exemplary power) or by enabling the adopter to perceive the intrinsic rewards in the proposed course of action.

In power-coercive strategies, the power used is generally political, economic, or moral. Chin and Benne include in this group the use of political institutions to achieve change (change of policy, legislation etc), strategies of non-violence/civil disobedience for effecting change (Gandhi, Martin Luther King) and manipulation/recomposition of power elites to effect change (Marx).
They suggest that power-coercive strategies are the least (morally) desirable strategy group and that they may be ineffective by themselves, but they also point out the importance of taking account of concentrations of power/power elites when devising a planned change programme.

Zaltman and Duncan suggest that the question of using power strategies may frequently not arise as the change agent can only use these if he is in a position to control rewards or punishments for the potential change adopters. The exception to this would be the use of moral power - creating feelings of guilt etc. They also suggest that power strategies have limited usefulness because they do not provide for the development of any commitment to the change and so although there may be initial compliance, the change will not be maintained without continued surveillance, or the use of additional strategies. They do however see a limited range of uses for power strategies - for example, to force the change in a small sub-part of the adopter system where resistance is creating a barrier to change and the majority of the system is favourably disposed towards it or, to force an initial, small-scale, trial of the proposed change (which can then form the basis for other strategies).

Bhola (1984) also suggests that there are "acceptable currencies of power" such as knowledge and persuasion and, suggests that the ability to change actually means the ability to control which equals power.
7.1.4. Persuasive Strategies

Zaltman, Kotler and Kaufmann (1972) define this group as,
"...strategies which attempt to bring about change partly through bias in the manner in which a message is structured and presented. They attempt to create change by reasoning, urging and inducement. Persuasive strategies can be based in rational appeal and can reflect facts accurately or be totally false". The strategies thus included in this group do not include extreme forms of persuasion such as brain-washing which might better come within the "power" category although "inducement" is also suggestive of "reward power". There are ethical questions involved in the use of any persuasive techniques and particularly when considering the use of latent messages - of which "subliminal advertising" (which created something of a furore in 1985) must be the extreme example. On the other hand, the whole concept of planned change could be seen as being a question of persuading the potential change adopters to change their behaviour. It is useful therefore to consider persuasive strategies in a formal manner and evaluate their usefulness or counter-productivity for a particular situation.

Persuasion could be seen as falling within the Normative - Re-educative strategy group as it is designed to appeal to the valutative structure of individuals or even, partially, within the empirical - rational group as persuasion relies on a (covert or overt) appeal to some form of self-interest and also involves an element of rationality or quasi-rationality.
However, persuasive strategies are sufficiently different to these other groups that I would agree with Zaltman and Duncan in treating them separately. I also feel this is desirable due to the ethical questions which arise with their use and which might easily be overlooked if they were incorporated in another strategy group.

Zaltman and Duncan (1977) suggest that persuasive strategies can most usefully be employed in tandem with empirical - rational (Chin & Benne’s definition) strategies to draw attention to a problem/need not yet identified by the potential change adopter, increase commitment to change by stressing incentives/disincentives of change/non change or, to convince the adopter system to sustain a change or to obtain resources for a trial or change programme.

Bettinghaus (1973) points out that persuasion depends on communication - whether this be interpersonal, or impersonal, verbal, written or visual. Communication involves four elements: source, message, channel and receiver. Any one or more of the first three of these elements can be manipulated in order to create persuasive communication. For example, the source, or presenter of the message may be a person or organisation which is highly respected by the receiver(s) so that there is more likelihood of the message being received and acted upon; the message itself may be biased towards a certain viewpoint, designed/stylised in certain ways or may include references which appeal to the receivers; the channel(s) used for sending the message can be chosen with a view to highest exposure of the messages to the receiver, or the channel used may be one which is highly regarded by the receiver.
Bettinghaus also points out that persuasive communication is frequently a two-way process with the receiver of the persuasive communication reacting and putting forward his/her viewpoint with the intent of persuading the sender of the communication. It seems to me that although this occurs most obviously in interactive/interpersonal situations the desire to react in impersonal situations may result in resistance to the message or "switching off" - either literally or figuratively! For example, if TV viewers are presented with persuasive messages with which they disagree they may react by switching off the television, changing channels, leaving the room or arguing with this inanimate object! A conference delegate may go to sleep or start thinking of something else. It is therefore important to take this factor into account when designing the message(s) and choosing the channel(s) and the source (where possible) so as to optimise the persuasive effect of the message.

7.1.5 Facilitative Strategies

Zaltman and Duncan (1977) state that the purpose of facilitative strategies is to make change easier for the potential change adopter but they perceive three prerequisites to the use of facilitative strategies:

a) That the potential change adopter recognises the problem (which the change programme is intended to solve).

b) That the potential change adopter agrees that remedial action is necessary, and
c) That the potential change adopter is open to external assistance and willing to engage in self-help.

I do not agree that all of these are always prerequisites for the use of facilitative strategies. It has been pointed out earlier that there are situations where the potential change adopter system does not recognise a particular problem and therefore would not agree that remedial action, or change, is necessary but, where another individual or system, whether it be the "client" or the change agent, does perceive both the problem and the need for change. In this case, the task of bringing about change is obviously even more difficult as the potential change adopter system is unaware and therefore likely to be unresponsive and resistant to change efforts. In such a situation, there would seem to be an increased need for facilitative strategies - ie. action which provides direct help to the potential change adopter system in adopting change so as to reduce the disruptive impact of the change and consequently reduce resistance.

In other words, if it is possible to institute a planned change programme despite this lack of awareness in the potential change adopter system, then the use of facilitative strategies is vital in order to increase the likelihood of adoption of the change, rather than either mere compliance with procedures until surveillance is removed or, resistance to the change on multiple grounds which might be paraphrased as, "We don't perceive a problem or the need for this change and furthermore it is extremely inconvenient to us to adopt this change, we can't afford it and also, we have no access to the
knowledge and skills which are obviously needed to implement this new process."

I would agree that it is necessary for the potential change adopter system to be prepared to accept external assistance - whether this is in the form of finance, knowledge, skills or procedures. It is desirable that the potential change adopter is also willing to engage in self-help, but this is likely to be related to perception of the problem and of the need for change and therefore may not be present, at least at the start of the change programme. It may develop at a later stage when working through the process of change has broken down the resistance to the concept of change and led to an increased awareness, not only of the problem but that it is soluble. At that point, it is likely that the potential change adopter system will develop a desire to internalise the skills, resource-provision, knowledge, procedure-forming activities etc and reduce its reliance on external agencies.

As Zaltman and Duncan point out, the use of facilitative strategies is dependent upon being able to create awareness of the availability of assistance which means that lines of communication may have to be set up in order to inform the potential change adopter system of the availability of assistance. An example of this would be if an agency (local government) has an aim of improving the standard of repair of houses in its area and identifies a need for providing financial assistance to householders to facilitate this. They therefore decide on a facilitative strategy - to provide 50% grants for housing repairs. This can only be effective if householders are
made aware that these grants are available and of the procedures for obtaining them. Of course, this strategy alone may not be sufficient to bring about the desired change as other factors may still prevent the householders from effecting the repairs, or, the level of help may not be sufficient to overcome other factors.

Zaltman and Duncan assess facilitative strategies as being valuable in overcoming low motivation and overcoming resistance to the change stemming from its complexity or cost, but found that such strategies were generally insufficient by themselves, particularly where a change objective involves altering firmly held attitudes or beliefs, or entrenched behaviour. They also point to the need to gauge the optimum time span for provision of the help - if help is available over a long time span, the potential change adopter system will not recognise a need to change itself as it can continue to rely on the "outside" help. Alternatively, too short a period of help tends to inhibit participation.

7.2 Choice of strategy types to meet the specific goals and objectives of this project.

The most attractive of the strategy types available to the change agent is the normative - re-educative group. Firstly because of its interactive orientation - change agent and potential change adopter working together towards a definition of, and then a solution to, a particular problem. Secondly, because it consequently allows for change to take place without external manipulation or indoctrination. However, there is one basic requirement for the use
of such strategies which is that the potential change adopter system must recognise either, the need for change to deal with a specific problem or, the need for help in coping with change that is already taking place. If this basic awareness is not present, in at least some sub-part of the potential change adopter system, then this strategy type becomes unavailable to the change agent, at least until such time as other strategies may have led to development of this awareness.

As previously discussed (chapters 5 & 6), the potential change adopter system in the present case was, in general, unaware of the problem and its implications and therefore its members could not perceive a need for change or for help in bringing about change. With the exception of a few scattered individuals, only one sub-part of the system - the elected councillors - had some perception of the problem and even they were not actively seeking change as they did not perceive a practical solution. However, they were open to proposals for change.

In this situation, it appeared that only the change agent (SLCEG) perceived both the problem and the solution. The first task therefore, was to heighten the awareness of the councillor sub-group that there were (potential) solutions to the problem and then to work with this sub-group to bring about change in the rest of the system.

Thus the councillor sub-group was identified as a leverage point (objective 6.2.5) and it was then necessary to select the
appropriate strategy, or strategies, for meeting objective 6.2.7 with this sub-group - to create awareness of the benefits, practicality and affordability of energy efficient dwellings. The appropriate strategies for this appeared to be a mixture of empirical-rational and persuasive types, followed by facilitative strategies to assist the sub-group in taking action which would enable a change programme to be instituted for the remainder of the potential change adopter system.

It would be appropriate to use empirical-rational strategies in this case as the councillor sub-group were ideologically receptive to the concepts of energy efficiency, were aware of the problems caused by housing which was inefficient in energy use and were open to (rational) information which would indicate that there were realistic solutions to the problem. Appeals could be made also to their self-interest in terms of both their political and their ideological aspirations.

Some degree of persuasion would also be required, however, to convince this group that there were realistic possibilities for bringing about change in the system so that energy efficient housing could become the norm. To this end also, it would be necessary to use facilitative strategies to provide concrete help to this group in playing their leverage point role.

The question of using power-coercive strategies in this particular situation hardly arises as the change agent system did not have any direct means of power at its disposal, with the possible exception
of moral power - it might be possible for the change agent to use moral force to cause the potential change adopter system to comply with certain procedures by engendering feelings of guilt that by not doing so they were causing suffering, wasting resources etc.

However, this type of negative activity, as well as the use of power generally, is contrary to the ethos of most change agents. For practical reasons, also, it is usually unproductive in the longterm to use power as a strategy for change as its effect is likely to last only as long as the pressure remains applied and the actions of the potential change adopter system are monitored.

A very limited use of power is accepted by some writers (eg. Zaltman and Duncan) - for example, to remove a blockage in a system where the majority is favourably inclined to the change. In this particular case, although the change agent (SLCEG) did not have any direct power, some sub-parts of the potential change adopter system were in positions of power over other sub-parts, so that there was, at least theoretically, the possibility of the change agency persuading others to utilise their power on its behalf. Therefore, although power-coercive strategies were not initially selected for use in this project, the possibility of using them, indirectly, at some stage during the programme, should this appear necessary, was held in reserve.

So far as the main body of the potential change adopter system was concerned, it seemed that multiple strategies would be needed to meet the goals and objectives:
Empirical - rational strategies would need to be used both at the start of the planned change programme and throughout. They would be needed at the start for two reasons; first, that they could be sufficient, alone or with facilitative strategies, to cause some individuals and/or sub-parts of the system to adopt the change and these individuals or sub-parts would then act as leverage points, or catalysts to encourage other sub-parts to adopt the change or at least give it a trial. Secondly, empirical-rational strategies could be used at the beginning because this strategy group does not require a high level of commitment from the potential change adopter system. Arrangements have to be made for the potential change adopter system to be exposed to the message and for this message to be both a rational exposition of relevant facts and also to include an indication (whether explicit or implicit) of how adopting the change may serve the self interest of the adopter. Whilst it is recognised that empirical-rational strategies alone are unlikely to be sufficient for the majority of the potential change adopter system, the intention in using them would be to create conditions in which the use of additional strategies was possible and where these would then lead to adoption of the change.

In this project, the purpose of the use of empirical-rational strategies would be to develop awareness of the benefits of energy efficiency and the low capital costs involved, together with the provision of empirical data which would be accepted as "proof" of various aspects of the subject, thus counteracting some of the erroneous beliefs held by some members of the potential change
adopter system. At the same time, it would be possible to suggest how adoption of the change would serve the adopter's self-interest - in terms of job satisfaction, approbation of superiors or clients etc. It was felt that this approach could then create a condition of openness to change and willingness to adopt new practices and procedures aimed at the production of energy efficient dwellings. The effect of these strategies would then be reinforced by facilitative strategies and re-educative strategies aimed at enabling the potential change adopter system to implement, evaluate and sustain the change.

Empirical-rational strategies would also be required throughout the change programme in order to sustain the change process by providing an unimpeachable database for reference by the potential change adopter system when assailed by doubts of the efficacy of the change and to provide periodic reminders that there are advantages to the adopter as well as the beneficiary (i.e. to answer the question, "what's in it for us?").

Persuasive strategies were seen to be required in conjunction with the empirical-rational strategies, particularly to stress the benefits of the proposed change. As the obvious main beneficiaries of the change would be the building occupants (as they would benefit from reduced fuel bills and improved comfort) it would be necessary to persuade the potential change adopter system that there would also be benefits for them such as, in the case of housing managers for example, a decrease in complaints from occupants or a decrease in the need for remedial work and repairs to dwellings. It seemed
likely that any persuasive techniques used would tend to also involve a use of moral power - appealing to the social conscience of the potential change adopters as a means of persuading them to adopt the change because it would be (socially/morally) irresponsible not to do so. This illustrates how persuasive and power strategies can be seen as part of the same continuum and consequently need to be treated cautiously on both practical and ethical grounds. There is also a relationship with the self-interest component of empirical-rational strategies - persuasion, when based on accurate facts, appeals to come aspect of self-interest in the way these facts are presented in order to encourage movement towards adoption of the change.

In the early stages of the project, the main source for persuasive communication would necessarily be the change agent so that it would be vital for this source to be credible and respected. This was achieved by a combination of factors - the fact that the UK Dept. of Energy and the EEC were funding/sponsoring a Demonstration Project directed by the change agent was well publicised and endowed the change agent with status in the field of energy efficiency and, monitored results from some energy efficient dwellings, designed by the change agent, were shown to have saved significant amounts and to have fulfilled the predictions. Dissemination of this information, with its veracity vouched for by some individuals within the potential change adopter system, aided credibility.

Thirdly, the Demonstration Project used as the focus of the change programme included the public display of monitored data from the
houses and flats, automatically, on a daily basis, thus providing further credibility in terms of technical expertise as well as showing that the change agent was being open and honest by not "doctoring" the data before it was seen by others!

At later stages of the project it was expected that some sub-parts of the potential change adopter system would use persuasive strategies to help bring about the change in other sub-parts. Also, it would be possible to use other (external) sources to reinforce the message(s) by, for example, arranging for members of the potential change adopter system to attend conferences and seminars run by others (e.g., Dept of Energy, Universities etc.) or by drawing attention to books, articles etc dealing with the subject.

The message to be communicated (whether "persuasively" or "rationally") would need to be structured differently for different sub-parts of the potential change adopter system - for example, for designers, the emphasis would be on the practical details of designing energy efficiency into buildings whereas, for councillors, the emphasis would be on the advantages for the occupants, with much less technical input.

The choices for the channel(s) theoretically encompass all communication methods - face to face (either one-to-one or one to a group), radio, television, computers, videos, slides, films, exhibitions etc. Not all would be available to the change agent in a particular situation. In this particular project there were possibilities for some face-to-face communication, both on a
one-to-one basis and through seminars but it seemed that the main channel available was through the use of an exhibition and associated publications. (see 8.2)

In this project, the category of facilitative strategies was considered to be absolutely essential for the change process because of the need for certain skills and knowledge to be utilised by the potential change adopters which they did not yet possess (see chapters 5 & 6). It might have been possible to present a rational case for energy efficient housing and to convince the potential change adopters that they would benefit from supplying this, with or without the use of persuasive communication. It might even have been possible to enter into a re-educative relationship so that the potential change adopter system would diagnose the problem(s) and solution(s) for themselves. However, the desired change would still not have taken place due to the lack of skill and knowledge resource.

Whether the lack of resource is real or unreal is not relevant as it is the perception of it which hinders implementation of the change. In this case, there was a real lack of resource in terms of relevant knowledge and skills to design, specify, build, supervise or evaluate energy efficient housing. The perceived (but less real) lack of financial and time resources was also a stumbling block. The change agent therefore devised a number of means for providing the necessary resources to, for example enable the designers to produce energy efficient designs without needing to acquire the full knowledge and skills themselves.
This was done by providing a consultancy service whereby SLCEG analysed the energy efficiency options for each building project (in terms of capital cost-v-savings), suggested several (optimised) solutions to the designers (leaving the final design decisions with him/her) and assisting with specifications of measures, detail design problems etc. The assumption was made that the designers would gradually absorb some of the necessary knowledge and skills, gain confidence in their ability in this field and be prepared to invest some personal effort in developing their expertise so that the consultancy input could be gradually reduced and the designers provided with appropriate tools (eg computer software) to carry out the full process themselves. This and other similar facilitative strategies, intended to meet objectives 6.2.9, 6.2.10 and 6.2.12, are described in chapter 8.

As suggested earlier, there was little scope for using normative-re-educative strategies at the start of the change programme due to the lack of awareness of the potential change adopter system. However, since the intention was to use other strategy types to create this awareness, a point would (hopefully) be reached where re-educative strategies could be brought into play. This point would be reached when the potential change adopter system, or any of its sub-parts, were aware both of the problem and its potential solution(s) and perceived a need for change(s) to allow solution of the problem. The system, or sub-part, would then be able to interact with the change agent to develop new patterns of action and commitment to these.
This strategy group would be the most difficult to implement within the bureaucratic and compartmentalised structure of a local authority with its difficulties in the relationships between sub-parts. On the other hand, it seemed probable that, once the change had been experienced and positively evaluated, by at least some sub-parts of the system, there would be an inclination towards developing procedures, skills, knowledge, etc. further. The change agent's role at this juncture would be to assist the potential change adopter system in developing its own problem-solving processes, at least in respect to this particular issue, and to provide support by way of facilitative strategies as required. This use of re-educative strategies could be seen, in this project, as preparation for meeting objectives 6.2.3 & 6.2.4 - to institutionalise the change and resolve the change process. It also represents a distinct alteration in the respective roles of change agent and adopter.

This project required the use of multiple strategies. First, the emphasis would be on the use of Rational and Persuasive strategies to bring about a desired change in one sub-part of the potential change adopter system (councillors) so that this sub-part could be utilised as a leverage point in dealing with the remainder of the system. Secondly, Rational Strategies would be utilised with the main body of the potential change adopter system supported by Persuasive strategies with the availability of Facilitative strategies clearly apparent, although these would not necessarily be
utilised to any great extent until some changes, such as the formulation of energy policies, had taken place.

Power strategies were rejected except that the use of indirect power (that of Councillors or chief officers) would be utilised if the situation arose where the majority of the potential change adopter system was prepared to adopt the change, or to give it a trial, but there was some (minority) sub-part which was blocking this. This limited use of power, if required, was felt to be justified by the desirability of the end result.

Normative-re-educative strategies would not be appropriate at the beginning of the change programme because they require the potential change adopters to perceive the need for the change and this was not the case (see 7.1.2). However, as this awareness was developed in the various sub-parts of the system, some normative-re-educative strategies could be introduced.

The next chapter (8) describes the various activities which were designed within these strategy groups, to meet the goals and objectives specified in chapter 6.
7.3 The Phases of Change

One of the objectives identified earlier (6.2.10) was to monitor the phases of change in order to adapt the change programme as necessary.

Cryer (1983, PP20-27) identifies that models of innovation diffusion can be equally well applied to planned change (and vice-versa) and suggests that the majority of models are systems models (i.e. dealing with the relationships and forces within a system) rather than developmental. Three examples of systems models were described earlier and used to diagnose the present problem (see chapter 5).

However, there are a number of developmental models of change/innovation diffusion, the majority of which appear to be derived from Lewin's original three-stage model - Unfreezing, Moving, Freezing. The main difference between the various developmental models is their viewpoint - whether they are primarily concerned with the change agent or with the change adopter.

Examples of models which concentrate on the stages of change of the potential adopter system are those of Rogers and Shoemaker (1971) and two from Zaltman and Duncan (1977) - one for individuals and one for organisations. An example of a model concentrating on the change agent is that provided by Lippitt et al (1958).
Kurt Lewin first identified that, for permanent change, there had to be distinct stages/phases in the adoption of any innovation or change and he described three stages:

"Unfreezing" the existing situation,
"Moving" to a new situation and
"Freezing" the new situation.

Lippitt (1958, p.129-143) expanded these three phases into seven:

1. Development of a need for change.
2. Establishment of a change relationship.
4. Working towards change - establishing goals and intentions.
5. Working towards change - transformation of intentions into change efforts.
6. The generalisation and stabilisation of change.
7. Achieving a terminal relationship.

Zaltman and Duncan (1977, p.225-241) suggest another model for the change process similar to Lippitts particularly in the latter
stages but concentrating more in the initial phases on personal characteristics of individuals and their resistance processes:

1. Perception
2. Motivation
3. Attitude
4. Legitimation
5. Trial
6. Evaluation
7. Adoption/Rejection
8. Resolution

Lippitt's first 2 stages and Zaltman and Duncan's first 3 roughly correspond to Lewin's "unfreezing", Lippitt's phases 3, 4 and 5 or Zaltman and Duncan's stages 4, 5 and 6 are expansions of Lewin's "moving" stage and Lippitt's sixth and seventh stages relate closely to Zaltman and Duncan's stages 7 and 8, both of which are expansions of Lewin's "Freezing" stage.

The unfreezing stage(s) are concerned with creating the initial conditions for change: perception, by client and/or by adoptor, of a problem or need for change/innovation - which may have to be developed by the change agent if it has not occurred spontaneously, plus motivation to change, including the belief that a solution to the problem exists and the development of appropriate attitudes based on beliefs about the subject of the proposed change.

The next stage, "Moving", encompasses the diagnosis of the problem leading to the establishing of goals and objectives and the
development of activities designed to meet these. Legitimation of these activities relies mainly on social interaction and the change agent has to demonstrate to the potential adopters the social acceptability of the change. The individuals then test and evaluate the innovation/change - either in actuality or symbolically.

Symbolic adoption occurs where the need for change is perceived and motivation and attitudes favour adoption but the individual is not able to adopt the change because, for example, the necessary procedures or skills are not available to him. The converse, symbolic rejection, can also occur in similar circumstances.

Behavioural adoption can take place without symbolic adoption, i.e., where the individual may not hold a favourable attitude but may still behave in the desired manner due to other psychological, sociological or situational factors. However, Zaltman and Duncan (p. 234) suggest that in this latter case, these individuals may be sources of negative interpersonal communication and thus should not be used as opinion leaders or influencers.

The last stage, "Freezing", includes either commitment to the long term adoption of the change or its rejection and, what may be termed as the institutionalisation of the change - where it becomes a permanent part of the belief-attitude-value system of the individual and a permanent part of the structure of the system by being incorporated into its normal functions/procedures. The last part of this stage is resolution of the change relationship, where the change agent and client agree on whether to terminate the relationship or continue it in a different (usually reduced) form in
order to ensure the full adoption of the change or further
development of the system to improve it further. At this stage, the
adoption system individuals may feel insecure if suddenly left
without the change agents support unless previous efforts at
institutionalisation and provision of the necessary skills,
knowledge, equipment etc. have allowed the adopters to feel
comfortable and confident with the new behaviour.

Table 7.3.1 indicates my view as to how these models relate to each
other and how the stages of planned change for the change agent may
interact with the stages through which the potential adopter passes.
|----------------|--------------|----------------------|---------------------------|-----------------------------------------|------------------------------------------|
| **1. Unfreezing** | 1. Perception/development of a need for change. | 1. Knowledge | 1. Perception of need of Innovation | 1. Initiation  
1a. Knowledge, awareness  
1b. Attitude formation |
| **2. Moving**   | 3. Diagnosis | 3. Decision | 3. Trial - real or conceptual | 2. Implementation  
2a. Trial |
|                 | 5. Actual change efforts | | 7. Adoption/Rejection | | |
|                 | 7. Achieving a terminal relationship. | | | | |
Table 7.3.2 shows my adaptation of the stages/phases of change to more closely reflect the specific characteristics of this particular project. I have adopted Lippitt's stages with the addition of Zaltman and Duncans stages 5-7 (renumbered as 6a,b,c) as reflecting the stages through which the individuals within the potential adopter system may pass whilst the change agent is involved in the process.
actual change efforts. In many cases stages 1-4 would be common to both change agent and adopter although they may not be contiguous in time. This may be due to, for example, the lack of perception of a need for change amongst members of the potential adopter system until after the change agent has initiated some specific activities.

In this particular case (for a number of reasons which were considered earlier - chapters 4 & 5) the change agent had to deal with stages one to five alone - at least in the early stages. Stages 7 and 8 have to be common but could be initiated by either the change agent or the adopter - in this project there have been some moves by both the adopter system and the change agent towards institutionalisation (see 9.4 and 10.3).

The establishment of the change relationship depends on the potential adopter system, as well as the change agent, perceiving a need for change and therefore, in this case, this could only happen subsequent to other stages. As various individuals and sub-parts of the adopter system developed this perception and the associated openness to change at different rates, this relationship tended to be set up at different times with different people/groups (see 8.1.4). Stage 6 reflects the duality of the change programme, with the change agent carrying out the actual change efforts whilst at the same time the potential adopters go through the phases of Trial (6a), Evaluation (6b) and Adoption or Rejection (6c).

In this project, the actual change efforts were the demonstration suite - exhibition and seminars, consultancy facility, setting up
procedures, etc., as described in chapter 8. As suggested earlier (4.3) one of the most important roles/activities of the change agent is to monitor the phases/stages of change (of the adopter) so that the programme, or any of its constituent parts, may be adjusted, in timing, intensity, direction, content or format, to meet altered needs or circumstances. A description of this process for the present case is given in 9.5.

Having considered the various strategy groups to be utilised in this specific project (7.1. and 7.2 above) and set the framework of the change process in terms of stages or phases, the next step was to design and develop the specific activities of the planned change programme as described in the next chapter (8).
Chapter 8

Design and development of the Specific Activities of the Planned Change Programme.

As suggested in the previous chapter, the use of multiple strategies was required in this project in order to meet the objectives set out in chapter 6. The next stage in developing the Planned Change Programme was therefore to design and implement activities, within the framework of the strategy groups, aimed at meeting the objectives over a period of time. This chapter therefore covers the fifth and sixth stages of change (as they affect the change agent) as defined in 7.3 and Table 7.3.2, i.e. design of the elements/activities of the change programme, establishment of the change relationship (as and when possible) and implementation of the various elements of the change programme. The corresponding stages for the potential adopters (6a,b and c) needed monitoring (see 8.10) and the deductions made are given in 9.5.
Some of the activities described here are of an educational nature, such as the Exhibition and Seminars (see 8.4.1) whilst others are associated activities, necessary to the process but not in themselves educational - the setting up of procedures for the consultancy service and the bulk quotation programme could be seen as equivalent to the provision of desks and pencils in schools.

Other parameters, such as the resources available, also had to be taken into account at this point to determine the type and time-scale of the possible activities. The various objectives are dealt with here in (approximate) chronological order of implementation rather than the order used in chapter 6.

8.1 To select the appropriate change agent role(s) and to establish the change relationship. (objective 6.2.1)

This is a necessary prerequisite for any change programme. The roles available to the change agent will be partially determined by the particular circumstances and also by the agent's own expertise and preference. In this case, the change agency (SLCEG) was already recognised as being an expert in the field of energy efficiency so this was one role which could easily be utilised. As Zaltman and Duncan (1977, p.212) point out, the change agent who is external to the potential adopter system has advantage of being seen as more objective and professional although lacking in familiarity with the potential adopter system. I felt that three further roles were both appropriate and feasible in the given circumstances. The first was as a provider of a special environment for the dissemination of
information about energy efficiency in buildings (see 8.1.1 below),
the second as a provider of resource (see 8.1.2) and the third as an expert on procedures (8.1.3).

8.1.1. Change Agent Role as Provider of a Special Environment.

The ability of the change agency to provide the special environment arose as a result of the availability of external funding for a "Demonstration Project." In 1979 both the UK Department of Energy and the EEC Directorate General for Energy had identified a need for Demonstration Projects which would in some way help to bridge the gap between research and development projects and fullscale implementation/ adoption of the results of these. The expectations of both the the UK and EEC funding bodies were broadly similar - that techniques, materials or processes which had been proved in R & D and field trials should be used in appropriate, "normal", situations and their effect closely monitored. The results, together with relevant costing s, practical implications etc. would then be widely disseminated in the form of a written report and one or two seminars. It was assumed that this would result in widespread replication of the technique, material or process.

On receiving details of these proposals, we (the SLCEG) identified that whilst this technique might be effective where it is applied to innovations in technology where the relationships between capital costs and savings were very clear and where each project would be dealing with a single item, the same technique would be unlikely to be sufficient in the case of energy efficiency in buildings. The
reasons for this view were two-fold. First, that the interaction between the building occupants, systems and fabric and the incorporation of a number of different energy efficiency measures together would be too complex to be presented only in this way. Secondly, the previously identified non-technical barriers to adoption, including the characteristics of the organisations and individuals who would be the potential replicators would still pertain.

We therefore decided to apply for funding for a Demonstration project but to include in the proposal the setting up of a facility within the project which would allow for more effective dissemination of the information and allow for various activities which would contribute to bringing about the desired change. This facility was termed a "Demonstration Suite" and the idea was accepted by both funding bodies who agreed to fund both the monitoring costs as originally intended and the costs of setting up and running the Suite (which was not part of their original brief.)

In terms of the overall change goals and objectives identified earlier, the setting up of this project, and the Demonstration Suite in particular, were of paramount importance. The project involved the building of 18 energy efficient family houses and the rehabilitation of 3 large Victorian houses and their conversion to 15 energy efficient flats. The project was to provide a focus for the whole change programme whilst the Demonstration Suite provided a special environment for a variety of activities. The success of the change agency (SLCEG) in obtaining the funding also served to
consolidate our reputation as an expert in this field as well as raising the profile of the project.

Further information regarding the Demonstration Project and the activities in and around the Demonstration Suite is given in 8.4 and 8.5.

8.1.2 Change Agent Role as Provider of Resource.

The change agency (SLCEG) was able to act as a provider of resource in that it had already developed:

a) a computer program to analyse the energy balance of buildings

b) the "Integrated Approach to Energy Efficiency in Buildings" (Makkar 1979) which delineated some simplified "Rules of Thumb" which could be utilised by designers to achieve energy efficient building designs.

c) A development of the energy analysis program (a) which allowed all possible permutations of packages of energy efficiency measures to be explored for any building, providing comparisons of capital costs, fuel (running) costs and savings and payback periods for each. (This software is called "ELF".)

d) A knowledge base of information and experience regarding energy efficiency materials and techniques.
e) A knowledge base of the effects in energy terms of
different types of construction and also of the causes and
remedies for condensation and mould growth problems (which
are closely related to the same factors as affect energy
utilisation and are also the subject of increasing concern
and expenditure in local authorities).

These could all therefore be offered to the potential adopter system
as resources to be utilised to assist in the production of energy
efficient designs. The methods by which this was done, such as the
provision of a consultancy service and of "standard" specification
clauses are described in 8.5.

8.1.3. Change Agent Role as Expert on Procedures.

It was necessary for the change agency (SLCEG) to act as an expert
on procedures in order to facilitate the creation of special
procedures within the departments of the change adopter systems
(local authorities) which would encourage the development of energy
efficient design. I felt that without special procedures,
especially in the early stages of the change programme, energy
efficiency considerations were liable to be overlooked. This might
be intentional - by those who were not (yet) convinced of the need
for or efficacy of energy efficient design. Alternatively, it might
be accidental - as a result of the many other requirements which the
designer has to fulfil.

We were able to establish some credibility as an "expert on
procedures" when called in to investigate a particular estate which
appeared to suffer from continual problems with its communal heating system which had defied all attempts at a solution by the in-house engineers. The SLCEG investigation identified the major problem as being that when the fans in the heat emitters in the dwellings failed, repairs were not executed for a very long time. This was generally attributed to poor availability of spare parts but further investigation showed that the basic fault lay with the procedures for reporting faults, instructing the maintenance contractor, supervision and checking of repairs, and feedback to the client. A simple set of procedures was instituted and found to be very successful in overcoming the problems.

As a result of this exercise, the SLCEG were able to act as experts in the area of procedures when liaising with departmental heads to persuade them to set up procedures which would assist movement towards energy efficiency design.

8.1.4. Establishing the change relationship.

Establishing the change relationship explicitly was not a practical proposition at the start of the programme because (the majority of) the potential adopter system was not convinced of a need to change. However, a working relationship needed to be established, at least implicitly, which could be developed and become more explicit as the change programme progressed through time.

The first of the three components of the relationship identified earlier (chapter 4) is that the client system must see the change
agent as a competent and legitimate person/team whose task is to help change the adopter system.

As has been previously suggested, in this project there was not, at least in the initial stage, a client system as such in that the impetus for the change programme emanated from the change agency (SLCEG) itself. To some extent however, the local authority councillors were treated as the client system even though they also had to adopt certain changes before they could fulfil this role accurately. Their support for the SLCEG to take on the role of change agent was, however, implicit in both their continued funding of the group and their encouragement to apply for the grants for the Demonstration project. The granting of the funding for the demonstration project by the EEC and the UK Department of Energy enhanced their (the councillors) perception of our role as a legitimate change agency.

Other sub-groups of the potential adopter system were less inclined to view the SLCEG as a legitimate change agency, preferring to see their role as that of (small scale) innovators and therefore not as a "threat" to their existing practices and procedures. As the change programme progressed, this situation altered, with some individuals/groups increasing their acceptance of the change agent role but with increased resistance from others.

The second component of the change relationship involves the clarification of expectations about the change relationship. This obviously requires good communication between the change agent and
the client and/or potential adopter system. For the reasons given
above and previously, there were initial difficulties in
communicating with the client and/or potential adopter system about
the change process. However, once the change programme had begun,
the client group (councillors and some chief officers) developed
expectations, both about the change process and about their own aims
and objectives. It was then possible to jointly develop policies
and procedures to assist the change process and at the same time
clarify expectations and consider the practicalities of meeting
these. For example, it was possible to agree that, in addition to
the formal SLCEG meetings (3 per year) where progress would be
reported and discussed, it was desirable for the change agent to
meet with individuals and sub-groups from time to time in order to
clarify or agree action on specific issues related to the change
programme.

The third component, that adequate sanction be given to the change
agent by the client and/or the potential adopter system, was again
dealt with implicitly to start with. The question of sanction
refers to the potential adopter system allowing the change agent to
try to bring about the change.

As the diagnosis of the problem had shown that the majority of the
potential adopter system either did not perceive a need for the
change or did not perceive the practicality of the change it was
clear that they would not explicitly sanction a change programme.
Therefore, we initially only looked for a degree of openness in that
the potential adopter system would allow itself to be exposed to
communication about the subject of energy efficiency. This the
majority were (more or less) willing to concede though there were
notable exceptions such as the group (of clerks of works) who
visited the Demonstration Suite (under duress) and belligerently
refused to receive any message whatsoever whilst they were there!

At later stages of the programme, once a significant proportion of
the potential adopter system had (wholly or partially) adopted the
change or at least moved on to the stage where they perceived the
need for change, it was possible to obtain explicit sanction for
specific activities within the change programme and therefore for
the principle of the change itself.

8.2 To identify and utilise leverage points (objective 6.2.5)

The identification and use of leverage points as proposed by Lippitt
et al (1958, p100) overlaps with identification of those individuals
or groups whom Zaltman and Duncan (1977, p206) refer to as
"influentials". The purpose is to identify those persons/groups who
are in a position to influence other parts of the potential adopter
system. Those who can be used as leverage points, to assist in the
change process, are those who are (at least partially) convinced of
the need for change, accessible to the change agent and open to
persuasion that the goals are both worthwhile and achievable.

There may be other influentials or opinion leaders whose attitudes
and/or actions may be counterproductive to the change process and
who may appear not to be open to change. This group may require a
special effort, for example in the provision of appropriate
information in an appropriate manner which will cause them change. Those influentials who are open to the proposed change are likely to also be susceptible to pressure from groups who are resisting the change and would therefore require reinforcement at regular intervals.

In this project, a number of individuals/groups were used as leverage points at various stages of the change programme. The councillors who were their authorities' representatives on the SLCEG were the initial leverage points as they were known to the change agency, had some awareness of the issues such as Fuel Poverty, Condensation, finite resources etc. and also of the practicality of producing energy efficiency buildings as the SLCEG had already designed and built (a small number of) such buildings. They were less sure of the practicality of implementing a change programme or of successfully bringing about the desired change. However, the achievement of the external funding for the Demonstration Project provided sufficient impetus for them to start believing that it might be possible to bring about a change.

These councillors were then in a position to persuade other councillors in their authorities to take various actions which would assist the change process. This entailed two main activities - increasing awareness in the Council itself of energy matters so that, for example, the Housing Committee would question proposals from officers which did not address this question and secondly, agreeing an Energy Policy for each Borough. (see 8.3. below)
The Councillors, due to their position of authority, were also able to directly influence Chief Officers (departmental heads) towards altering existing practice and setting up new procedures which would assist in the change process. For example, in all three Boroughs, procedures were set up to try to ensure that all technical officers visited the Demonstration Suite at least once, thus allowing them to at least be exposed to the messages which the change agent wished to communicate.

Some individual Chief Officers were also identified who could be utilised as leverage points, for example, the Chief Executive in one borough, the Director of Housing in another. These individuals had adopted the concepts of energy efficiency and had perceived some value in promoting a programme of Planned Change in this area. For example, the Director of Housing argued that if fuel bills for the tenants were reduced, there was more likelihood of their paying their rents - and rent arrears were one of his chief headaches! He was therefore prepared to persuade his subordinates to implement procedures which would assist the change.

Some other individuals - a minority of Chief Officers and some second and third tier officers were identified as being influentials/opinion leaders but inappropriate for use as leverage points as they lacked any commitment to energy efficiency and therefore to the proposed change. It was hoped that the implementation of a Borough-wide policy would help to overcome their lack of interest or resistance and in addition continual attempts
would be made to put forward both rational and persuasive arguments which might eventually lead them to change.

I also recognised that the use of leverage points might not be confined to getting the programme off the ground but that intervention by these key people might be required at various stages of the programme so it was important to provide them with feedback on the progress of the change process and reinforcement of the rationale for Energy Efficient buildings. This was done through the regular SLCEG meetings, correspondence and telephone conversations with individuals and by arranging for periodic press articles and the publication of reports and booklets related to the Demonstration Project and other aspects of the SLCEG work on Energy Efficiency.

8.3. To bring about the formulation of an Energy Policy in each of the three Local Authorities. (objective 6.2.6)

I considered that the existence of Energy Policies in the authorities was necessary for a number of interrelated reasons. It would indicate that the Council had a commitment to Energy Efficiency and would also reinforce this commitment; it would raise the profile of Energy Efficiency and give legitimacy to the change agency (SLCEG). Both empirical-rational strategies and persuasive strategies were utilised to reinforce and extend the existing attitudes and knowledge of the councillors so that they were brought to a stage where a policy could be formulated co-operatively by the change agency and the representative Councillors. Each of the three Boroughs then amended it slightly to suit their own particular
circumstances and it was then approved by each of the three Councils. (see Appendix II)

Many council policies tend to be statements of intent/ideology/aims without associated objectives or procedures. Consequently they are often ignored or circumvented by officers. We therefore suggested that the Energy Policy should include a requirement for certain action which did not of itself force compliance with the policy or force a change to energy efficient design but would serve to: a) allow for monitoring of compliance with the policy and b) help to maintain awareness of this policy.

Therefore, the Policy included both, a general statement of intent - to the effect that it was desirable for the Authority to be Energy Efficient in its buildings (both public buildings and Housing), transport, street lighting etc. and also, specifically for housing, all building projects would require, at the design stage, a "Certificate of Design Energy Consumption" as described below:

8.3.1 The Design Energy Consumption Certification Scheme.

The councillors agreed that these certificates would be produced by SLCEG as they had the computer program to carry out the necessary calculations, the expertise to interpret buildings and drawings and were also perceived as sufficiently independent for this purpose.

The Certificate would be a statement of the calculated fuel costs for space heating (and other uses) for each dwelling plus the
calculated saving achieved (over a declared base) where energy efficiency measures were included in the design.

Some councillors would have preferred to impose an "energy target" or a savings target of some kind but we persuaded them that this could easily become counterproductive as it would be attempting to achieve the desired change by coercion (with its attendant difficulties) and that there would always have to be exceptions to the rule. Arguments for making exceptions of particular projects would tend to be increasingly put forward, especially if a high target was set or, if a target was set on the low side, the tendency would be to just comply with the requirement rather than aiming for the optimum design (as was already the case with the standards set by the Building Regulations).

We anticipated that the requirement for each project to have a Certificate, (whether it showed an annual fuel cost of £1,000 or £100 or a saving of 50% or 0%) would have a number of effects:

a) It would require the designers to, at least briefly, consider the question of energy efficiency.

b) The designers could not remain unaware of the running costs of the houses they designed.

c) Councillors and/or Chief Officers, when approving designs, could use the figures from the Certificate as one of the criteria for accepting/rejecting a design.
d) Monitoring the levels of savings shown on the certificates would be one indicator of the progress of the change programme.

e) Designers might gradually evolve a competitive spirit amongst themselves to see who could achieve the highest savings or their "professional pride" might come into play and encourage them to improve on their own previous performance.

f) The above factors would work together to help create a climate of openness to information about energy efficiency and to change.

It must be pointed out here that it was not at any time expected that the designers should achieve significant energy savings without assistance. A procedure was set up whereby the SLCEG would provide an advice/consultancy service prior to production of the Certificate so that designers were enabled to optimise their design from an energy viewpoint to whatever extent they wished without first having to internalise all the relevant knowledge and skills.

This procedure helped to legitimise the change agent's (SLCEG) roles as energy consultant and provider of resource and also helped me to monitor the change process and identify areas of resistance and to adapt the information and help being provided to the designers to suit their different or changing needs.
Despite this requirement (for Energy Certificates) being included in the Council Policy documents, considerable time elapsed before all the relevant departments adopted the procedure. Indeed, there are still some departments and sections within departments who do not request the certificates at all, or who request them after the building work is complete rather than at the design stage. (The reasons for this are explored in 10.1.2)

8.4 To create awareness of the benefits, practicality and affordability of energy efficient dwellings (objective 6.2.7)

To meet this objective involved the use of both rational-empirical and persuasive strategies and, to a lesser extent, normative - re-educative strategies. There were two loci of activity - the Demonstration Suite and the SLCEG's consultancy role. The first is described in detail below (8.4.1) and the second discussed briefly in 8.4.2 and in more detail in 8.5.

8.4.1 The Demonstration Suite

The Demonstration Suite occupied the ground floor of one of the rehabilitated houses. The Demonstration activities had to be designed into the basic layout of 4 main rooms plus ancillary areas as the structural elements had to be preserved and the facility to convert the area back to two flats at a later date retained. The plan overleaf shows how the various spaces were utilised.
The Demonstration Suite was used in two main ways - as an exhibition which people could visit independently and without requiring a guide and, for seminars and meetings where the various issues could be explored, by myself or other members of the change agency (SLCEG), with groups from the potential adopter system. These are described in 8.4.1.1 and 8.4.1.2 respectively.
8.4.1.1 The Exhibition

The exhibition set up in the Demonstration Suite set out to present the facts about energy efficiency design (capital costs, savings, materials, construction details, etc.) and the Principle of the "Integrated Approach" and to provide real examples of costs and savings drawn from the Councils' own housing stock. This was a purely empirical-rational strategy in that we presented information in an (almost) unbiased form and assumed that the demonstrated fuel cost savings could be sufficient to encourage (some) designers to adopt a similar approach. This information was supported by monitored data.

The exhibition consisted of 3 sections. The first (in the Exhibition Room) outlined the Principle of the Integrated Approach and the "4 Rules" ("rules of thumb" which can be used by designers to achieve significant energy savings with minimum effort) together with an exposition of the positive relationship between measures which will reduce condensation risks and those which will reduce energy consumption whilst improving thermal comfort. This section was supplemented by an example of energy efficient new houses, designed by SLCEG for L B Southwark and completed over a year before the Demonstration Suite was opened so that monitored temperatures and fuel consumption figures were available to be displayed to provide the empirical proof that it was feasible to build family houses which were energy efficient and within normal cost limits. (The houses had an average annual space heating bill of £81 for a
three bedroom house, average temperature 20°C, no condensation and contented tenants!

This first section was completed by four brief examples of packages of measures which could be specified for older houses undergoing rehabilitation, showing how the choice of measures could be adjusted according to both the type of building and the range of works otherwise required. For example, if the walls required replastering, a thermal lining could be specified instead but this would be far less cost-effective if the existing plaster was in good condition. These examples showed that this approach enabled fuel cost savings of up to 50% to be made at a capital cost of less than 1% of the total contract sum.

The second section of the Exhibition (in the "Exhibition/Seminar Room") dealt with the energy efficient new houses and rehabilitated flats which formed the Demonstration Project (at Lawrie Park Road, London SE26) where the Demonstration Suite was situated. The SLCEG acted as energy consultants to the Architect and the Surveyor of L B Lewisham who designed the new houses and the rehabilitation respectively. This exhibition was far more detailed than the first section and occupied the whole wall space of one large room, which was also used for seminars. There was also a large-scale model of one of the new houses which opened to show all the energy measures. In addition there were annotated plans of the new houses and the rehabilitated flats which indicated all the energy saving features and these were also marked by labels on or near the actual features.
- so that visitors to the Suite could take themselves for a "guided
tour" if they wished.

The third section of the Demonstration was related to the monitoring
of all the 33 dwellings in the project. Each dwelling had a
temperature sensor in each room and automatic readings were taken
virtually continuously and averaged over each hour. Readings were
also taken of fuel consumption, both gas and electricity and of the
climatic conditions. All the readings were collected, checked,
totalised or averaged by a mini data-logger in each dwelling. These
were then connected to a mini-computer in the Monitoring Room which
collected the data every hour, stored it and carried out a daily
analysis.

This enabled a daily printout of data to be produced and displayed
in the monitoring room thus providing up-to-date data on
temperatures and fuel use and aiding the credibility of the claims
made about energy savings. Because the data displayed was only one
day old visitors could relate it to their own knowledge of the
previous day's weather, conditions in their own homes etc.

In order to aid the development of awareness about the
energy-related behaviour of house a graphics program was developed
whereby any of the dwellings could be displayed on the VDU and a
date (or dates) specified whereupon the screen would display in
colour the hourly temperature movements of each room together with
the outside air temperature changes, amount of sunshine etc and a
display of the amount of fuel used during the 24 hour period, using
the real data aquired from the project. All the monitoring equipment was also clearly displayed. The purpose of all this was to indicate that the statements made elsewhere about fuel savings, temperatures, etc were based on solid empirical evidence which was "published" as soon as it was collected.

In designing the exhibition I was concerned to take particular account of the different needs of different sub-groups of the potential adopter system in terms of both content and format. Havelock and Benne (1966, pp163-4) suggest, "...recoding the information so that it is understandable and acceptable to the receiver. This may involve organising it in the receiver's categories, using the receiver's special language,..." A small sample of representatives of the major sub-groups of the potential adopter system were interviewed at the beginning of the project in order to help determine these requirements. (see report of these interviews at Appendix I.)

One example of how this was achieved is that architectural drawings, showing the details of how the energy efficiency measures were incorporated into the building, were included for the benefit of architects and surveyors but, as these would have little meaning for most Councillors or Housing managers additional information was provided. This took the form of simple statements of the benefits of the energy efficiency measures to their tenants and reassurance on such points as that the appearance of the buildings would not become unacceptable due to the energy measures. These messages could be conveyed with a few written sentences and photographs plus
visitor's direct experience within the (energy efficient) demonstration suite. Again, quantity surveyors are most concerned with costs and value for money and so a table of comparative costs-versus-savings was presented for their benefit and schematics of the heating system for the heating engineers. Each group would obviously have some interest in/knowledge of the other aspects so the exhibitions had to be put together in an homogenous fashion whilst still providing the specific information elements for each group. Other factors related to exhibition design such as size, type and diagrams, typeface, height of exhibits, direction of viewing etc. all had to be taken into account.

Consideration was also given to the general "ambience" of the Demonstration Suite - in order to try to create the optimum conditions for transference of the message. I felt that it was necessary to create a friendly, welcoming atmosphere in order to reduce resistance and, at the same time to provide an impression of scientific reliability/credibility. Therefore, the majority of the Suite was carpeted, windows were curtained and the walls treated with plain emulsion paint but generally in pastel colours; the reception area included a small sofa and the chairs in the seminar room were cushioned but with chrome frames so they were modern but reasonably comfortable. The monitoring room however, was given a more "clinical" treatment with white paint, blinds to the windows and vinyl flooring to enhance the scientific nature of its use. (This also reduced the dust and static for the benefit of the computer equipment).
Whenever visitors (whether individuals or groups) arrived at the Suite they were greeted by the receptionist who offered them tea or coffee, took their coats etc. For individual visitors the Suite was designed as a self-learning facility so that, after being greeted and made welcome, they could spend as much or as little time as they wished in each area. The layout of the Suite was explained by a display in the reception area, pointing hands were used to indicate the directions round the exhibition panels and, as previously mentioned, sheets were provided to enable the identification of particular energy measures.

There were also display sheets and booklets to take away which included the majority of the illustrations and text of the various parts of the exhibition. At the start of the project these included two A3 sheets covering the Principle of the Integrated Approach, the 4 Rules, Condensation and the Wingfield Street Low Energy Houses plus two booklets, one dealing with the Energy Efficient Rehabilitation at Lawrie Park Road and the other covering the Energy Efficient New Houses. These were all produced "in house". Later in the project, the Dept. of Energy funded the publication of a single booklet which amalgamated these separate items and which was distributed, by the Dept., to some 5,000 Architectural practices and local authorities throughout the UK. (copy of booklet at Appendix V)

In the design of the exhibition/demonstration, the principles embodied in the major theories of communication (Lasswell, Shannon and Weaver, Berlo etc.) were utilised as far as possible within the
constraints of space, time and resource available. For example, efforts were made to present the **source** of the message (the SLCEG) as both credible, non-dictatorial and non-threatening; the message itself was presented/encoded in ways which reflected the needs and previous experience of the various recipients; the circumstances surrounding the communication were considered both in terms of the various social influences on the recipients in respect of energy efficiency and, in creating the environment of the Demonstration Suite itself. Provision was also made for feedback in that visitors were asked to complete a pair of questionnaires (one at the start of their visit and one at the end) which included a facility for them to comment on the Demonstration itself as well as the content and format of the information contained within it. (These questionnaires were also used to evaluate the effectiveness of the Demonstration facility - see 9.1) The intention was that if this feedback indicated a need to change the exhibits, this could be done. In the event, such a need was not identified, although a need for additional information on various subjects was found and this was addressed chiefly through the seminars which were held in the Suite.

The Demonstration Suite was organised so that it was open to individual visitors from 1-5pm, Monday to Friday, for over two years (Oct 1984 - Dec 1986). At the same time, seminars were arranged for groups of officers from the three local authorities as well as groups from architectural schools, other local authorities etc. The groups numbered between 8 and 20 people and some 100 seminars were
held during the two years the Suite was open. Altogether, some 1500 visitors were received.

8.4.1.2 The Seminars

The Seminars provided the opportunity to add a degree of persuasion to the rational-empirical strategies of exhibition/demonstration.

The seminars were most frequently led by Dr Lali Makkar (the Director of SLCEG) and I also led some and took part in others. We were conscious of the fact that our own bias in favour of energy efficiency would be very apparent in these interpersonal situations - far more so than through the exhibition - and that it would therefore be necessary to show clear, rational, empirical, evidence to support this bias. The groups attending the seminars were frequently motivated to do so purely by an instruction (or strong suggestion) from a superior, rather than from a desire to investigate the subject of energy efficiency (although most did not admit this overtly in their questionnaire responses). For this reason and for the various reasons previously discussed (chapters 4 & 5) the groups tended to arrive complete with resistance to any rational or persuasive appeal to change their beliefs or behaviour. The strength and overt nature of this resistance varied between groups and, according to this and to the nature of the group as a whole, various techniques were employed to overcome this resistance and to replace it with positive forces.

For example, in some cases we would express sympathy with the multitude of problems which the seminar participants felt they
already had to deal with in their jobs and attempt to convince them that we were not trying to add to their problems/workload but simply to provide them with the knowledge which would help them be better, more effective designers. In other cases, where resistance took a more direct and challenging form, we might also throw out a small challenge to them, such as suggesting that if they were so confident that energy efficiency measures were ineffective/overly expensive/caused other problems (or whatever reason they put forward), they should try them out on just one project of their own and we could then all learn from the results. Or, we might ask them to consider their own response if their own heating bill was reduced by two-thirds. In fact, we found that one of the most effective techniques in such face-to-face communication situations was to encourage the participants to discuss the energy problems and possible solutions for their own homes, rather than those which they designed or managed - this seemed to alter their perception of our role from that of interfering in their working practices to that of helping them improve their personal quality of life. In a way this returns to the reward aspect of the empirical-rational approach.

We also utilised appeals to professional pride, social conscience etc. to provide motivation for energy efficiency behaviours. For example, where participants expressed concern over (or belonged to a group who were concerned with) the longer term maintenance of the building stock, we would stress the positive effects of energy efficiency design in reducing maintenance problems and suggest that
in order to raise their own standards they should therefore adopt the proposed change.

However, as well as the persuasive aspect of the seminars they were intended to provide purely rational arguments for energy efficient design and to provide an overview of the subject of energy efficiency in buildings. The seminars generally followed a similar format:

a) Participants arrive, are shown into Seminar Room, provided with tea/coffee and clipboards with some "worksheets" and the questionnaires.

b) Participants asked to fill questionnaire part 1 while drinking coffee etc., no restriction on discussion or viewing exhibition during this period.

c) Part 1 of Seminar - an exposition of the Integrated Approach and the 4 Rules with the participants abstracting relevant figures from computer output sheets (provided) and transferring them to the examples of the 4 Rules on the worksheets. This activity was intended to provide a certain amount of participation and concentration on the figures so that the effects of the various energy efficiency measures in reducing fuel consumption would be noted by each individual. During this activity and the subsequent discussion of the practicalities of the measures, implications for condensation control etc, the participants generally raised a number of questions of
concern to them/their group. These might be matters of cost, effectiveness, difficulty in implementation, lack of resource (eg. time), etc. and therefore provided the opportunity for us to attempt to satisfy concerns, alter erroneous beliefs etc.

d) The next part of the Seminar included a description of the energy efficiency design of the houses and flats at Lawrie Park Road. For this we utilised the exhibition in the Seminar Room and invited participants to take away the booklets.

e) After a short break (with more tea/coffee if desired) participants were escorted round the remainder of the Demonstration Suite, allowing for further discussion of the exhibition, the energy efficiency features of the building, viewing of the monitoring system, the previous day's data and the colour graphics display on the VDU. The majority of groups also visited one of the energy efficient new houses (on the other side of the road) which was kept unoccupied for this purpose (and also for some experimental work).

f) During the course of the seminars (the total duration of which was between two and three hours) we took/made opportunities to draw attention to the available help for energy efficient design (as described in 8.5 below) so as to overcome that resistance due to lack of knowledge and skills. Also, to draw attention to the existence of the
Energy Policies in the authorities to encourage awareness that there was an environment which was conducive to the desired change.

8.4.2 The SLCEG consultancy role

At the beginning of this section it was stated that there was a second locus of activity for meeting the objective of creating awareness about energy efficiency and that this was the SLCEG's consultancy role. This is described in the next section (8.5) as it was developed primarily to meet objective 6.2.10 - to provide designers with knowledge, skills and help) but it is mentioned here as it necessarily brought us into face-to-face contact with individual designers and other members of the adopter system and therefore enabled further interpersonal communication to take place with the consequent opportunities for further increasing awareness, overcoming resistance etc.

We were aware that both the seminar activities and these one-to-one relationships were not one-way processes - the feedback from the potential adopter system was valuable both in modifying/tuning the energy efficiency measures and their implementation and, in developing the presentation of the subject to take account of existing knowledge, experience, beliefs and prejudices within the potential adopter system.
8.5. To provide designers with the necessary knowledge, skills, procedures and help to design and implement energy efficient dwellings (objective 6.2.10).

The diagnosis (chapter 5) had established two of the impediments to energy efficient design as being the lack of the necessary knowledge and skills amongst the building designers and the lack of any procedures which either required or enabled them to consider energy efficiency in their designs. A requirement was also established for "outside" help to be available to assist the designers once they had been brought to a stage of readiness to adopt the change, particularly to overcome the organisation and resource difficulties which would inhibit the acquisition of knowledge and skills and the lapsed time required for internalisation of these.

In order to address these needs a number of facilities were provided and procedures set up:

Firstly, the Energy Policies agreed by the three authorities included the procedural requirement for each building project to have a Design Energy Consumption Certificate (see 8.3). This would require heat-loss calculations to be carried out for each dwelling type - a technique with which most designers were unfamiliar and which, though not particularly complex or timeconsuming, would require some additional effort. To overcome resistance on these grounds, the SLCEG provided a service to the designers to carry out these calculations and produce the Certificate(s). This also had another advantage - that I could monitor the change process to some
extent by a) the proportion of all projects presented for Certification and b) the extent of energy savings indicated by the calculations.

Secondly, with an Energy Policy in existence, there was clearly an expectation (from their employers) that designers would improve the energy efficiency of their buildings and this would provide some motivation towards the desired change. However, the designers would have to make decisions regarding which measures should be incorporated in specific designs with due regard to cost, cost-effectiveness, practicability etc. They did not have the knowledge or experience to carry out this analysis themselves so the SLCEG provided a consultancy service for this purpose – the designers send details of their proposed design to SLCEG who feed the basic data regarding areas of elements (walls, roof, windows etc) and their heat loss characteristics ("U" values), fuel type, number of occupants etc. into the ELF computer program together with a number of different options for insulation, ventilation control, different fuels etc. The program then carries out the heat loss and consequent space heating fuel cost calculations for the base case plus all the permutations of the energy efficiency options and produces a table of all the permutations, in order of cost effectiveness.

The SLCEG then writes a report to the designer, enclosing this information, drawing attention to the optimum packages of energy efficiency measures and to any areas of potential condensation risk etc; advising on materials, any difficult details and so on. The
designers are then in possession of all the relevant information to choose the option which fulfils their own criteria (whether cost, payback period or level of saving). The Certificate is then produced by SLCEG for the chosen option and it indicates the energy cost saving achieved in each case. This in turn (at least where the saving is substantial) reinforces the changed behaviour and increases the likelihood of further change in the future.

The designer is also able to consult SLCEG advisors, at any stage in the project, about materials and techniques. It was anticipated that, by working through this analysis process with the designers they would gradually acquire the relevant knowledge and skills themselves without having to expend concentrated effort to do so. There is an intention to make the analysis program (ELF) available for use directly by the designers as soon as they indicate a readiness for this. (This is likely to take place during 1988).

Another aspect of the designers' job where the necessary knowledge was lacking was in the specification of materials and methods to be used in the actual building process. Although many of the materials and techniques used for energy efficiency are the same as or similar to standard building materials and techniques, the fact that they are being used for a different purpose or in slightly different ways or positions led designers to feel they were not able to specify them properly. To assist with this we (SLCEG) provided a set of specification clauses which could be directly inserted into building Contract documents. These were later developed to form the basis of a "Bulk Quotation Programme" which provides a facility to use a
selected specialist contractor to carry out the energy efficiency works. This has a number of advantages, one of which is the simplification of specifying by the designer - it becomes almost a Chinese Take-Away - ordering by numbers! (More details in section 8.9)

Designers also needed to be assured that, once designed in and specified, the energy efficiency measures could be actually implemented during the on-site building process. This was achieved through the provision, by SLCEG, of further resources and services and by setting up various procedures. (see 8.9)

Following the ethos of Planned Change, we made strenuous efforts not to impose the desired change either directly or indirectly, on the designers (or other sub-groups). The only borough-wide formal requirement was that for Energy Certificates to be produced with the Policy merely expressing the pious hope that housing would be energy efficient! Some departmental heads were then persuaded that in order to achieve energy efficiency designs, they should guide their designers to avail themselves of the consultancy service available from SLCEG.

This still left the choice of energy efficiency measures to the designers or, indeed, the choice of not including them, though there was an implicit "threat" that their designs might be rejected by the client committees if the fuel costs were seen to be too high. In fact, this has only occurred once to my knowledge - partly because it relies on the Committee members being and remaining aware of this
question amongst the many other demands on their attention. Despite this thread of a power strategy running through the programme, the emphasis was on facilitative strategies such as those described in this section (and in sections 8.7, 8.8 and 8.9) and on persuasion based on rational argument and empirical evidence. Nevertheless, there did come a point in the programme where the majority of the potential change adopter system had adopted the change but where pockets of resistance were starting to undermine the programme so that consideration had to be given to the use of further power strategies. (see 10.3)

8.6 To develop an Environment more conducive to Energy Efficient Design. (objective 6.2.8)

This objective was met chiefly through meeting the other objectives as far as the immediate, localised environment was concerned. Particularly useful in this respect would be the energy policy (8.3) and increased knowledge of the value of energy efficiency (8.4).

Whilst we were not in a position to greatly influence some of the wider environment factors such as societal beliefs regarding the availability and/or relative costs of fuels, this objective needed to be kept in mind in order to respond whenever opportunities did present themselves. For example, one of the local authorities had a housing project (designed by a private architect) incorporating a system for solar-heated water and space heating. The system had not worked correctly from the beginning and then, in its first winter, frost had cracked the solar panels and pipework with consequent
flooding to dwellings and total breakdown of the system. As the majority of those who are not energy specialists associate solar energy closely with energy efficiency, this type of occurrence could be very counter-productive to the change effort. We (SLCEG) therefore volunteered to remedy the faults in the system and to maintain it in working order. Once this was successfully achieved and made known, it helped to offset the potential damage of the initial failure (and even enhanced our credibility) thus contributing to a positive environment.

Another opportunity arose when changes to the national Building Regulations were proposed in 1986. We took the opportunity to comment on the proposals for energy efficiency thus influencing (hopefully) the wider environment. Other activities, such as liaising with Fuel Boards, co-operating with other R & D groups, writing (or being the subject of) press articles, etc., are all aimed at meeting this objective.

8.7 To develop the awareness and expectations of client departments so that they include energy efficiency in their briefs to designers. (objective 6.2.11)

This objective and the means for meeting it are very similar to the seventh objective - to develop awareness amongst Designers, but with a slight difference of purpose. In this case the intention was to raise the awareness of those who could in turn influence the designers towards the desired change.
The client departments (Housing Management) act on behalf of the Council and the Tenants to brief the designers regarding the type of housing required at any given time. In many cases the brief will be just that - brief - a mere statement of dwelling sizes and mix required, for example, 70% family houses plus 30% single people flats. There is, however, the facility to be far more specific in the requirements for design, materials, ancillary provisions, etc. and these requirements could include energy efficiency. Once the designers have produced their initial design the client department has the opportunity to comment on it, suggest alterations and so on. The Housing Committee (councillors) also have a role in approving or altering proposed detailed designs, though not for all projects - most major maintenance works and even many rehabilitation projects are approved in principle before the detailed design is carried out and it is left to senior officers to approve this.

The client departments are in a position to positively influence the designers towards energy efficient design (or even to insist on it) but in order to do so they need to become aware of the practical possibilities, the benefits and the cost implications so as to make informed judgements and not be deterred by "excuses" from designers.

The activities designed to provide for the development of this awareness and knowledge were visits to the demonstration suite, seminars on similar lines to those held for the designers and the provision of a consultancy service for advising on specific dwellings(blocks/estates with energy related problems - chiefly condensation.
The exhibition in the demonstration suite was intended to serve the purpose of raising awareness of the practicality, cost effectiveness and value (to the Tenants) of energy efficient design. The seminars were biased towards the particular concerns of housing managers - for example, concentrating on the value of energy efficient design in avoiding condensation problems and, therefore, reducing maintenance costs and effort and, its contribution to improving the living conditions of the occupants and consequently helping to reduce the number of complaints, requests for transfer, etc. that housing officers have to deal with.

One of the major misconceptions of this group was found to be that energy efficient design would lead to increased maintenance requirements - through the use of novel heating systems or increased condensation due to reduced ventilation rates etc. These aspects were therefore addressed during the seminars but additionally, we suggested that our recommendations should be implemented for a small number of "problem" dwellings - where, for example, there were severe condensation problems which had not responded to conventional treatments. The intention of this strategy was that the energy efficiency approach would be clearly demonstrated as useful and viable and thus demonstrate empirically that such fears were unnecessary. It was possible to carry out a number of projects of this type including the following examples:

1. A block of flats had originally been built with an under-floor electric heating system. This only covered part of each flat and, had fallen into disuse mainly due to the high cost of
running the system coupled with its inadequacy to heat the whole flat. The flats suffered from condensation and mould growth due to inadequate heating coupled with a thermally poor structure. The block was not suitable for installation of gas-fired central heating systems so the borough had consulted the Electricity Board who proposed the installation of off-peak storage heaters. However, the weight of these was such that the floors could not support a sufficient magnitude of them to provide adequate heating capacity. There was therefore a proposal to clad the whole block externally with insulation covered in steel sheet, in order to reduce the heat load. This was going to be excessively expensive as well as aesthetically undesirable so SLCEG was asked to devise an alternative. We proposed a package of measures which included some internal wall insulation, rationalising the ventilation, double glazing to the living room and resiting of the heaters. This package was considerably cheaper than the previous option, equally effective in reducing the heat losses and also left the external appearance unchanged.

The package was implemented and fuel bills, comfort levels and condensation monitored for two years with positive results which helped to convince those involved in the project of the usefulness of the integrated energy efficiency approach.

2. A variety of individual dwellings with condensation problems were referred to SLCEG who visited the properties and proposed packages of solutions based on achieving a balance between heating, ventilation and the thermal characteristics of the
dwellings. The packages of remedial measures were individually designed for each dwelling. In a number of cases the full package was not "allowed" to be implemented. Where it was, however, the majority of cases showed no return of the problems. This again aided awareness and encouraged positive attitudes towards energy efficiency in the officers involved.

Again, the approaches used to meet this objective were a combination of rational-empirical and persuasive strategies, leading towards the use of normative - re-educative strategies where the officers were encouraged to themselves develop ways to assist the change process both in terms of dissemination within their own department and by influencing others (designers) towards adopting the change. This could not be developed however until this sub-group, or at least some influential parts of it, had been brought to a stage where they were aware of the need/desirability of the change. This process has been slow and is still continuing - some comments on progress so far and proposed future activities will be found in chapters 9 and 10.

8.8 To provide for the allocation of the necessary resources to allow for energy efficient design and building. (objective 6.2.9)

The main resource requirement was for time. Some additional design time would be needed until energy efficient design became a fully integrated part of the design process. This was reduced to a minimum by the provision of the consultancy service (see 8.5) but there was still a need for design department managers to allow some additional time for design. They also needed to allocate time
resource for the educational activities such as visits to the
Demonstration and seminars. This required a certain amount of
persuasion but was encouraged by the prior existence of the
Boroughs' energy policies.

The three authorities already (financially) supported the SLCEG and
the consultancy activity was funded by the charging of a small
percentage fee on each project. This was fairly easily accepted by
most departments as it fitted into standard practices of using
consultants for various aspects of design such as engineering
services (heating, lighting, drainage) and structural advice. The
fee level was set so that the income to SLCEG simply covered the
cost of the resource provided. (As a mini local authority, the
SLCEG is not allowed to make a profit!) The costs of setting up and
running the demonstration project/suite, seminars, providing
booklets, etc. were covered by the funding received from outside
bodies so that as far as the authorities were concerned, this was
additional resource available at no cost to them.

The only other resource required was (very small) additional capital
cost for the energy saving measures in the actual buildings. In
some cases the energy efficient design would not increase the
capital costs and could even reduce them but on others there would
be a need for up to 1% of the total cost extra.

The first few projects, particularly Lawrie Park Road itself,
demonstrated that these extra costs were accepted by the Department
of the Environment as complying with their "Value for Money"
criteria and consequently were allowable for subsidy purposes. These projects also demonstrated that these costs resulted in significant savings for the tenants with short (notional) payback periods. Special exercises were carried out with some quantity surveyors to establish that energy efficiency measures were not unreasonably expensive and were affordable. This included persuading them to work through costings for example designs where the extent of energy efficiency measures actually resulted in savings elsewhere, such as in the costs of heating systems or, where the energy efficient option was actually cheaper than the norm as in the case where fewer openable windows are provided which saves heat loss through draughts and also the costs of sub-frames and ironmongery.

Once these "facts" had been established, the question of additional resource being required for the energy measures ceased to be a problem, apart from a few exceptional cases.

8.9 To provide assistance and develop procedures to allow implementation of energy efficiency measures during the building process. (objective 6.2.12)

The basis for this objective was that there was little point in bringing about a change to energy efficient design if this was not actually implemented in practice. There were a number of reasons for assuming that, without specific procedures, implementation would not take place. These included resistance by the Clerks of Works, lack of familiarity with the materials and/or techniques on the part
of building contractors/sub-contractors and the type of checking required for (some) energy efficiency measures which was of a different nature to that for most building components.

Two activities were designed to meet this objective, both being of a facilitative nature although the first also has elements of persuasive and normative - re-educative strategies:

8.9.1 Procedures for supervision of energy efficiency measures

The first activity was to set up procedures for supervision/checking of the energy efficiency measures. These entailed the SLCEG again acting in a consultant capacity to carry out the supervision of the energy efficiency measures on behalf of the supervising officer/designer (S.O.) The S.O. is strongly encouraged to accompany the SLCEG officer during the checking process as this then presents the opportunity for them to acquire the relevant knowledge and skills so that they will be able to carry out their own checking in future. It also provides further opportunities for persuasion, in a one-to-one situation and for the S.O. to feed back concerns, interests and needs to us.

The supervision process requires such elements as checking the thickness and extent of loft insulation and testing draughtstripping with smoke cones to evaluate its effectiveness. The SLCEG officer takes to site a list of the energy efficiency measures which the designer has stated were included in the design and checks each for existence, correct installation and effectiveness and then sends a
report to the S.O. (whether or not there are any deficiencies and whether or not the S.O. attended the inspection). The S.O. then decides what, if any, remedies to implement and informs the SLCEG so that these can also be checked. The report sent to the S.O. also suggests that if the remedial work is not done then the figures given on the (previously issued) Certificate will not be accurate. This can provide a small amount of pressure/encouragement for the S.O. to ensure that the remedial work is completed.

8.9.2 The Bulk Quotation Programme for the Supply and Fix of Energy Efficiency Measures

The second activity was the setting up of a "Bulk Quotation Programme for the Supply and Fix of Insulation and Associated Works". There was already a tradition of Bulk Quotation (BQ) programmes for supply, or supply and fix, of various building components (windows, sanitary ware, floor finishes, fencing, etc.) run by the SLCEG and other Consortia (similar groups) and available for use by the local authorities. The principle behind such programmes is that they provide components and/or services of fixed, known and monitored quality at a known price which is arrived at through competitive tender. This saves on specification and tendering time for designers and provides bulk discounts even though an individual project may only require small quantities. The supply and fix programmes also provide for specialist/expert contractors for specialised building operations, such as the injection of damp proof courses into existing buildings, which are not within the scope of the majority of general contractors.
In the case of energy efficiency measures, the lack of knowledge and expertise of the general contractors created a tendency towards unreasonably high prices for these elements and/or direct attempts to dissuade the designer from specifying them. There were, however, a small number of specialist contractors dealing with insulation, draughtstripping, etc. These factors suggested that it was feasible to set up a B.Q. programme for this work. After a pilot programme in 1983-85, the first programme started in 1985 to run for two years. Very keen prices were obtained for the various elements and this has helped to explode the myth about energy efficiency measures being expensive. Designers have found that use of the programme has helped in both the specification and the implementation of energy efficient designs. In some ways this activity was "too successful" as the selected contractor was found to be unable to develop his management systems quickly enough to cope with the speed of the rise in the volume of work and this led to some delays to projects. On the other hand, the quality of work and the costs were generally accepted to be excellent so that on balance this was probably still a positive action. Further developments have been incorporated in the second two-year programme now underway which should improve its effectiveness. (see chapter 10)

8.10 To Monitor the Phases of Change and Adapt the Change Programme accordingly. (objective 6.2.2)

The phases of change, for both the change agent and the change adopter, were discussed earlier (7.3). As was then suggested, in this particular situation the main onus for the initial stages of
The process rested with the change agent - myself and SLCEG. The rationale for objective 6.2.2 suggested the importance of monitoring the phases of change. In this project, Stage 6 is where I see the main need for monitoring occurring. This is where we (as change agents) were implementing the "actual change efforts" - the various activities and strategies described in 8.2 to 8.9 above - whilst the potential adopters were going through the Trial, Evaluation and Adoption/Rejection process (Stages 6a, 6b and 6c).

In practice, this monitoring was carried out on a subjective level, by myself and other members of SLCEG, in that we tried to remain aware of the way that individuals and groups were responding to the various elements of the programme. This led to the identification of specific persons and groups as opinion leaders, innovators/early adopters, gatekeepers and so on. When these identifications were made we then planned how to adjust the programme to either utilise or neutralise them and to respond to the phases reached by particular sub-groups of the potential adopter system. Examples of this are given and discussed in 9.5. (The seventh and eighth stages/phases of the change process are discussed in chapter 10.)

The activities described in this chapter were all implemented, with the demonstration suite being fully operational from October 1984 and the policies being agreed by all three authorities in late 1984/early 1985. The programme has been evaluated and the methods and results are given and discussed in the next chapter (9). This leads on to a look ahead in chapter 10 where improvements and further developments to the programme are proposed.

Chapter 9

Evaluation of the Programme of Planned Change

This chapter describes the methods used to evaluate the programme and the results obtained, including (in section 9.4) my assessment of the current stage of adoption of the change in one of the three local authorities which were the primary targets of the programme. This then leads into the following chapter (10) which discusses the activities required to consolidate the change, a plan towards further change and the resolution of the change relationship.

Both objective and subjective evaluation techniques were used to evaluate the effects of the programme. The objective techniques were the use of questionnaires (9.1) and, an assessment of energy savings achieved together with the rate of growth of the level of savings/number of projects for which energy efficiency measures were considered, arrived at by analysis of the Certificates issued by SLCEG. (9.2)
Subjective techniques include the observation of behaviour and reported behaviour in response to the Energy Efficiency Policies and the Certification scheme (9.3) and, my assessment of the current status of overall adoption of the change in one of the local authorities (9.4).

Monitoring of the phases of change is described in section 9.5 and some further indicators of adoption of the change are suggested in section 9.6. The conclusions from all these evaluative processes are summarised in section 9.7.

9.1. The Demonstration Suite - evaluation by questionnaire

The purpose of using questionnaires was to:

a) identify existing behaviours, beliefs/opinions and attitudes regarding energy efficiency at the start of a visit to the Demonstration Suite;

b) evaluate the effect of the Demonstration in changing beliefs and intentions as to future action;

c) identify reasons for visiting the Demonstration in order to indicate the state of readiness to receive information and to inform future change activities in the light of visitors' own perception of their requirements;
d) assess the impact of the Demonstration and discover specific responses to both the format and content of the Demonstration so as to provide a basis for the design of a future similar facility.

The design of the questionnaires is discussed below (9.1.1) followed by analysis of the completed questionnaires (9.1.2 to 9.1.2.5) which is summarised in 9.1.3.

9.1.1. Questionnaire design

In order to meet the objectives outlined above, the questionnaire was designed in two parts - the first to be completed by visitors immediately on arrival at the Demonstration Suite and the second part to be completed at the end of the visit. (The two parts of the Questionnaire can be found at Appendix III). It was recognised that this procedure would have two potential inbuilt problems - one was that a number of visitors would not wish to expend necessary time at the end of their visit as they would tend to be in a hurry to be on their way and therefore there would be fewer part 2 questionnaires completed than part 1.

The other potential problem was that the time period between "before" and "after" responses would be, at most, only about three hours, so that, if the same questions were asked (on matters of belief for example) there would be a danger that the "before" response would be remembered and transposed to the "after" question for the sake of appearing consistent and thus indicate "no change"
where in fact a particular belief might have been changed. Also, the provision of the same response would then tend to reinforce the original belief thus negating any change which had been (temporarily) brought about by exposure to the demonstration.

It should be noted however, that this concern may have been unnecessary as Lee & Uzzell (1980) in their study of the Educational Effectiveness of Farm Open Days did not appear to find this a problem as the results of their "before" and "after" interviews and questionnaires did show some statistically significant changes, (although it is not clear from their report whether the two samples contained precisely the same individuals.)

In this case, I decided that, as one of the primary purposes was to assess any change resulting from exposure to the demonstration, care should be taken to ensure that the "before" and "after" samples were identical and that consequently, the questions in the second part of the questionnaire should not be identical to those in the first part and that the level of change would be assessed chiefly by comparing reported previous behaviour (re. energy efficient design) in part 1 with intentions as to future action in part 2. (Questions 011 and 114). On evaluating the questionnaires the answers to some of the "open" questions were also found to be useful in evaluating potential change. (see 9.1.2.3)

The questionnaires were based on a pilot set of interviews (see Appendix I) plus input from numerous informal discussions I had had with architects and surveyors over the preceding two years (as well
as reports of similar discussions from other members of SLCEG).
Both sources had indicated a wide variety of attitudes and beliefs in regard to energy efficient buildings, a number of areas of concern/worry, mistaken assumptions on costs and effectiveness and, in the case of the interviews, a number of suggestions for both content and format of the exhibition.

The questions included in the questionnaires were therefore designed to identify the extent to which particular beliefs were held, particularly "erroneous" beliefs such as "energy efficiency leads to an increase in condensation"; to discover possible motivating forces, both for visiting the demonstration and for including energy conservation measures in buildings; to discover where it was felt that responsibility for energy efficiency lay (for example with designers or with policy makers); to assess the impact of the demonstration and obtain suggestions for its improvement.

In order to cover these various aspects, a variety of question types were utilised. Some questions were in the "closed" category and included those where a selection of possible responses was provided, one of which was to be chosen; checklists where the respondent was invited to tick as many of the proffered responses as s/he wished; checklists where a number of possible options were to be rated as, for example, "very useful", "quite useful" or "not very useful" and questions which required five or six options to be ranked in order of importance. There were also purely factual, biodata questions.
Other questions were of the "open" or free-answer type, (for example, "During your visit, what has made the most impact on you?") in order to gain the maximum detail in the answers - although the number of responses to these questions was considerably less than to the closed type which are comparatively much easier for the respondent to answer.

In addition, there was a need to include one filter question (110) to direct respondents to different supplementary questions (111 or 112) and the majority of closed, checklist questions included the facility to provide alternative/additional answers or to expand on the ticked response(s). (e.g. q. 007, 011, 114).

As building designers (architects, surveyors) had been identified as the primary "targets" of the Demonstration, the questionnaires were oriented particularly towards this group and some questions were restricted to designers only (011, 012, 013 and 114). In the event, 52% of the completed questionnaires were from visitors who were not designers. As the questions which were intended to provide an indicator of change (011 & 114) were restricted to designers, there was no logical way in which to identify change in other groups (except to some extent, through answers to the "open" questions). This was, in the light of the sample obtained, an error in the design of the questionnaire.

Analysis of the questionnaires showed up other possible weaknesses in the design which had not been picked up in the initial piloting of the questionnaires. These related mainly to the clarity of the
instructions for answering questions - there were numerous instances
where respondents ticked say, three out of five options when they
were supposed to rank all five or, ticked more than one response
where only one was asked for. This may be due to the instructions
being in the same type style, size and weight as the question -
although in many cases significant parts of the instruction were
highlighted by being put in capitals, eg. "Please tick the ONE
description that..." However, there was also clear evidence of
respondent error/carelessness, for example in question 105 where
four lines were given for respondents to include their own ("other")
categories - some respondents put ticks against all the lines
without filling in any categories!

The questionnaire was designed in conjunction with University staff
and I attempted to follow the guidelines and avoid the pitfalls of
Questionnaire design as described by Oppenheim (1966). For example,
by mixing the question types and through careful ordering and
wording of the questions I hoped to avoid serious problems of bias
or leading questions, although I recognised that my own bias as a
promoter of energy efficiency would be apparent to the respondents
and could thus influence their answers. To reduce this the
questionnaires were presented as neutrally as possible - generally
being handed to the visitors by the receptionist with a polite
request to complete it but no coercion to do so and, of course, the
usual assurances of anonymity were given, with respondents being
invited to fill in their name and address at the end of part 2 only
if they wished to do so. After the Demonstration had been open to
visitors for two months, some preliminary analysis was carried out on the questionnaires completed - seventy-two Part 1 and thirty-four Part 2. (There had been some 250 visitors). This analysis indicated no particular problems with interpretation of questions, although not all respondents answered all questions. The questionnaire appeared at this stage to be satisfactory so no changes were made although subsequent analysis has shown up some weaknesses, as mentioned above.
9.1.2. Analysis of Questionnaires

Subsequent to the preliminary analysis, a further 311 questionnaires were obtained where both Part 1 and Part 2 had been completed (out of 620 given out). These were analysed in two groups - 260 were analysed first (Oct '85) and a further 51 added later (July '87).

It was interesting to note that the second sample (n = 51) gave virtually identical results to the first sample (n = 260). This could possibly be taken as an indication that external forces (either for or against the desired change) were not having a very great effect on awareness, attitudes or behaviour or, that there were equal forces for and against the change. The only exception to this occurred in answers to question 113 where condensation appeared to have assumed a greater importance compared to maintenance.

The analysis which follows is for the full sample of 311 and is divided into five sections, reflecting the four purposes for which the questionnaires were designed (see 9.1) plus the background data on occupation, age and sex of the sample so that; section 9.1.2.1 gives the background data, followed by Existing behaviours, beliefs, attitudes (9.1.2.2), Change of beliefs and intentions for future action (9.1.2.3), Reasons for visiting the demonstration (9.1.2.4) and Impact of the demonstration (9.1.2.5).
Table 9.1 shows that the sample was almost equally split between building designers - architects and surveyors (149/48%) and non-designers (162/52%) which included small numbers of many different professions/occupations.
Table 9.2 shows that 65% of the respondents were between the ages of 26 and 50, with almost equal numbers in the 19-25 and 50-65 age group. 266 (86%) of the sample were male and 45 (14%) female.

Table 9.2  

<table>
<thead>
<tr>
<th>Age Range</th>
<th>(q.005, n = 311)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 18</td>
<td>3</td>
</tr>
<tr>
<td>19 - 25</td>
<td>55</td>
</tr>
<tr>
<td>26 - 35</td>
<td>107</td>
</tr>
<tr>
<td>35 - 50</td>
<td>97</td>
</tr>
<tr>
<td>50 - 65</td>
<td>47</td>
</tr>
<tr>
<td>Over 65</td>
<td>1</td>
</tr>
<tr>
<td>'prefer not to say'</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>311</strong></td>
</tr>
</tbody>
</table>

9.1.2.2. Evaluation of existing behaviours, beliefs/opinions and attitudes towards energy efficiency at the start of a visit to the Demonstration Suite.

Seven questions in Part 1 of the questionnaire dealt with these pre-existing attributes. Questions 011 & 013 dealt with existing behaviours (designers only) whilst questions 008, 009, 010 & 012 explored attitudes and beliefs/opinions (all).
A. Existing behaviours

Question 011 asked designers (total 149) to indicate the extent to which they had included energy efficiency measures in their designs over the previous three years by asking in what proportion of their designs they had achieved thermal standards better than those required by the Building Regulations.

Table 9.3 indicates that, of the 127 valid responses, only 6% (8) routinely included energy efficiency measures in all their buildings and 37% (47) never did so. However, 42% (53) stated that they had done so in a few buildings. Overall, 63% had raised thermal standards in at least a few designs which could indicate a positive attitude towards energy efficiency but which was not transferred fully into practice - in all, 92% did not routinely raise thermal standards. This would suggest there were barriers (other than attitude) preventing energy efficient design behaviour as a general rule and this supports the hypotheses suggested in chapter 5 - that the inactivity may be due to factors such as erroneous beliefs, inadequate information, lack of help and procedures etc.
The second question dealing with existing behaviour (013) asked whether any of the "alternative" energy technologies had been used by the designers. This question was asked as it had appeared from my previous discussions with practitioners that they found these of more interest that the energy efficiency measures which are incorporated into the fabric of the building and therefore it would be useful to see if their behaviour reflected this. 57 of the 149 (38%) eligible respondents (designers) answered this question,
providing a total of 87 responses (Table 9.4). Unfortunately, I had
omitted to ask how many times each had been used. However, the
usage was fairly high in comparison with the answers to the previous
question, suggesting that the novelty and prestige value of such
measures tended to outweigh their considerably higher cost and
complexity and poorer effectiveness (in terms of a cost-benefit
ratio). The higher incidence of use of solar water heating and heat
pumps may be due to higher levels of public advertising and media
coverage.

Table 9.4  Question 013
Have you included any of the following in any of your projects?
(tick as many as applicable)

<table>
<thead>
<tr>
<th>Method</th>
<th>No. of responses</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Water heating</td>
<td>28</td>
<td>32</td>
</tr>
<tr>
<td>Heat pump</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>Passive solar heating</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Waste heat recovery</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Photovoltaics</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Wind power</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>87</strong></td>
<td></td>
</tr>
</tbody>
</table>

(n = 57)
B. Attitudes, Beliefs, Opinions

Questions 008 & 009 were similar in that they both related to opinions/beliefs held about energy efficiency, but 008 was concerned with beliefs about the (useful) purpose of energy efficiency whilst 009 was concerned with possible results ("good" or "bad") from doing so.

Question 008 asked respondents to rank five possible reasons for installing energy efficiency measures in buildings. Table 9.5 shows the order of priority obtained by allocating five points to rankings of 1, four points to 2, etc., and taking the mean of the resultant score. This shows that overall, reducing fuel costs, saving energy and increased thermal comfort were perceived as above average in importance, whilst providing higher temperatures at the same fuel cost fell below average and, increasing the value of the property was of very little importance. (In relation to this last point however, it must be noted that the majority of respondents were from local authorities and therefore likely not to perceive this as important whereas a different sample, say, house-owners or property developers could have considered this of high importance.)
Table 9.5  Question 008

Below are some reasons for putting energy conservation measures in buildings. Please put a '1' by the reason you feel is most important, '2' against the next important, and so on up to '5'.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Reason</th>
<th>Score</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Reducing fuel costs</td>
<td>1118</td>
<td>4.11</td>
</tr>
<tr>
<td>D</td>
<td>Saving energy</td>
<td>1044</td>
<td>3.84</td>
</tr>
<tr>
<td>C</td>
<td>Increased thermal comfort</td>
<td>928</td>
<td>3.41</td>
</tr>
<tr>
<td>E</td>
<td>Providing higher temperatures at the same fuel cost</td>
<td>620</td>
<td>2.28</td>
</tr>
<tr>
<td>A</td>
<td>Increasing the value of the property</td>
<td>370</td>
<td>1.36</td>
</tr>
</tbody>
</table>

No answer or invalid - 39
n = 272

Figure 9.1 shows the distribution patterns for each of the categories which are reflected quite closely in the mean scores given above. It is interesting to note that no respondent scored "increasing the value of the property" as top priority and only one scored "reducing fuel costs" as the lowest priority.
Question 009 was a checklist incorporating six pairs of positive and negative possible results from the installation of energy efficiency measures in buildings. Respondents were asked to tick as many as they felt were appropriate.

The whole sample (311) answered this question. However, a number ticked both paired options and one ticked all twelve! It is possible that these respondents felt that both sets of conditions...
could occur under different circumstances. In all there were 1290 responses and the distribution (see Figure 9.2) suggests that the primary results of energy efficient buildings are perceived to be lower running costs and more comfortable buildings (88% and 79% of the sample). These were closely followed by warmer buildings, higher living standards and less condensation (74%, 64% and 58%). However, there were a significant number of respondents who felt condensation would result (16%/50) and the votes for more or less risk of infection were very close at 17% (53) and 12% (38).

The total percentage of the sample who voted on each pair of options is given in Table 9.6 and shows a comparatively low total vote on risk of infection suggesting either, that respondents had not considered this area or, were very uncertain as to which of the pair of options might occur, or, did not consider that energy efficiency buildings would have an effect in either direction. Nevertheless, this category received the second highest percentage vote for a negative option and the condensation category received the highest vote for a negative option, indicating that these areas of concern and erroneous belief needed to be addressed clearly in the change programme.
Fig. 9.2 Percentage Votes cast for various effects of Energy conservation measures (paired options)
Table 9.6  Percentage of respondents casting votes on paired options (question 009) as to the results of e.e. measures

(Sample : 311; responses : 129)

<table>
<thead>
<tr>
<th>Options</th>
<th>% of sample</th>
<th>% for pair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living Standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher</td>
<td>64.0</td>
<td>65.3</td>
</tr>
<tr>
<td>Lower</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Warmth of Buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warmer</td>
<td>74.0</td>
<td>76.3</td>
</tr>
<tr>
<td>Colder</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>Condensation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More (Yes)</td>
<td>16.1</td>
<td>73.7</td>
</tr>
<tr>
<td>Less</td>
<td>57.6</td>
<td></td>
</tr>
<tr>
<td>Running Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher</td>
<td>0.6</td>
<td>88.1</td>
</tr>
<tr>
<td>Lower</td>
<td>87.5</td>
<td></td>
</tr>
<tr>
<td>Comfortable buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More</td>
<td>79.4</td>
<td>82.3</td>
</tr>
<tr>
<td>Less</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Risk of Infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher</td>
<td>12.2</td>
<td>29.2</td>
</tr>
<tr>
<td>Less</td>
<td>17.0</td>
<td></td>
</tr>
</tbody>
</table>

Question 010 sought to discover respondents' opinions as to the group(s) who should bear responsibility for initiating energy
efficiency design. A checklist was provided of the 9 groups involved, directly or indirectly, in the provision of housing and heating, plus a category for "others". Respondents were asked to tick as many as they wished. Answers were provided by 310 respondents; nine ticked all categories and fifteen added to the list: the additions included, "clients", Building Societies, Environmental Health Officers, Housing Managers, Developers and the Media.

Analysis of the total of 1,124 votes cast gave an order of perceived responsibility for initiating energy efficient design as shown in Table 9.7.
Table 9.7  Question 010

Assuming it is felt to be desirable to conserve energy in buildings, which of the following groups do you feel should be responsible for initiating this?
(tick one or more)

Sample 310. Total votes : 1124

<table>
<thead>
<tr>
<th></th>
<th>n.</th>
<th>% of sample</th>
<th>% of votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architects/Surveyors</td>
<td>260</td>
<td>83.9</td>
<td>23.1</td>
</tr>
<tr>
<td>Politicians</td>
<td>194</td>
<td>62.6</td>
<td>17.3</td>
</tr>
<tr>
<td>Occupants</td>
<td>153</td>
<td>49.4</td>
<td>13.6</td>
</tr>
<tr>
<td>Local councillors</td>
<td>125</td>
<td>40.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Services Engineers</td>
<td>123</td>
<td>39.7</td>
<td>10.9</td>
</tr>
<tr>
<td>Planners</td>
<td>95</td>
<td>30.6</td>
<td>8.5</td>
</tr>
<tr>
<td>Fuel Supply Industries</td>
<td>85</td>
<td>27.4</td>
<td>7.6</td>
</tr>
<tr>
<td>Civil Servants</td>
<td>47</td>
<td>15.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Chief Executives</td>
<td>42</td>
<td>13.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Total</td>
<td>1124</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The designers (architects/surveyors) were perceived as the group who should be most responsible, by a very wide margin, gaining votes from 84% of the respondents - 21% more than the next highest group (politicians). This may be related to the proportion of respondents (48%) who belong to this group (designers).
Politicians were also strongly felt to have an important role (63%) and almost half the respondents felt building occupants should be responsible for initiating energy efficiency. At the other end of the scale, very few respondents felt that either Civil Servants or Chief Executives had much responsibility in this field. (15% & 13.5%). These results were encouraging in that they supported the contention that designers were the group towards whom the change programme should be directed as they themselves felt energy efficiency to be their responsibility.

Question 012 asked designers' opinions as to whether the thermal requirements of the Building Regulations should be upgraded and, if so, within what time period. The purpose of this was that if a majority felt they should be upgraded and reasonably soon, say, within 2 years, this would suggest a fairly positive attitude towards energy efficiency. The results obtained are given in Table 9.8 and show that a clear majority were in favour of upgrading the Building Regulations within 2 years (70.5%) whilst only 8% felt they definitely should not be upgraded. Over half the respondents felt they should be upgraded immediately. The total of 139 responses can be split as a ratio of positive to negative of 4:1.
**Table 9.8** Question 012
Do you think the Thermal part of the Building Regulations should require higher standards than at present? (please tick one)

Sample : 149 (Designers only). Responses : 139

<table>
<thead>
<tr>
<th>Ref.</th>
<th>n</th>
<th>% of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>73</td>
<td>52.5</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>18.0</td>
</tr>
<tr>
<td>E</td>
<td>17</td>
<td>12.2</td>
</tr>
<tr>
<td>C</td>
<td>13</td>
<td>9.4</td>
</tr>
<tr>
<td>D</td>
<td>11</td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td>139</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total positive response (A + B + C)</td>
<td>111</td>
<td>79.9</td>
</tr>
<tr>
<td>Total negative response (D + E)</td>
<td>28</td>
<td>20.1</td>
</tr>
</tbody>
</table>

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Summary

The existing behaviours, beliefs/opinions and attitudes towards energy efficiency, as found from analysis of the questionnaires can be summarised as; Only 6% of (the 149) designers routinely included energy efficiency in their designs and 37% never did so. This is despite indications that attitudes were generally positive and designers were perceived to bear the main responsibility for initiating energy efficiency in buildings. The primary benefits from energy efficiency were seen as reduction of fuel costs, saving energy and increasing thermal comfort but some respondents were concerned that energy efficiency could cause condensation and/or raise the risk of infection, although there was only a low level of opinion on the latter aspect and it was fairly evenly matched between a view that the risk would be increased and the opposing view that it would be decreased.

9.1.2.3 Evaluation of the effect of the Demonstration in changing beliefs and intentions as to future action.

The evaluation of any change that might have taken place was carried out mainly by comparison of answers to question 011 in part 1 with those to question 114 in part 2. Question 011 was:

"The Building Regulations require certain standards of thermal insulation to various elements of buildings. These standards are changed from time to time. In the buildings you have designed over the past 3 years or so, have you provided for HIGHER thermal
standards of construction than required by the Building Regulations? (please tick one).

Yes, in a few of the buildings
Yes, in many of the buildings
Yes, in nearly all of the buildings
Yes, in all of the buildings
No."

The answers to this question therefore indicated existing behaviour with regard to energy efficient design prior to visiting the Demonstration Suite.

Question 114 was:

"As a result of this exhibition, I will in future projects...(please tick one)
...continue to design low energy buildings as I have been doing.
...make sure I include energy conservation measures.
...make sure I consider energy conservation.
...include energy conservation measures if this is part of the client's brief.
...include energy conservation measures and maximise solar gain.
...include energy conservation measures, solar gain and waste heat recovery.
...probably not include energy conservation measures because...
and the answers therefore indicated intentions as to future behaviour regarding energy efficiency design at the end of their visit to the Demonstration Suite.

In order to be able to show a clear relationship it was necessary to match the "before" and "after" answers on an individual basis. Ninety designers had provided valid answers to both questions so the following analysis relates to this sample of ninety only - out of a possible 149 designers who filled in both parts of the questionnaire.

As varying degrees of change were possible, dependent on both the starting position (q. 011) and the finishing position (q. 114), I devised a points system to reflect both the direction and the amount of change for each individual which, when summed and divided by the maximum possible points (dependent on starting position) would give an overall indicator of the degree of success/failure of the change effort for this sample.

The first step was to order the answers to the first question in relation to their distance from the desired behaviour - and therefore to their capacity for change, as shown in Table 9.9. Thus "No" was ranked first, being the furthest from the desired behaviour and allowing for the greatest change:
Table 9.9  Ranking of answers to question 011  
(n = (90)

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Answer</th>
<th>Rank</th>
<th>Respondants</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>No</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>A</td>
<td>Yes, in a few of the buildings</td>
<td>2</td>
<td>39</td>
</tr>
<tr>
<td>B</td>
<td>Yes, in many of the buildings</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>Yes, in nearly all of the buildings</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>D</td>
<td>Yes, in all of the buildings</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

From this table it can be seen that the majority of respondents (74%) fell into the first two categories and therefore there was a great potential for change.

The next step was to rank the answers to question 114 conversely, ie. the first position was allocated to the answer (F) which indicated the strongest intentions to design energy efficiency buildings in future, as shown in Table 9.10:
Table 9.10  Ranking of answers to q. 114

(\(n = 90\))

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Answer : ... I will in future projects ...</th>
<th>Rank</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>... include e.c. measures, solar gain and waste heat recovery</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>E</td>
<td>... include e.c. measures &amp; maximise solar gain</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>B</td>
<td>... make sure I include e.c. measures</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>C</td>
<td>... ... ... consider e.c. measures</td>
<td>4</td>
<td>43</td>
</tr>
<tr>
<td>D</td>
<td>... include e.c. measures if this is part of the client's brief</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>G</td>
<td>... probably not include e.c. measures because ...</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>A</td>
<td>... continue to design low energy buildings as I have been doing</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

The third stage was to allocate points for each possible combination of answers to the two questions:

Answer A (to question 114) indicates no change so, irrespective of starting position, no points would be allocated for this.

Answer G to question 114 would indicate no change if the starting position was E in question 011 ("No") but in all other cases would indicate a change in the opposite direction to that required and was therefore allocated negative points, increasing in relation to the
difference in the two positions. Where I considered the starting and finishing positions to be equal (i.e. no change) I also allocated zero points (eg. B (q 011) to C (q 114)) and where I considered the "after" position to be inferior to the "before" position again I allocated negative points.

The resulting points table is given as Table 9.11:

Table 9.11  Points allocated for change between positions in question 011 and those in question 114.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Rank.</th>
<th>From question 011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ref. E A B C D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rank 1 2 3 4 5</td>
</tr>
<tr>
<td>F</td>
<td>1</td>
<td>6 5 4 3 2</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>4 3 2 1 0</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>3 2 0 0 -2</td>
</tr>
<tr>
<td>D</td>
<td>5</td>
<td>2 0 -1 -2 -3</td>
</tr>
<tr>
<td>G</td>
<td>6</td>
<td>0 -1 -2 -3 -4</td>
</tr>
<tr>
<td>A</td>
<td>7</td>
<td>0 0 0 0 0</td>
</tr>
</tbody>
</table>

page 281
Table 9.12. Distribution of matched answers to questions 011 and 114
with points allocated for each level of change and total points achieved.

<table>
<thead>
<tr>
<th>q.011. Higher thermal standards than Building Regulations during past three years?</th>
<th>No. of responses</th>
<th>Points</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, in a few buildings</td>
<td>Yes, in many buildings</td>
<td>Yes, in nearly all buildings</td>
<td>Yes, in all buildings</td>
</tr>
<tr>
<td>T*011. Higher thermal standards than Building Regulations during past three years?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in a few buildings</td>
<td>in many buildings</td>
<td>in nearly all buildings</td>
<td>in all buildings</td>
</tr>
<tr>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>q.114 In future, I will...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Include energy conservation + solar + heat recovery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref.</td>
<td>E</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>6</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Include energy conservation plus solar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref.</td>
<td>E</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Make sure to include energy conservation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref.</td>
<td>E</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>32</td>
<td>30</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Make sure to consider energy conservation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref.</td>
<td>E</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>16</td>
<td>20</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>48</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Include energy conservation if part of client's belief</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref.</td>
<td>E</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>-4</td>
<td>0</td>
</tr>
<tr>
<td>Probably not include energy conservation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref.</td>
<td>E</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>-4</td>
<td>0</td>
</tr>
<tr>
<td>Continue as before</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref.</td>
<td>E</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>89</td>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>

(0 indicates no change, minus points = change opposite to desired)
Table 9.13. Maximum possible points and total points achieved related to starting position.

<table>
<thead>
<tr>
<th>Start Position (q. 011)</th>
<th>No. of respondents</th>
<th>Maximum available points</th>
<th>Maximum available total</th>
<th>Actual total points</th>
<th>Actual as % of maximum available</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>28</td>
<td>x</td>
<td>6</td>
<td>168</td>
<td>92</td>
</tr>
<tr>
<td>A</td>
<td>39</td>
<td>x</td>
<td>55</td>
<td>195</td>
<td>89</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>x</td>
<td>4</td>
<td>32</td>
<td>10</td>
</tr>
<tr>
<td>C</td>
<td>7</td>
<td>x</td>
<td>3</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>D</td>
<td>8</td>
<td>x</td>
<td>2</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td></td>
<td>432</td>
<td>199</td>
<td>46.1</td>
</tr>
</tbody>
</table>

Change Score = \( \frac{\text{total points}}{\text{max points}} \times 100\% = \frac{199}{432} \times 100 = 46.1\% \)

Table 9.12 shows the distribution of the matched answers to both questions, with the points allocated to each (from table 9.11) and the consequent points totals. Table 9.13 shows the maximum points which could theoretically have been gained (if all respondents had indicated the maximum change available in relation to their starting position) together with the actual scores achieved.
This enables an overall Change Score to be arrived at where,

\[
\text{Change Score} = \frac{\text{total points}}{\text{max. points}} \times 100\%
\]

In this case,

\[
\frac{199}{432} \times 100\% = 46.06\%
\]

which indicates that the Demonstration succeeded in bringing about (at least temporarily) 46% of the change for which the change programme as a whole was aiming. It was also reassuring to note that no respondents appeared to have changed in the negative direction although there were a total of twenty (22%) who showed no change which is somewhat disappointing (although it is still hoped that other aspects of the change programme would have an effect on them).

Change was also assessed, somewhat subjectively, by study of the answers to question 104, the first question of part 2 of the questionnaire which asked respondents to state in their own words, "During your visit, what has made the most impact on you?" A large proportion of the answers to this question indicated that respondents had altered their beliefs/prejudices and/or increased their awareness as a result of their visit to the Demonstration, for example, "The surprisingly low cost of energy conservation packages." (Q. No. 441), "That the house is not completely eccentric and odd, yet saves 70% of space heating costs." (Q. No.
671) and, "Greater awareness of the extent to which relatively simple measures can contribute to energy savings." (Q. No. 96).

There was also, frequently, an element of surprise that the subject was simpler than they had thought and/or that costs were less and benefits greater, for example, "The simplicity of it all!" (Q. No. 480), "How easy it actually is to save energy and how simple the methods are." (Q. No. 687) and, "That draught-proofing had such a significant effect." (Q. No. 121)

The answers to this question were categorised (in the same way as the other "open" questions - see Appendix IV) using a sample of fifty Questionnaires. Five categories were chosen and the answers from the remaining 261 questionnaires allocated to these categories as shown in Fig. 9.3.
There were a total of 228 answers - thirteen respondents had given complex answers which were split into their separate parts, whilst...
forty-five respondents did not answer this question. The majority of responses (215/94%) were "positive" (i.e. indicating a positive effect from the visit) but thirteen answers were negative. The majority (12) of these came into the category of "The experience of visiting the "Demonstration Suite" and all dealt with the physical environment of the Demonstration Suite during their visit (too hot, too cold, too stuffy etc.). It is worthwhile pointing out here that it is normal for around 5% of people to differ from the majority in their perception of thermal comfort (Fanger, 1970) but nevertheless, these negative impressions could serve to reinforce negative attitudes to energy efficiency. There is the usual difficulty here in interpreting the meaning of no answer - it could be a negative response, a neutral response or, a function of lack of time etc. If taken as a negative response this would, overall, indicate 20% negative and 80% positive responses to the visit.

Further indications as to the effect of the demonstration in increasing awareness of or interest in the subject can be gained from consideration of questions 110, 111 & 112 in part 2 of the questionnaire. Question 110 was a "filter" question which asked, "Do you wish to investigate the subject of energy conservation further?" Those answering "Yes" were directed to question 111 and those answering "No" to question 112 which was an open question asking for comments on why the answer "No" was given. Question 111 gave six options (plus a free answer category) as to how respondents might go about further investigation and asked them to tick as many as appropriate.
Of the sample of 311, twenty-two did not answer question 110. Of the 289 responses, 268 (86%) answered "Yes" whilst 21 (7%) answered "No". Only one of the 268 who answered "Yes" failed to answer the follow-up question (no. 111). Their preferences for the various options are shown in Table 9.14 and indicate that the first five options are (almost) equally popular choices, whilst the taking of a degree or diploma course was much less popular, though still appealing to 10% of the respondents - this was expected as such a move would require a very high level of commitment - higher than that which was the aim of the exercise. Thirteen respondents provided other suggestions including, "do practical work on my own house", "revisit the demonstration centre" and "discuss with initiators and occupants of the dwellings".

Of the twenty-one who answered "No" to question 110, twelve gave reasons at question 112. The majority can be paraphrased as, "I have enough information for my purposes." Two stated they had not enough time and two, that they "preferred to be advised by SLC"!
Table 9.14  Options for modes of investigating energy conservation further.

Question 111.  n = 267

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Option</th>
<th>No. of votes</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Approach experts for advice</td>
<td>155</td>
<td>58.1</td>
</tr>
<tr>
<td>C</td>
<td>Discuss with colleagues</td>
<td>149</td>
<td>55.8</td>
</tr>
<tr>
<td>E</td>
<td>Attend relevant conferences/seminars</td>
<td>147</td>
<td>55.1</td>
</tr>
<tr>
<td>B</td>
<td>Read journals on the subject</td>
<td>146</td>
<td>54.7</td>
</tr>
<tr>
<td>A</td>
<td>Read books on the subject</td>
<td>144</td>
<td>53.9</td>
</tr>
<tr>
<td>F</td>
<td>Join a relevant Degree/Diploma Course</td>
<td>27</td>
<td>10.1</td>
</tr>
<tr>
<td>G</td>
<td>'Other'</td>
<td>13</td>
<td>4.9</td>
</tr>
</tbody>
</table>

The high level of response to this question clearly suggests that interest in the subject had been stimulated by the visit to the Demonstration Suite and that visitors intended to take steps to increase their knowledge. Also, that there is a need to provide the information through a number of different channels to meet the various needs/preferences of the potential change adopters.

A further indicator of change may be deduced by comparing the ranking of various reasons for incorporating energy efficiency measures in buildings, before and after the visit. Unfortunately, the questions - No. 008 in part 1 and No. 113 in part 2 - are not
directly comparable, being worded slightly differently and with five elements in question 008 and six in question 113. However, table 9.15 shows the ranking for each side by side. The comparable options are 008B & 113A; 008D & 113D; 008C & 113B. Comparisons of these pairs show that "Reducing fuel/running costs" increased slightly in importance (82% to 84% of maximum mean score); "saving energy/fossil fuels" reduced quite considerably (77% to 56%) and "increased thermal comfort" became more important (68% to 72%) and also moved up one position in the order of priority.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Reason</th>
<th>Score</th>
<th>Mean</th>
<th>Ref.</th>
<th>Reason</th>
<th>Score</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Reducing fuel costs</td>
<td>1118</td>
<td>4.11</td>
<td>A</td>
<td>Reduce running costs</td>
<td>1308</td>
<td>5.05</td>
</tr>
<tr>
<td>D</td>
<td>Saving energy</td>
<td>1044</td>
<td>3.84</td>
<td>B</td>
<td>Incr. thermal comfort</td>
<td>1124</td>
<td>4.34</td>
</tr>
<tr>
<td>C</td>
<td>Increased thermal comfort</td>
<td>928</td>
<td>3.41</td>
<td>D</td>
<td>Conserve fossil fuels</td>
<td>868</td>
<td>3.35</td>
</tr>
<tr>
<td>E</td>
<td>Higher temps. for same cost</td>
<td>620</td>
<td>2.28</td>
<td>E</td>
<td>Control cond.</td>
<td>844</td>
<td>3.26</td>
</tr>
<tr>
<td>A</td>
<td>Incr. value of property</td>
<td>370</td>
<td>1.36</td>
<td>F</td>
<td>Red. pollution</td>
<td>523</td>
<td>2.02</td>
</tr>
</tbody>
</table>

Table 9.15 Comparative rankings of reasons for installing e.e. measures - questions 008 and 113.
This comparison suggests mainly that the (positive) reasons for energy efficiency were confirmed by the visit rather than radically altered, although fuel saving and increased comfort were ranked higher after the visit.

Question 115 (Part 2) asked respondents’ views regarding "payback periods" for energy saving measures. Five choices were given, one of which to be chosen. The results are given in Table 9.16. As a payback period of less than a year is only realistic for a few energy measures, a high vote for this could have been seen as indicating a negative attitude. However, the 54% who suggested up to five years as appropriate, together with the 8% who felt payback did not matter and further 24% who felt up to 10 years was acceptable, suggests a very positive attitude overall after the visit to the demonstration and, perhaps, a realisation that energy measures can be cost effective.
Question 115. I believe the cost of energy saving measures should be recouped (in fuel cost savings) in:

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Option</th>
<th>No. of responses</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>n = 263</td>
</tr>
<tr>
<td>B</td>
<td>under 5 years</td>
<td>143</td>
<td>54</td>
</tr>
<tr>
<td>C</td>
<td>under 10 years</td>
<td>62</td>
<td>24</td>
</tr>
<tr>
<td>A</td>
<td>one year or less</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>E</td>
<td>it doesn't matter</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>D</td>
<td>don't know</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>263</td>
<td></td>
</tr>
</tbody>
</table>

Taking the Change Score together with responses to the other questions described above indicates that the Demonstration was successful, in a majority of cases, in changing visitors beliefs, developing awareness and in motivating designers to improve the energy efficiency of their designs in the future. To what extent this effect endured subsequent to the visit is not known and cannot be clearly assessed as other aspects of the change programme should/may also have affected the same individuals.
9.1.2.4. Identification of reasons for visiting the Demonstration.

Identifying the reasons given for visiting the Demonstration was felt to be useful both to indicate the state of readiness of the visitors to receive information and to provide information for future similar activities. Question 007 (in Part 1) asked respondents to tick one description in a checklist which most closely fitted their main reason for visiting the exhibition. Eight choices were given plus an invitation to provide their own reason if it was not included. The results are shown in Table 9.17. Nineteen respondents gave multiple answers and six did not answer leaving a sample of 286. It was felt unlikely that respondents would admit to "negative" reasons for visiting the Demonstration so the majority of options were couched in positive or neutral terms. The exception was option D - "to discuss some of the problems that arise with some energy saving measures."
Table 9.17 Please tick the ONE description that most closely fits YOUR main reason for visiting this Exhibition.

(Q.007 n = 286)

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Option</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>To find out more about the techniques for saving energy in buildings.</td>
<td>144</td>
<td>50.3</td>
</tr>
<tr>
<td>B</td>
<td>To find out what techniques have been used in these 'low energy' flats and houses.</td>
<td>71</td>
<td>24.8</td>
</tr>
<tr>
<td>A</td>
<td>To see how far these low energy flats and houses are succeeding.</td>
<td>20</td>
<td>7.0</td>
</tr>
<tr>
<td>H</td>
<td>To find out about alternative forms of energy.</td>
<td>16</td>
<td>5.6</td>
</tr>
<tr>
<td>D</td>
<td>To discuss some of the problems that arise with some energy saving measures.</td>
<td>12</td>
<td>4.2</td>
</tr>
<tr>
<td>F</td>
<td>To find out the opinions of the occupants of these dwellings.</td>
<td>6</td>
<td>2.1</td>
</tr>
<tr>
<td>G</td>
<td>To confirm that the techniques I am using are effective.</td>
<td>5</td>
<td>1.7</td>
</tr>
<tr>
<td>E</td>
<td>To find out how effective solar heating is.</td>
<td>4</td>
<td>1.4</td>
</tr>
<tr>
<td>J</td>
<td>Other</td>
<td>8</td>
<td>2.8</td>
</tr>
</tbody>
</table>

286

By far the greatest number (144/50%) chose option C - "to find out more about the techniques for saving energy in buildings" suggesting both a positive attitude towards the subject plus a readiness to receive information. The second most popular option (71/25%) was B - "to find out what techniques have been used in these "low energy"
flats and houses" - a more specific version of the previous option. All the other options received low scores and with only eight respondents providing their own option. It would therefore seem that the main motivation for visiting the Demonstration was to gain knowledge about techniques for saving energy in buildings. This is also corroborated by the answers to the open questions in part 2 of the questionnaires where the main requirement was for further information on techniques and materials - see next section.

9.1.2.5. Assessment of the impact of the Demonstration and response to both the format and content.

A major part of the second part of the questionnaire was devoted to questions designed to elicit responses to the format and content of the Demonstration, to whom it was likely to be most useful etc. The results obtained will be used to modify the Demonstration facility for the future (see chapter 10). Both open and closed questions were used for this purpose. Of the open questions, question 104 directly asked what had made the most impact and questions 106, 107, 108 and 109 asked for suggestions for improving the Demonstration in terms of information which should be included, topics which should be covered in more detail and techniques which should be used to transmit the information. The closed questions (105 & 116) dealt with the usefulness of aspects of the Demonstration to the visitors and, their opinion as to which groups would benefit from visiting it. The answers to question 104 have already been considered in Section 9.1.2.3.
The categorisation exercise for the open questions (see Appendix IV) indicated that the answers to questions 106 to 109 were mixed and overlapped (e.g., answers which dealt with format were not necessarily given to the format question (108)) so all the answers to all four questions were grouped together and then classified into eight categories which were grouped under the general headings of "Content", "Format" and "Other". Of the sample of 261, 130 either gave no response or answered "No" or "None". From the remaining 131 respondents there were a total of 220 responses, the distribution of which is shown in Figure 9.4.
The majority (67%) of the suggestions concerned the content of the Demonstration and of these the highest proportion (47% & 46%) required more information in categories 2 and 3 - Construction and Energy Efficient Design. The Construction category includes construction details, techniques, materials and DIY information

Sample: 261
No. of responses: 220
(from 131 respondents)
whilst the Energy Efficient Design category includes theory, modeling, other building examples, thermal comfort, and "alternative" energy sources. The Format categories received only 22% of the responses and the majority of these requested more two-dimensional exhibits - slides, films, drawings etc. rather than 3-D exhibits - models, samples of materials etc.

There were 25 suggestions for "Other" improvements including opening during evenings or weekends, more "signposting" of features of interest and so on.

A number of suggestions were actually for facilities which were available, such as displays of up to date data from the houses, so evidently not all visitors were fully aware of all the available features and it would therefore be important in future to make all the available facilities clearly known to visitors (and potential visitors).

The first of the closed questions (105) asked for the various elements of the Demonstration to be rated as either (a) "very useful", (b) "quite useful" or (c) "not very useful." By allocating 2 points for "very useful", 1 point for "quite useful" and -1 for "not very useful", the Mean Scores shown in Table 9.18 were arrived at. Where no rating was given this was scored as zero and item F - Film, was removed altogether as, although it had been initially planned, it had not been possible to provide this.
Table 9.18

Usefulness to visitors of various elements of the Demonstration

Question 105:
Please indicate against the following items how useful they have been to you.
(tick one box against each item).

\(n = 311\)

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Element</th>
<th>No. of Votes</th>
<th></th>
<th></th>
<th>Mean (_1), n = 311</th>
<th>Mean (_2), n = no. of votes per element</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Information on energy savings</td>
<td>208</td>
<td>84</td>
<td>5</td>
<td>1.59</td>
<td>n 297 1.67</td>
</tr>
<tr>
<td>G</td>
<td>General info. on energy saving techniques and materials</td>
<td>158</td>
<td>106</td>
<td>6</td>
<td>1.34</td>
<td>n 270 1.54</td>
</tr>
<tr>
<td>H</td>
<td>Leaflets to take away</td>
<td>153</td>
<td>104</td>
<td>5</td>
<td>1.30</td>
<td>n 262 1.55</td>
</tr>
<tr>
<td>B</td>
<td>Info. on costs</td>
<td>153</td>
<td>113</td>
<td>19</td>
<td>1.29</td>
<td>n 285 1.40</td>
</tr>
<tr>
<td>J</td>
<td>Seminar</td>
<td>153</td>
<td>47</td>
<td>2</td>
<td>1.14</td>
<td>n 203 1.74</td>
</tr>
<tr>
<td>A</td>
<td>Building details of these houses</td>
<td>113</td>
<td>142</td>
<td>19</td>
<td>1.12</td>
<td>n 274 1.27</td>
</tr>
<tr>
<td>D</td>
<td>Monitored data</td>
<td>50</td>
<td>128</td>
<td>55</td>
<td>0.56</td>
<td>n 233 0.74</td>
</tr>
<tr>
<td>E</td>
<td>Monitoring system demonstration</td>
<td>42</td>
<td>92</td>
<td>66</td>
<td>0.35</td>
<td>n 200 0.55</td>
</tr>
</tbody>
</table>

As Table 9.18 shows, most of the elements were perceived to be very useful or quite useful, with only a few respondents finding the elements not very useful. The exceptions were the monitored data and the demonstration of the monitoring system where more respondents found these not very useful than those who found them very useful, though there were still a majority who found them quite useful. The Seminars scored very highly with those who attended them but their overall score is in the middle of the range due to the fact that not all visitors took part in a seminar so could not comment. Only two of the 203 respondents who commented on the seminar found it not very useful - less than one percent, whereas
154 (76%) found it very useful. The Mean Scores shown in Table 9.15 reflect this - when n is taken as the number of responses to each element rather than the number of respondents overall, the Seminar scores highest, with a Mean of 1.74.

The most useful elements of the Demonstration therefore appear to have been: seminars, information on energy savings, leaflets to take away and the general information on energy saving techniques and materials.

The other closed question dealing with the impact of the Demonstration was question 116 where respondents were asked whether they thought various groups would benefit or would not benefit from visiting the Demonstration. Twenty-nine of the 311 respondents did not answer this question and a number seemed unsure on some categories (entering question marks and/or comments) - these were discounted for analysis. There were a total of 2,094 positive (would benefit) and 165 negative (would not benefit) responses from the 282 respondents. Scoring positive responses as +1 and negative responses as -1 gave the scores and order of groups most likely to benefit as shown in Table 9.19.
### Table 9.19: Relative benefit of visit to demonstration to various groups

(Question 116) \( n = 282 \)

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Group</th>
<th>Would benefit</th>
<th>Would not benefit</th>
<th>Score</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Architects/Bldg. Surveyors</td>
<td>277</td>
<td>2</td>
<td>275</td>
<td>0.98</td>
</tr>
<tr>
<td>H</td>
<td>Students of Bldg. subjects</td>
<td>259</td>
<td>0</td>
<td>259</td>
<td>0.92</td>
</tr>
<tr>
<td>G</td>
<td>Teachers of Bldg. subjects</td>
<td>248</td>
<td>3</td>
<td>245</td>
<td>0.87</td>
</tr>
<tr>
<td>B</td>
<td>Services Engineers</td>
<td>238</td>
<td>17</td>
<td>221</td>
<td>0.78</td>
</tr>
<tr>
<td>E</td>
<td>Housing Managers</td>
<td>230</td>
<td>22</td>
<td>208</td>
<td>0.74</td>
</tr>
<tr>
<td>D</td>
<td>Politicians</td>
<td>229</td>
<td>22</td>
<td>207</td>
<td>0.73</td>
</tr>
<tr>
<td>J</td>
<td>General public</td>
<td>220</td>
<td>16</td>
<td>204</td>
<td>0.72</td>
</tr>
<tr>
<td>F</td>
<td>Bldg. Contractors/Sub-Contractors</td>
<td>211</td>
<td>32</td>
<td>179</td>
<td>0.63</td>
</tr>
<tr>
<td>C</td>
<td>Quantity Surveyors</td>
<td>182</td>
<td>51</td>
<td>131</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Almost all respondents (277/98%) felt that designers
(architects/surveyors) would benefit from visiting the demonstration
and 1% or less felt that designers, students and teachers of
buildings subjects would not benefit. Conversely, almost 20% (51)
felt that Quantity Surveyors would not benefit. 110 respondents
(39%) stated that all the groups would benefit and thirty-three
respondents suggested a total of thirteen other groups who would
benefit, including Environmental Health Officers, Developers,
Planners, Estate Agents, Tenants' representatives. As with many of
the questions, the answers are likely to be, to some extent, related
to the profession/job/role/ of the respondents but, the
demonstration was aimed primarily at designers, 48% of the
respondents were designers and 98% of the respondents felt the
demonstration would benefit designers which at least suggests some
success in achieving the aims of the exercise.

9.1.3. Summary of Questionnaire Analysis

The major points that have been ascertained from analysis of the 311
questionnaires are:

1. 48% of the respondents were building designers
   (architects/surveyors) - the remainder being divided among 11
   other groups. 86% of the sample were male and 65% were aged
   between twenty-six and fifty. (Section 9.1.2.1)

2. There were clear indications that visitors held positive
   attitudes towards energy efficiency BUT these were not
   translated in corresponding positive behaviours although 53% of
   designers thought the Building Regulations should be upgraded
   immediately. (Section 9.1.2.2)

3. The major benefits from energy efficiency were perceived to be
   reduction in fuel costs, increased thermal comfort & saving
   energy BUT there was some concern that energy efficiency could
   increase risks of condensation and infection. (Section 9.1.2.2)
4. Responsibility for initiating energy efficient design was seen to lie primarily with designers but also with politicians (central government). (Section 9.1.2.2)

5. The effect of the Demonstration was that many designers went away with intentions to change their behaviour in terms of improving the energy efficiency of their designs - the degree of change was assessed as 46% of the maximum theoretically possible change - related to the starting positions of the individuals. (Section 9.1.2.3).

6. There were changes in perception of particular aspects of the subject, and a desire by 86% of the sample to pursue the subject further by a variety of means. (Section 9.1.2.3)

7. The main stated motivations for visiting the demonstration were:
   a) To find out more about the techniques for saving energy in buildings (50%) and,
   b) To find out what techniques have been used in these "low-energy" flats and houses (25%). (Section 9.1.2.4)

8. The main impact of the demonstration on the visitors appeared to be in altering their beliefs about and increasing their awareness of the subject particularly in regard to the practicality, cost-effectiveness and sound theoretical/professional base of low energy design. 94% of the 238 responses were positive. The thirteen negative responses
mainly related to the thermal comfort of the demonstration suite itself. (Section 9.1.2.5)

9. Visitors would have liked more information on Constructional details, including D-I-Y information plus further examples of energy efficient design, alternative heating systems etc. (Section 9.1.2.5)

10. Visitors would have liked more visual (2-D) material – particularly slides and/or film. Section (9.1.2.5)

11. Of the elements of the demonstration, the Seminars and the information on energy savings were seen to be the most useful. The information on energy saving techniques and materials and the leaflets to take away were seen as the next most useful elements. The monitoring system and data were perceived as least useful though still of some positive value. (Section 9.1.2.5)

12. Respondents felt the Demonstration would be of most benefit to Designers (Architects/Surveyors), closely followed by students and teachers of these disciplines. It was felt to be of rather less benefit to Quantity Surveyors. (Section 9.1.2.5)
9.2. Evaluation through analysis of growth of scheme of Certificates of Design Energy Consumption and (resultant) energy/fuel cost savings.

The adoption of an Energy Policy in each of the three local authorities who are members of the SLCEG and the attendant requirement for all building projects to have a "Certificate of Design Energy Consumption" was discussed in chapter 8 (Section 8.3).

As the SLCEG provide these Certificates to the designers it has been possible to monitor them and thus provide some insight into the degree of change which is occurring in these authorities.

Despite the requirement to obtain the certificates being part of Council policy it was expected that there would be resistance to the change in policy and procedures and to the notion of considering energy efficiency in all building designs - due to the various factors discussed in chapter 5. Therefore it was expected that full implementation of this policy would take time and also that there would be differing rates of adoption between different departments and between the three authorities. Analysis of the growth rate of the number of certificates issued, and more importantly, the number of dwellings these represent, would indicate the development of the adoption process. (One certificate can relate to one dwelling or many identical dwellings.)

In addition, any growth in the level of fuel saved - per dwelling and in total - would indicate an increase in the implementation of energy saving measures in the designs and therefore indicate that
the desired change was being adopted. (This can be assumed as the issue of Certificates does not depend on there being any energy saving measures in the design - the certificate simply states the estimated fuel cost per annum of the dwelling in question plus a statement of the percentage and cost savings achieved (if any). If no saving is made, this statement would merely show a zero saving. Thus, designers have the option to comply with the "letter of the law" - in this case, the policy for obtaining certificates - without entering into the spirit/intent of the policy as a whole. This means that any savings shown indicate that the desired change is beginning to be adopted and increases in the savings indicate an increase in adoption of the change.

At some time, the stage should be reached where all designs are submitted for certification and where all designs show a similar level of saving which would be the optimum level at that time (balancing technical possibilities and cost effectiveness). The graphs for number of dwellings certificated and savings achieved would then level off - except where changing work loads affected the first of these and/or if the adopted change did not endure and savings/take-up started on a downward path.

At the present time it is not possible to directly compare the number of jobs/dwellings certificated by SLCEG with the total numbers designed in each authority for three reasons - firstly that the planned workload tends to fluctuate dependent on financial restraints and changing priorities, secondly, that the chief officers seem rather reluctant to allow this information to be sent
to SLCEG and thirdly, most departments do not have a very sophisticated method of keeping track of their contracts. The exception to both the second and third points is the Housing Surveyors Division in Southwark which has detailed, up to date records and makes them available to SLCEG.

Although it is not possible to directly compare precise numbers, it is possible to make "educated guesses" as to the level of take-up of the Certification scheme: The take-up is variable between both departments and authorities - in most cases, take-up is low when the chief officer heading the department is less committed than others and therefore, although mindful of Council Policy, does not set up appropriate procedures and checks to enable this process to proceed fully. This is the case, for example, with the Housing Department in LB Lewisham and with the Architects Department in LB Southwark. The take-up is lower in an authority where the political will and the leadership from the most senior officers (eg the Chief Executive) is weaker and therefore, although the policy exists, there is less pressure to comply with it. This is the case in LB Lambeth where take-up has fallen at the present time (contrary to the other two Boroughs) as a result of these conditions plus the appointment of a new Director of Development who has been persuaded by some of his staff that this process is unnecessary.
The certificates issued were analysed at five stages from when they were first issued in January 1985 to July 1987. The analysis intervals are not consistent as the analysis was carried out for presentation to SLCEG Member meetings but, when presented graphically, the trends are clear.

Table 9.20 gives the figures on which the Graphs - Figures 9.5 to 9.8 - are based.
<table>
<thead>
<tr>
<th></th>
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<th>To</th>
<th>To</th>
<th>To</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>31.3.86</td>
<td>18.8.86</td>
<td>6.1.87</td>
<td>31.1.87</td>
<td>24.7.87</td>
</tr>
<tr>
<td><strong>Total mths</strong></td>
<td>15</td>
<td>19\frac{1}{2}</td>
<td>24</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>

**Lambeth**

<table>
<thead>
<tr>
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<th>To</th>
<th>To</th>
<th>To</th>
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<tr>
<td></td>
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<td>6.1.87</td>
<td>31.1.87</td>
<td>24.7.87</td>
</tr>
<tr>
<td><strong>Total mths</strong></td>
<td>15</td>
<td>19\frac{1}{2}</td>
<td>24</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>

**Lambeth**

- No. of certificates issued
- No. of projects
- No. of dwellings
- Saving per dwelling (mean)
- Total saving

<table>
<thead>
<tr>
<th></th>
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<th>To</th>
<th>To</th>
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<td></td>
<td>31.3.86</td>
<td>18.8.86</td>
<td>6.1.87</td>
<td>31.1.87</td>
<td>24.7.87</td>
</tr>
<tr>
<td><strong>Total mths</strong></td>
<td>15</td>
<td>19\frac{1}{2}</td>
<td>24</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>

**Lewisham**

- No. of certificates issued
- No. of projects
- No. of dwellings
- Saving per dwelling (mean)
- Total saving

<table>
<thead>
<tr>
<th></th>
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<th>To</th>
<th>To</th>
<th>To</th>
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<tr>
<td></td>
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<td>18.8.86</td>
<td>6.1.87</td>
<td>31.1.87</td>
<td>24.7.87</td>
</tr>
<tr>
<td><strong>Total mths</strong></td>
<td>15</td>
<td>19\frac{1}{2}</td>
<td>24</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>

**Southwark**

- No. of certificates issued
- No. of projects
- No. of dwellings
- Saving per dwelling (mean)
- Total saving

<table>
<thead>
<tr>
<th></th>
<th>1.1.85 - To</th>
<th>To</th>
<th>To</th>
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<td>24.7.87</td>
</tr>
<tr>
<td><strong>Total mths</strong></td>
<td>15</td>
<td>19\frac{1}{2}</td>
<td>24</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>

**ALL**

- No. of certificates issued
- No. of projects
- No. of dwellings
- Saving per dwelling (mean)
- Total saving

<table>
<thead>
<tr>
<th></th>
<th>1.1.85 - To</th>
<th>To</th>
<th>To</th>
<th>To</th>
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<td>24.7.87</td>
</tr>
<tr>
<td><strong>Total mths</strong></td>
<td>15</td>
<td>19\frac{1}{2}</td>
<td>24</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>
Fig. 9.5 Analysis of Certificates issued, 1.1.85 to 24.7.87 - 3 Boroughs.
Figure 9.5 shows the trends for the three boroughs together, up to July 1987 and shows that the number of certificates issued ran at almost the same rate for the first two years (average 16 per month) but then shows a significant rise to an average of 24 per month - a 50% increase. The number of dwellings covered by these certificates rose by 37% in the second year and by a further 27% in the first four months of the third year but then reduced slightly. The total savings (£) rose sharply in the first four months of 1987 but then returned to the same rate as in the second half of 1986. The savings (£) per dwelling, which is a mean for all the dwellings, seem to have levelled off at £163 per dwelling, having risen to this level from £68 per dwelling at 31st March 1986. This increase in the mean saving per dwelling is the most significant of the figures given. Supposing that some energy efficiency measures were already being incorporated in designs prior to the commencement of this programme of Planned Change, the savings achieved were, at most, £68 per dwelling (and probably much less) as this is the saving level achieved 15 months after the energy policies were implemented. The increase from £68 to £163 (139%) over the subsequent sixteen months can therefore, with reasonable safety, be attributed to the change programme in general and to the policy/certification element of it in particular.

Nevertheless, within these overall encouraging figures are hidden some undoubtedly failures: the mean figures include some projects with very low savings (though none with zero) and, of course, there are those projects which have escaped the procedure altogether where
it is more than likely that savings, if any, would be extremely low. However, as the number of dwellings receiving certificates is also increasing overall, this latter problem is hopefully, declining in significance.

The figures must also be considered in the light of the current situation where building and major repair work in local authorities is declining due to financial cut-backs thus reducing the overall design programme.

Figures 9.6, 9.7 and 9.8 show equivalent graphs for the three Boroughs separately and serve chiefly to highlight the differences between them.
Fig. 9.6 Lambeth
(a) No. of dwellings
(b) No. of Certificates

Fig. 9.7 Lewisham

Fig. 9.8 Southwark

Page 313
Figure 9.6 (Lambeth) clearly shows a short burst of activity in early 1987 followed by none at all between April and July 1987. Despite this, the total saving is 38% higher than that of Lewisham (Fig 9.7) for a similar number of dwellings. Fig 9.8 shows that Southwark has obtained certificates for more than twice the number of dwellings of Lambeth or Lewisham and achieved two-and-a-half or three-and-a-half times (respectively) the total savings due to the much higher mean saving per dwelling. These differences are due in part to the relative size of the workload in each borough, in part to the level of take-up of the process and in part a function of the mix of work – in that, a high proportion of new-build would tend to show lower overall savings as the comparison is with Building Regulations standards which already incorporate some energy measures, whilst rehabilitation projects have greater scope for high savings, especially where a change of fuel is included.

On the basis of the evidence given here it would appear that this element of the Planned Change Programme has been successful in increasing the levels of energy efficiency where it has been adopted but that there is now a need to develop strategies to increase the use of the certification scheme and, to attempt to boost the savings per dwelling, which seem to have reached a plateau. To achieve these aims is likely to require the re-mobilisation of political will plus steps towards institutionalising procedures for certification. It may also require modifications to the facilitative strategy of SLCEG providing energy advice, transferring the computer facility to the designers, with appropriate training,
so that they can test their own alternative designs and choose the optimum solution directly. (See chapter 10)

9.3 Subjective evaluation of the response of designers and others involved in the building process to the Energy Efficiency Policies and the Certification scheme.

In addition to objectively monitoring the effect of Energy Certificates as described above (9.2) it has been possible to observe reactions of individuals and groups to the policy and the certification procedure and to note different patterns of behaviour and reported behaviour which indicate either, movement towards adoption of the desired change or, resistance to it. These observations, together with the objective evaluations, lead towards a specification for adjustment and extension of the Planned Change programme - to capitalise on the successes and counteract the remaining areas of resistance. (see chapter 10).

To recap, the intermediate goal of the programme was that all dwellings (newly built, rehabilitated or having undergone major maintenance) should be energy efficient (see chapter 6.1) and this goal was divided into two parts - that designers (and others) should incorporate the optimum level of energy efficiency measures in their designs and, that steps are taken to ensure the full implementation of the energy efficient design.

Section 9.4 describes in some detail the current position in one of the three local authorities - the observations in this section are a
selection from all three authorities and are separated into
observations of adoptive behaviours (9.3.1.), resistive behaviours
(9.3.2) and reversal of change (9.3.3).
9.3.1. Observation of adoptive behaviours

In those departments/authorities where procedures have been set for implementing the energy efficiency policy, these are broadly that; designers will consult the SLCEG at an early design stage, SLCEG will analyse the building from the point of view of thermal comfort, fuel costs, condensation risk, possible energy efficiency measures etc., SLCEG then report to the designer on the optimum design option(s) to minimise fuel costs and condensation risk and maximise thermal comfort. The designer makes a decision on which measure(s) to incorporate into the design (in consultation with the client where appropriate) and informs SLCEG who produce a Certificate of Design Energy Consumption based on this information. When the building work is nearing completion, SLCEG inspect/test the energy efficiency works to check their efficacy and report any omissions/non-effective installations to the designer who can then arrange for remedial work to be done. The provision of the advice and checking services by SLCEG are facilitative strategies intended to overcome lack of knowledge/skill/time/motivation etc. of the designer but to enable the designer to gradually acquire the necessary knowledge and skills - for which purpose, the advice reports give detailed arguments and pros and cons for the suggested package(s) of measures, whilst still leaving the final choice to the designer.

The above procedure applies equally to "in-house" designers and external consultants where these are used.
Three types of adoptive behaviour have been observed: the first concerns approximately one-third of the firms of consultants employed by the Councils - after following the above procedure through for one project, when the initial designs for a second project were sent to SLCEG these already included a number of the measures which had been recommended the first time - particularly increased loft insulation and ventilation control. The same consultants have also demonstrated increased awareness of the subject by posing relevant questions in relation to specific building types or details and openness to the change in that they were prepared to spend (a little) extra time on considering energy, attending meetings with SLCEG and so on. The same consultants were also found to be efficient in informing SLCEG when the contract was almost complete (for the inspection of the energy measures) and in remedying any defects found.

The second type of adoptive behaviour relates to the in-house designers - many of whom began by being hostile to the procedures - mainly it seems because they felt that these would involve them in extra work and also that they might lose some of their design independence. Many of the designers therefore began by simply following the procedures without any motivation other than this being a requirement of the job. However, significant changes of attitude were noted when either, they found that their independence was not threatened and the additional work was negligible or, that the consideration of a scheme from an energy efficiency viewpoint aided them in solving a particular problem - for example, helping to
overcome extreme tenant dissatisfaction with an estate or finding a practical, cost effective solution to severe condensation problems. In other words, once they found that energy efficient design could make a positive contribution to themselves (in their work), they were ready to adopt the proposed change and in many cases, became, to some extent, change agents/influencers in that they actively encouraged colleagues to also adopt the change, persuaded clients/tenants that energy efficiency is desirable and practical and so on.

The third type of adoptive behaviour was reported to me by a senior architect in one of the boroughs. He reported that the issue of the Certificates had, after about eighteen months, led to a "friendly competition" amongst the architects in his department to see who could achieve the lowest (projected) fuel bills and the highest percentage savings in their designs. I would suggest that this represents a major movement in adoption of the change as it indicates an underlying positive attitude and change in beliefs (i.e. that energy efficiency is practical, cost-effective, worthwhile, does not cause problems etc.) and must lead to the designers acquiring further knowledge and skills in order to achieve their objective. Learning from this, the change agency (SLCEG) is attempting to establish a similar motivation between departments and authorities in order to stimulate those which are lagging behind to take action to achieve as much as the leaders. This is being done by bringing to their attention the differences in the proportion of
projects/dwellings becoming energy efficient and differences in the scale of energy savings being made.

9.3.2. Observation of resistive behaviour

Resistance to the desired change was widely encountered in the initial stages of the programme when designers clearly felt that the requirements to comply with the energy efficiency policies were, at least, an imposition on their time. However, as mentioned above, with a little experience of the help available, many have either adopted the change or seem to be on the way to doing so. However, there are still pockets of strong resistance to the change amongst both groups and individuals which seems to take two forms - active and passive resistance.

The first has been encountered in two notable areas: the best example is one particular consultant design practice, now disbanded, used by at least two of the authorities for a fairly large amount of work. This practice was actually the residue of the ex-GLC Architects Department, which formed itself into a consultancy when the GLC was wound up in 1986. This group was strongly supported politically by the Labour (and Alliance) controlled London Boroughs. Their GLC background and this political support may account for their attitudes. They received briefs from the client boroughs (as do all consultants) which included the requirement to consider energy efficiency, consult SLCEG and obtain Energy Certificates. Their response was to attempt to persuade the client boroughs that energy efficiency was not very important, they could deal with it
without help from SLCEG and, that they could produce their own Certificates. As one of the purposes of the certificates is to provide a relatively independent assessment of the fuel bills/savings, this last was immediately rejected by the boroughs.

On the first point, they were told that as there was a council Policy on Energy Efficiency it clearly was of importance to the client. In one of the boroughs they were also clearly told that it was necessary for them to obtain energy efficiency advice from the SLCEG, as they had not previously shown any consideration of energy efficiency in their designs. (ex-GLC housing is widely accepted to be amongst the worst in London as regards energy efficiency, thermal comfort and high incidence of condensation.) In the other borough, a much softer line was taken, except on one scheme where a housing officer insisted that energy efficiency was one of the priorities and that SLCEG be involved. During the course of this scheme, the consultant made a number of efforts to discredit SLCEG - both on the energy efficiency advice given - "...the likelihood of additional condensation that may result from the provision of the thermal insulation package..." (CTU, 1987, p.8) and on administrative matters (such as providing certain information within agreed timescales) and also attempted to include the absolute minimum of energy efficiency measures rather than the optimum package for the scheme. This extreme level of resistance had to be countered by utilising a power strategy - involving the Chief Executive and Councillors to reiterate the policy and cause more definitive procedures to be set, both for consultants and internally, as it was
clear that part of the problem arose from disinterest in, or resistance to the change, within the client department.

Resistance also remains in some groups within the councils - notably the groups (mainly surveyors) dealing with rehabilitations and major maintenance in two of boroughs. Here however, the resistance is more passive - in one borough, this group simply does not either seek advice on energy efficiency or obtain the certificates (with an occasional exception). Lack of commitment by their Chief Officer and lack of political will has allowed this to continue despite it being in contravention of Council Policy. In the other authority, a proportion of projects go through the process but many of these are sent to SLCEG after the job has been sent out to tender or is even on site (rather than at the design stage) which tends to reduce the practical options available. In some cases, requests for (design) certificates have been made after the job was complete! In many cases, suggestions made for energy efficiency measures are rebutted on the grounds that the contract is too far advanced or, there is no money available. When the councillors or chief officer request information on those jobs which have not been through the process, much confusion is deliberately generated to conceal the facts (easily done as record keeping is not as streamlined as it might be!).
9.3.3 Observation of reversal of change

One other phenomenon worth mentioning here is the total reversal of the change in particular circumstances: the surveyors department in one authority is probably the group which has progressed the furthest in adopting the change. However, in moves to offset the effects of Government restrictions on housing finance, the authority has arranged to lease finance for installing central heating systems in several thousand homes over a period of two years. The purpose of installing central heating systems is to provide tenants with sufficient warmth at low fuel costs. However, in the majority of the buildings, this aim is unlikely to be achieved without energy efficiency measures also.

The interesting point was that this programme of work was first set up with absolutely no regard to the council policy on energy efficiency, no provision for energy efficiency advice and no requirement for certificates - totally at variance with the normal behaviour of this department. The reasons for this can be traced to a number of factors such as, the individual responsible for setting up the programme - different to the chief officer responsible for the normal work and unsympathetic to the question of energy efficiency; the speed at which the programme had to be started and implemented; the type of finance - which restricts the elements on which it can be spent, etc.

The change agent (SLCEG) had to expend considerable persuasive effort to achieve some modification to this state of affairs,
resulting in the reinstatement of the requirement for energy
efficiency advice and certification and the allocation of some funds
(albeit very small amounts) to cover some energy efficiency works
plus a procedure to record (and report to Councillors) other
measures felt to be necessary to achieve the original aim of the
exercise. Despite this (at least partially) satisfactory outcome,
this serves as a salutary lesson that even when it appears that a
change has been adopted, and even partially institutionalised,
circumstances which are different, or appear to be different, can
totally negate the change and result in a return to the original
status quo.
9.4. The current state of adoption within one local authority.

I felt it would be useful to attempt to give an overall picture of the current state of adoption of the change throughout one of the three local authorities. My observations are as follows:

9.4.1. The councillors, the major decision/policy makers, have fully adopted the change, in that they are convinced of the need for it and of the practicality of implementing it. They have formulated one Energy Policy and are in the process of considering development and extension of this. They have also appointed one of their number to take special responsibility for Energy Efficiency on a borough wide basis.

9.4.2. The Chief Executive, who plays a key role in both policy development and its implementation and leads the corporate management team, is likewise fully convinced of both the need and the practicality of energy efficiency in buildings and elsewhere and has been responsible for energy-related initiatives in non-housing areas of council activity (e.g., refuse disposal).

9.4.3. The Borough Architect (whose department includes architects, surveyors, quantity surveyors and service engineers, and deals with the majority of major building projects) also supports the change and has set up some procedures to aid its adoption but these are as yet not sufficiently comprehensive to ensure that energy efficiency considerations are a normal part of the departments' activity. The management team within the department (senior officers of each...
discipline) is keen to have access to the energy analysis programme (ELF) within the department rather than only through SLCEG.

9.4.4. The majority of architects appear to have adopted the change - the evidence for this being that a) the level of fuel cost savings achieved in their designs are increasing, b) the number of projects submitted for advice is increasing and c) I have received reports that there is now an (unofficial) competition running as to who can achieve the highest savings in their design. The sub-group of building surveyors in the same department, on the other hand, do not appear to have yet adopted the change - although they are, generally, routinely including some energy efficiency measures in their designs, they are unreceptive to suggestions for improvements and many designs are still not submitted for advice/certificates. There is also continued resistance from services engineers, though this appears to be diminishing gradually as they perceive that there is less threat to their professional role from this innovation than they had previously thought.

9.4.5. The client department (Housing Management) has adopted the change in some areas of its activity but not in others - its Director and officers have perceived both the need for change and the practicality of achieving it but have demonstrated extreme reluctance to institute procedures for its implementation.

9.4.6. The ultimate beneficiaries of the change - the council tenants - have always been conscious of the need for the change but lacking in knowledge of the techniques of energy efficiency and in
the power to demand change. Through representation on district committees they are now becoming more involved in decisions on designs, priorities for estate repairs and renewals and so on and consequently gaining awareness as well as power. However, this still only applies to the minority of tenants who are tenant association activists and there is still a majority of tenants who are unknowledgeable about the practicality of the desired change and unable to take any action towards its implementation.

9.4.7. The Council has a small "Energy Conservation Unit" (4 officers) located within the Borough Architects Department. This was originally set up to deal with energy monitoring and conservation in the Council's own buildings (offices, libraries, old peoples' homes etc) where expenditure on energy efficiency results in direct savings to the authority. (The initial survey of the 300 such buildings and the provision of a programme of energy efficiency measures was carried out by the SLCEG prior to this unit being set up.) The Unit was originally within the Services Engineering Section but has now been given more independent status within the Department and is currently engaged in setting up clearer procedures to ensure all projects are subject to advice on energy efficiency and Certificates of Design Energy Consumption obtained.

Whilst the above summary of the state of adoption of the change in this local authority suggests that the change has been adopted in many areas, there is also a clear need for further change efforts in other areas and also for the instigation of activities which will serve to stabilise the change and enable it to become
institutionalised and thus resistant to any efforts to undermine it. Proposals for further change efforts and for stabilising activities are put forward in the next chapter (10).

9.5. Monitoring of the Phases of Change

The phases/stages of the change process were discussed in chapter 7.3. Monitoring of the phases of change in this particular situation relates chiefly to stage 6 - the actual change efforts by the change agent and the Trial, Evaluation and Adoption or Rejection of the change by the potential adopter system (6a,b,c).

This monitoring involved the change agent (myself) remaining continually aware of the effects of the various activities on the individuals and subgroups to whom they were directed, whether there were unplanned side-effects, when it was appropriate to change tactics (eg. from rationality to persuasion or vice-versa), to concentrate on specific individuals because it became clear that they were either "opinion leaders" or "gatekeepers" or whether these was a need to provide further resources or information.

One example of the use of this monitoring was that the change agent was aware that the sub-group of Councillors who had been instrumental in formulating the Council Energy Policy would need feedback on its effectiveness in order to evaluate the change before proceeding to adopt/reject it on a permanent basis. To assist in this evaluation, a regular analysis was provided of the number of
Energy Certificates issued, the number of dwellings these covered, the extent of the savings identified - both as a mean per dwelling and as a total amount per borough - and an indication as to whether the savings were increasing over time (which they were, indicating increasing adoption of the change by the designers). This assisted the Councillors to evaluate the change positively and led to their adoption of it and also to the development of their perception of the need for further change in this area - in late 1986 they started considering extensions to the policies to enable a change towards energy efficiency to be developed in areas of council ownership/responsibility other than housing. (Other factors also influenced the development of this need, such as the 1986 Audit Commission Report urging local authorities to take more action on energy efficiency.)

Another example was the identification of "gatekeepers" - those who mediate in the communication process, making decisions about which messages are allowed to pass from the source to the receiver. It was found that some chief officers acted as gatekeepers in choosing not to inform their officers fully of the Council policy or of the existence of the demonstration suite, seminars etc. Each of these had to be persuaded, on an individual basis, to give the proposed change a fair trial. Various techniques had to be employed for this, ranging from more detailed face-to-face expositions of the rational case for energy efficiency, to confrontation, to the use of Councillors’ (implicit) power to force action by the chief officers.
Other individuals were identified as "opinion leaders" - those whose opinions/beliefs/actions are followed by others due to their (real or perceived) status or personal attributes. Some of these opinion leaders were early adopters of the change and therefore were positive forces for the proposed change. Others were strongly resistant to the change and as such had excessive influence on others to resist the change. These persons again required individualised effort to reduce their resistance and/or to counteract their effect by directing extra rational and persuasive activity towards those who were influenced by them. A small number of the resistant opinion leaders, once persuaded of the need/desirability of the change, became amongst the strongest advocates for it, suggesting that the additional effort to develop awareness and positive attitudes amongst opinion leaders can eventually be extremely beneficial to the overall change effort.

This monitoring process also drew attention to the need for the development of further and more detailed procedures than had been envisaged in the initial programme plan. For example, it was found necessary to instigate very precise and formal procedures for the submission of data on a building project (to the SLCEG) for advice and certification as some designers quickly discovered that one way to circumvent the process was to provide inadequate information or at too late a stage for the advice to be easily incorporated into the design. Some internal procedures in departments were also required in order that managers could monitor whether all projects were being subjected to this process. In fact, these procedures are
still not in existence although one architects department is currently developing them. It has also been possible to identify individuals and sub-parts of the potential adopter system who are still resistant to the idea of the proposed change and have not yet reached the awareness or trial stages. Whilst it is likely that adoption by other sub-parts and institutionalisation of the change will help to reduce this resistance, future efforts of the change agent will need to be directed at these groups or there is a danger that full institutionalisation will not be possible and/or that the resistive efforts of these groups will cause subsequent rejection of the change by the groups who have currently adopted it. (see chapter 10).

9.6. Other indicators of adoption of the Planned Change.

Whilst the majority of the change efforts were concentrated on the three local authorities who are members of the SLCEG, there were two exceptions: the Demonstration Suite (8.4) had a wider target audience (UK and Europe) and the Bulk Quotation Programme for the installation of energy efficiency measures (see 8.9.2) was made available for all public sector work in the Greater London area and these two activities have also had some noticeable effects:

a) Evaluation of the Demonstration Suite by one of the funding bodies - the UK Dept of Energy - has resulted in their deciding to adopt this method of disseminating energy efficiency information in other projects (albeit in a scaled-down version).
b) On receiving the Final Report on the Project, the other funding body - the EEC Directorate General for Energy - have expressed strong interest in the Design Energy Consumption Certificates and it appears that they may develop this scheme and use their influence to extend its use within the EEC member states. (Denmark already has a comparable system for any houses which are new-built or which change ownership.)

c) The SLCEG member authorities have perceived the role of the demonstration suite as very useful in contributing to increased energy efficiency in their authorities such that they have authorised the SLCEG to set up a permanent facility of this kind and to run educational/training courses for officers, tenants and councillors.

d) The availability of the Bulk Quotation scheme has encouraged several other London Boroughs to instigate schemes to upgrade the energy efficiency of some of their housing estates. Notable examples are Islington, Haringey and Kingston.

e) As a direct result of the Demonstration the London Borough of Greenwich has made the decision to join the SLCEG. In this case the main motive force came from technical officers in the Housing Department who visited the demonstration, attended two seminars and perceived that the discipline of energy efficiency could assist them in
providing a good service to their tenants and in counteracting severe problems caused by condensation. They were then able to persuade their councillors that joining the SLC would be beneficial to the council.

This council is thus slightly differently oriented to the planned change programme than the original three councils as they themselves perceived the need for change and sought help for the change. However, there are some sections in the authority (viz. the Architects Department) where strong resistances pertain and all the various facilitative strategies are still needed throughout the authority.

9.7. Summary

9.7.1 Summary of objective evaluation

The questionnaire analysis (9.1.2) provided confirmation of some of the assumptions made in the diagnosis (chapter 5) such as, that attitudes towards energy efficiency were generally positive but there seemed to be barriers to the corresponding behaviour due to erroneous beliefs and lack of knowledge, skills and help. The Demonstration appeared to have achieved some 46% of the desired movement towards full adoption of the change and engendered a desire to pursue the subject further in 86% of the visitors.

Analysis of the Certificates of Design Energy Consumption, for the period January 1985 to July 1987, (9.2) clearly indicated an increasing rate of adoption of the change - particularly through the
increase in the average saving per dwelling being achieved – from £68 after the first 15 months to £163 after 27 months.

9.7.2 Summary of Subjective evaluation

I have observed both adoptive and resistive behaviours in individuals and groups (9.3.1 and 9.3.2). Adoptive behaviours in both outside consultants and in-house designers included the unprompted inclusion of energy efficiency measures in subsequent designs once the first advice/certification process had taken place, together with signs of increased awareness and interest in the subject. In at least one department, a spirit of competition had developed so that designers attempted to achieve the highest level of energy savings.

Resistive behaviours were widespread initially but later reduced to particular groups and individuals and is generally passive in nature, with a few notable exceptions where positive efforts have been made to discredit both energy efficiency and the SLCEG.

In one particular set of circumstances, the previously adopted change was totally reversed due to the influence of external factors (9.3.3) which draws attention to the need for institutionalisation of the change and for close monitoring (by the change agent).

Consideration of the current state of adoption throughout one of the three local authorities (9.4) suggested that the change had been effectively adopted in many areas but there was a clear need for
further change efforts in others and for institutionalisation of the change.

Monitoring the Phases of Change (9.5) indicated the existence and importance of specific opinion leaders and gatekeepers and of feedback to the Client. It also indicated a need for improved procedures.

The objective and subjective evaluations in this chapter together provide a number of clear indicators as to further action - there is a need to continue with the existing activities of the change programme with some modifications, for example to meet the expressed needs of the visitors to the Demonstration; to develop and/or strengthen the internal procedures in the authorities so as to overcome lingering resistance, and to capitalise on the successes so far achieved in order to increase the rate of adoption. It is also time to consider methods for institutionalising the change - although only one of the three authorities is close to readiness for this. Plans for developing the Change Programme along these lines are proposed in the next chapter (10).
Chapter 10

Looking Ahead

The evaluation of the change programme to date, described in the previous chapter, indicates that whilst the change has been adopted by some sub-groups and individuals within the potential change adopter system, there are other sub-groups/individuals who have not yet adopted the change. There are indications that the change programme needs further development in order to reach these more resistant parts of the system. Proposals for this are put forward in section 10.1.

At the same time there is a need to consider methods for stabilizing the change in the groups who have adopted it and also look towards resolving the change relationship - terminating or altering it - once the change has been stabilized - ie. the "Freezing" (Lewin) phase of the change process. Proposals for stabilizing or "institutionalising" the change are set out in section 10.3 and for resolving the change relationship in section 10.4.

During this study (and particularly in the last year or so) I have identified a further area which needs attention in order for the change programme to progress - the training of the staff of the "change agency" (SLCEG). This has arisen due to an increase in the
size of the organisation, necessary in order to service the facilitative activities of the change programme (advice-giving, certification etc).

At the start of the programme, there were only two individuals involved in the process as change agents - myself and Dr. Lali Makkar - now there are eight other technical staff, all of whom are coming more and more into close contact with members of the potential change adopter system. Whilst these members of staff are technically competent and wholly committed to the aim of energy efficiency, they are not, at present, fully aware of the implications of their overt attitudes, behaviour, statements, etc. in terms of encouraging or discouraging the desired change. A proposal for internal training in the various facets of the role of change agent is therefore put forward in section 10.2.

10.1. Further development of the change programme

The analysis of the questionnaires (see 9.1) has indicated a number of ways in which the Demonstration facility should be modified in order to aid further change. The objective evaluation of the certification scheme plus the subjective evaluations of the change programme to date suggested the need for other modifications to the programme. Proposals for modifying the demonstration are put forward in 10.1.1 and for other modifications to the programme in 10.1.2.
10.1.1. Development/Modification of the Demonstration Facility

The questionnaire analysis (9.1) showed that the demonstration facility was effective in increasing awareness of both the benefits and the practicalities of energy efficiency and in dispelling a number of erroneous beliefs. It also confirmed that the majority of the potential change adopters were not attitudinally opposed to energy efficiency but lacked the necessary information, skills, help and motivation to modify their behaviour towards providing energy efficient housing.

The Demonstration facility, as existing, was due to close at the end of 1986, when the external (DoEn & EEC) funding expired, but, as noted in 9.6(c), the SLC member authorities had by then perceived the value of the facility and authorised its continuance and the subsequent relocation of the facility to combine it with the SLCEG offices to enable fuller, more economic use to be made of it. This required a change of location for the SLCEG offices to larger premises to incorporate this facility which took many months to arrange. However, the move finally took place in February 1988 and the proposals given here for modifying the facility are now being put into practice.

a) The exhibition will be modified to take account of the needs expressed in the answers to the questionnaires. (see summary at 9.3)

(i) Providing many more examples of different housing types and construction types and indicating the appropriate
energy efficiency measures for each. Also, different types of work should be shown with the attendant possibilities for energy efficiency measures. eg. some projects involve only re-roofing of a block of flats or replacement of all windows with no other work envisaged. Some may only concern the installation of a new heating system whereas others will be for complete refurbishment of the property or for minor repairs and re-decoration between tenancies.

(ii) Providing more examples of the use of different heating systems and/or fuels with their implications for capital cost, running cost, maintenance and thermal comfort.

(iii) A section devoted to the available techniques for energy efficiency including construction details, lists of manufactures/suppliers/installlers, samples of materials and cost-benefit analyses.

(iv) Short videos or slide sequences which can be self-operated by visitors, dealing with various aspects of the subject eg. principles of energy efficient design; the relationship between energy efficiency and condensation.

(v) A DIY guide for visitors who wish to install energy efficiency measures in their own homes.

(vi) Monitored data from as many examples as possible should be available in an easily comprehensible form, but there
would not be any great value in exhibiting monitoring systems as such.

(vii) The previous exhibition was felt to be of most value to building designers so there is a need to provide clearly relevant material for housing managers, services engineers and occupants so that they also have the necessary information to influence the design towards energy efficiency whenever they have the opportunity. This could be done by providing specialised leaflets setting out the way these groups can influence the design process and/or through seminars. The latter approach would be preferable as it is more flexible, providing that these groups can be attracted to such seminars.

b) The new demonstration facility, once it is set up, will allow for a number of educational activities - seminars, workshops, short courses etc. following the success of the seminars at the demonstration suite (see 9.1.3) and my perception that further such activities are required to overcome the continuing resistance in some sub-parts and capitalise on the readiness to change in other sub-parts of the adopter system. (see 9.3 and 9.5) It is intended to set up a programme of such activities for each of the four member authorities, for both technical and management staff as well as for the policy makers and tenants. Some of these will approach the subject directly whilst others will start with the widespread problems of condensation and its
remedies which, effectively, are energy efficiency measures. All such activities will be geared to the existing knowledge and practices of the groups involved and will develop their awareness of the role they can play in improving the energy efficiency of the housing stock.

For example, whilst a building designer can directly incorporate energy efficiency measures in the design, management officers may indirectly influence the design by including various requirements regarding energy efficiency in the brief to the designers. They may also, from time to time, directly specify works to individual properties and may then be able to incorporate some energy efficiency measures.

Again, a technical officer in a housing district is frequently concerned to remedy condensation problems and would be able to do so by adopting an energy efficiency approach. Tenants, on the other hand, are able (through representatives on District Management Committees) to make certain decisions/choices regarding works to their estates and they can be provided with a secure knowledge base from which to make informed decisions.

10.1.2 Other Modifications to the Change Programme

a) Procedures which need to be strengthened are those related to the obtaining of energy efficiency advice and ensuring that Energy Certificates are obtained for all projects.(see 9.2) At present, the policy in the authorities is that all housing
shall become energy efficient and that all building projects will have an Energy Certificate. However, the procedures for obtaining these are, in many departments, not sufficiently clear and precise and there are at present no procedures for checking that they are followed.

It is not possible for SLCEG to check that all projects have gone through the procedures as the complete lists of projects are not easily available to them so it will be necessary to persuade the authorities (and probably each department separately) to institute their own procedures. Depending on the circumstances, this may involve persuading Councillors to require their chief officers to address this matter.

The procedures need to be very clear on two points - one is that all projects (unless they concern total demolition or only landscaping works) are subject to the procedure and the second is to identify the precise stages in the design programme when energy efficiency advice should be sought and, when the Certificate should be obtained. It is also feasible (though not necessarily desirable) to, for instance, not allow a project to go out for tender unless it has an Energy Certificate. If it was then delayed, the officer(s) concerned would then bear the responsibility for this and would therefore be more likely to ensure that the Certificate was obtained and at the required stage, thus enabling advice on energy efficiency to be given before the design is finalised (although changes can be made even after a project is on site).
This type of procedure would assist in institutionalising energy efficiency by providing requirements similar to others already incorporated in the design process such as planning permission, adjoining owners consent, agreements with statutory authorities etc. (see also section 10.3)

b) Another activity which could now aid the change programme is to use the successes so far - numbers of energy efficient dwellings, amounts of fuel and money saved, etc., to raise the profile of energy efficiency in the authorities through various Public Relations activities. One such activity which is currently under development is to provide each authority with an electronic indicator, which will be continually updated, to display the amount of energy saved in the Borough in pounds sterling (and/or in kilowatt hours). A similar display in the new SLCEG demonstration area will give the total for all four member boroughs. (£1,627,826 saving to 6th June 1988, rising by around £5,000 per day!) Another activity, which was proposed by one of the chief officers, is to devise a competition to concentrate designers' attention on energy efficiency.

Articles in the press, TV coverage, etc., about energy saving developments in the authorities have a positive role to play in developing designers' pride in achievements and interest in the subject as well as, sometimes, a desire to show that they can achieve even better results. Therefore, it is intended to aim
for greater media coverage of the successes to date in order to encourage further movement towards the desired change.

c) In developing this change programme originally, the diagnosis of the problem and development of possible solutions and strategies was carried out "privately" by myself and my colleague as the change agents. This was necessary due to the widespread lack of perception of a problem. However, there are now sufficient individuals/groups within the potential adopter system who recognise the problem and its solubility that it may be useful to work through the diagnostic process once more, but more publicly.

One way of doing this could be to start with the problem of condensation in homes which is now recognised as being a serious problem in the council's housing stock and one which uses large resources in terms of both manpower and finance which can be ill-afforded. One of the boroughs recognised the need to address this problem seriously in 1986 and set up a multi-disciplinary working party to develop both technical and procedural remedies. The technical remedies finally agreed on follow the same principles as for energy efficiency as the most basic cause of condensation is inadequate heating which may be due to an inadequate heating system, high rates of heat loss through the structure and ventilation, inability to afford the high fuel bills or, generally, a combination of all of these.
The advantage of taking an energy efficiency approach to cases of condensation is that these are dealt with one property at a time and the "feedback" is almost immediate - officers who can be persuaded to try this approach will quickly be convinced of its efficacy - especially in comparison with presently-used remedies which are very frequently ineffective in curing the problem as well as being expensive.

SLCEG is therefore currently building up a series of case studies to illustrate the effectiveness of this approach and instigating short courses specifically to address the question of condensation. With the input of participants in these courses it should be possible to publicly work through the diagnosis of this problem with the authorities and thus lead them into developing appropriate activities (in conjunction with SLCEG as the Change Agency) to combat the problem. This will then form an additional part of the Change Programme.

10.2 The Change Agency: Internal Training

As mentioned in the introduction to this chapter, I have now identified a need to train the staff of SLCEG in their role as change agents.

Kotler (1973, pp 175 - 178) gives a concise definition of a change agency and describes the roles and motives of change agents as well as the various phases they tend to go through during their involvement with a programme of Planned Change. He defines a change
agency as, "an organisation whose primary mission is to advance a social cause," and states that it may be an informal group, a formal organisation or a political unit (or, occasionally, a single individual).

He includes all those who are involved in some way with the change agency in the category of change agents but differentiates between various types of change agent role within two main groups of "leaders" and "supporters" and also indicates that roles may alter with the development of the agency.

In the case of the SLCEG, which would fall into the category of a formal organisation, its role as an agency for change towards energy efficiency in buildings was conceived and developed by two individuals - Dr. Lali Makkar and myself - who would therefore fall into Kotlers' category of "directors." At first though, we played a variety of roles, including advocate, administrator, organiser and worker. However, over the intervening four or five years, the group has gradually expanded and now includes eight technical staff - four of whom have only been appointed within the last year - and two administrative/clerical staff.

Whilst these staff are aware of and committed to the purpose of SLCEG's existence, they are not yet fully aware of their own role as change agents or, members of a change agency. Only one formal session has so far been held to introduce them to the concepts of Planned Change and although the subject arises frequently in the course of discussions on day-to-day activities there is an agreed
need for further, semi-formalised, training to develop awareness of the complexities of the problem we face in trying to bring about change, the philosophies and ethics of various approaches and strategies, techniques of persuasion, etc. Several of the staff have shown considerable interest in pursuing the subject since it was brought to their attention in mid 1987. A series of seminars/workshops is now being planned to raise the awareness of the staff of SLCEG which will include the following topics (not necessarily in this order):

(i) The theories of Change and Planned Change.

(ii) The roles of change agencies and change agents.

(iii) Consideration of our own motivations and potential sources of disappointment.

(iv) The diagnostic process and how it was applied to this particular problem.

(v) Available strategies : pros and cons.

(vi) Techniques of persuasion.

(vii) Activities designed to promote re-education.

(viii) Facilitative strategies - how much help should we provide and for how long?

(ix) Identifying causes of and overcoming resistance.

(x) Capitalising on success.
(xi) Are we going to work ourselves out of a job?

(xii) Communication - process and skills.

Many of the above topics have been covered in this thesis but there are two additions - items (iii) and (xi). The first (iii) deals with the change agents' own motivations and the related possibilities of disappointment in results reducing their motivation to continue. Kotler (1973 p 177) suggests four motives for participating in "a cause" - to satisfy needs for affiliation, status, power or faith. In the case of SLCEG, all the staff are paid salaries and have the security of local authority employment conditions so they are in a slightly different position from members of a change agency which depends on voluntary labour. Nevertheless, they undoubtedly chose these jobs in preference to others in order to fulfil some need in themselves. Knowing the individuals, I would postulate that their need is either for affiliation or for faith - or perhaps a mixture of the two - it is worth noting that several of them belong to other groups with "alternative" or conservationist ideologies viz : Friends of the Earth and The Green Party.

The example given by Kotler (1973 p 178) of the psychological phases which Peace Corps volunteers underwent suggests that change agents need to be sufficiently mature and prepared for setbacks to their efforts and be encouraged to develop themselves by learning from these.

Item (xi) poses a question which has in fact been asked of me several times and must surely be a (secret) worry to many a change
agent - If you succeed in bringing about the change, surely you'll be left with nothing to work for? This fear could, of course, be detrimental to the whole change effort by engendering a (hidden) need to fail, at least partially, in order to keep the process going. I believe it is therefore necessary to clearly address this question and reassure the members of SLCEG that (a) there are some 205,000 dwellings in the four member authorities (the original three plus Greenwich) so that, whilst our role may reduce once a large proportion of the potential adopter system has adopted the Change, our assistance is likely to be required for several years at least; (b) that once the bulk of the housing stock is on the way to becoming energy efficient, there will be opportunities to work for higher standards of energy efficiency and for the improvement of energy efficiency in other areas (transport, street lighting etc); (c) that other local authorities may require our input in a similar manner and d) that other problem areas will arise where our expertise as change agents can be utilised in a totally different cause (eg. homelessness).

10.3. Institutionalisation of the change within the three local authorities.

The "Freezing" (Lewin) phase of the change process was split into two stages by Lippitt et al (1958) - generalisation and stabilization of change and, achieving a terminal relationship. Zaltman and Duncan (1977) referred to this phase as "Resolution" (for individuals) or "sustained implementation" (for organisations).
Despite the variations in labelling, there is commonality in the purpose and action required for this phase. This section deals with the first part of this phase and the term "institutionalisation" is used to include the various processes which lead to the change becoming an integral part of the normal operation of the potential adopter system - the rule rather than the exception - thus providing for sustained implementation and stability of the change.

Although some of the procedures introduced within the strategies for change (for example, the requirement for obtaining Energy Certificates) also tend towards integrating the change into the normal processes of the organisations, (which include many similar requirements for consultation, approvals and so on at various stages of the design and building process) a major effort to stabilize the change cannot be made until a significant proportion of the sub-parts of the potential adopter system have tried, evaluated and adopted the proposed change. This reinforces the need for the change agent to monitor the phases of change in order to identify the point when this stage is reached. At the start of the change programme some estimation may have been made as to the likely point - in time or in relation to a series of activities - but changes to the programme, external factors, earlier or later adoption by some groups etc. are likely to result in this point moving considerably.

In the present case, the evaluation in chapter 9 shows that there are significant differences in the rate of adoption between the three authorities and between sub groups within each authority. The
reasons for these differences are mainly related to a) existence or lack of corporate action, b) the extent of congruence between innovators (or "early adopters") and opinion leaders or senior management, c) the extent of interdepartmental rivalry and perceived "ownership" of energy conservation activities and d) the number/spread of negatively oriented "gatekeepers". As a result, the present position is that only one authority as a whole appears ready to institutionalise the change, whilst even within this authority there are pockets of strong resistance which will therefore have to be the subject of further change efforts during the stabilization process.

Lippitt et al (1958, p141) suggest that, for the change to become a permanent characteristic of the adopter system, the system needs confirmation of the effectiveness of the change in solving the problem/meeting the need. The system will then be prepared to implement procedural and structural changes which will assist in perpetuating the change. Zaltman and Duncan (1977 p 246) suggest that at this stage the change agent needs to provide support and reinforcement for the decision to permanently implement the change, particularly where there may be strong contrary influences from outside, or within, the system and to be aware that behavioural changes may have created dissonance which needs to be resolved in order to avoid reversion to earlier behaviour.

Zaltman and Duncan (1977 pp 261-268) have analysed various characteristics of organisations which may aid or inhibit both the initiation stages of the change and the implementation stages. They
found that for the stabilization stage, an organisational structure which is highly complex was most useful. The nature of local authorities tends to be highly formalised/bureaucratic; centralised in some respects but not in others in that the locus of power is with the Councillors, the "ruling group" (political party in power) of which controls policy and the direction of effort, but at the same time, despite some movement towards more corporate management styles, there is strong departmental demarcation (enhanced by rivalry for financial support from dwindling resources). The organisation as a whole is also highly complex with strong professional disciplines frequently competing for resource and status.

Within this framework, a number of activities, procedures and structural changes can be devised to aid the process of stabilizing the change. Those which have been implemented, are being implemented currently and those which are required in the near future are discussed below with particular reference to the authority which, in the change agent's opinion, has reached this stage as previously described in chapter 9.4:

10.3.1. The change agency should provide "feedback" to the designers as to the effectiveness of the change, in terms of quantity of fuel saved - both per dwelling and in total (as delineated by the certificates) possibly with a "league table" of the most energy efficient schemes. This will serve to reinforce the changed behaviour and may reduce dissonance by justifying the changed behaviour. It is to be hoped that the surveyors who have
not adopted the change may also react positively to this feedback due to a desire to conform with the group (of designers) norm. As yet, this feedback data (in summary form) has only been presented to councillors and chief officers.

A regular feedback procedure needs to be implemented to present this information to the designers themselves.

This requires us (SLCEG) to organise the large body of information we now hold in a more systematic way so that various sets of data can be extracted for presentation to different groups. We are currently setting up a Spreadsheet (on a microcomputer) to assist with this.

10.3.2. The change agency should also provide this feedback to other sub-groups, particularly the client (Housing) department, to increase their awareness of the practicality of the desired change and consequently increase the likelihood of their instigating and maintaining procedures aimed at requiring designers to consider energy efficiency.

A procedure needs to be set up to provide the client department with data on the effectiveness of energy efficient design.

10.3.3. The council is currently developing a new, extended, Energy Policy.

This should (and this is the intention) extend the policy from housing to cover all aspects of council activity eg. transport, street lighting, parks, refuse collection and disposal, public
buildings, leisure facilities and to incorporate policies related to the private sector - businesses, developers, ratepayers etc. This will provide a corporate image of energy efficiency, raise its profile and put it on the same footing as other borough-wide policies such as Equal Opportunities. As with the Policy for Energy Efficient Housing, the new policy should include procedures and supporting elements for each of the areas addressed. We, as change agents, are assisting with the development of this policy.

10.3.4. The main design department (Architects) needs a monitoring system

This would be intended to encourage the submission of all housing schemes for energy analysis, advice and certification to comply with the council policy. It should be reiterated that this does not force the designers to design energy efficient dwellings (the aim of the change programme) but provides for help to do so and for awareness of the implications of their design in terms of fuel costs. At present the Energy Unit (in conjunction with SLCEG) is developing a procedure to compare the list of projects in the design stage with those submitted for advice and certificates and to query those which seem not to have been submitted.

10.3.5. The Housing Department needs two procedures

One would be similar to that in the Architects Department for monitoring the seeking of advice and certificates for those projects dealt with by their in-house designers. The other is to provide a
requirement in their briefs to the Architects Department and to outside consultants to give due consideration to energy efficiency and obtain certificates and to subsequently monitor the take up and effects of this procedure. These procedures are currently being developed with the change agency (SLCEG).

10.3.6. A borough wide procedure

There is a requirement for a procedure to act as a "safety net" where building projects are unusual in some respect and may consequently not be seen to be subject to the normal procedures. An example of this is that this borough and another of the three have recently devised a scheme for leasing finance for installing certain equipment, notably central heating systems, in their housing stock. The financing requirements of these schemes result in the need to implement them on a large scale in a very short period of time and, for this and other reasons, they are seen as being different to the normal work with the result that in the second borough all consideration of the overall energy efficiency of the dwellings was initially ignored where otherwise it would not have been. In the first borough, energy efficiency was specifically included in the scheme due to the intervention of some key personnel, but the danger remains. One way of tackling this could be through the procedures for committee reports: At present, all reports to council committees include a section at the end which has to make a statement regarding the implications of the subject of the report for a number of matters which are seen to be of significance and/or are council policy such as Financial and Equal Opportunities.
"Implications for Energy Efficiency" could be an addition to this section.

10.3.7. An Energy Committee

The council are also currently considering the (re)formation of a committee to deal specifically with energy issues. This has advantages in providing a focus for energy efficiency activities and is to some extent a reflection of the interdepartmental nature of energy issues but could also detract from direct involvement within the departments and reduce the responsibility felt by other committees (such as the Housing Committee, Leisure Services Committee etc.). If, however, the Energy Committee is formed of members from each of the other relevant committees, this possible disbenefit may not result.

10.3.8. Education and Training

Procedures are also required to incorporate education/training activities related to energy efficient design into the existing CPD ("Continuing Professional Development") programme within the Architects Department and for similar procedures to provide for these opportunities in other relevant departments.

10.3.9. Awareness-Raising - Tenants

Procedures/strategies are now required to increase tenants' awareness - both of the possibilities of energy efficiency for which they can ask/campaign/demand and so that the efforts of designers who have adopted the change are not negated by resistance to the
proposed energy efficiency measures due to ignorance of their benefits or the benefit relationships between one measure and another. For example, large numbers of tenants are convinced of the benefits of double glazing, presumably due to its high profile in TV (and other media) advertising but unaware that greater benefits can be obtained from, say, draughtproofing, as far less cost. Although it might appear that they would not to be too concerned with cost as they are not providing the finance, lower costs mean more work can be undertaken to the dwellings or, more dwellings dealt with.

I have put forward a proposal for raising tenants awareness which involves the training of small numbers of advisors, drawn from the tenants themselves, on each estate or in a small area, who will then disseminate information to the other tenants. This proposal is currently under consideration and funding has been secured for a pilot scheme. (Such a scheme might later be extended to cover private sector households.)

10.3.10. Effects of structural changes in the organisation

Some structural changes which are currently underway in the Borough (for other reasons) may also aid this process of institutionalization of the change, particularly the moves towards decentralisation of services which should lead to more inter-disciplinary team-work and consequently to a reduction of the intergroup rivalry which is one of the barriers to full adoption of the change.
10.3.11. Access to ELF Energy Analysis Program

It was suggested earlier that some members of the sub-group of designers had expressed a desire that the SLCEG's computer analysis program (ELF) should be made available for use by the designers directly. This suggestion had also been made much earlier in the change programme but they had been persuaded that this would be counter-productive at that stage as the designers had not yet developed the awareness and knowledge required to utilise the program effectively. We consider that, the change having been widely adopted in this group, it would now be appropriate to provide this facility. The SLCEG would still however, carry out the analysis and give advice when requested, would service the program in terms of updating costs, etc. and would continue to issue the Certificates as the "independent" status of the SLCEG aids their credibility. The current plan is to install the ELF facility in the authorities, linked (by modem) to SLCEG to enable the two-way exchange of data.

10.3.12. Summary

In summary then, the action required to institutionalise the change is seen to be a combination of:

a) Maintenance of procedures to provide Councillors and Chief Officers with feedback on energy savings.

b) A regular feedback procedure for presenting the achievements in energy savings to the designers.
c) A procedure to provide data on achieved energy savings to the client department.


e) The development of a monitoring system in the Architects' Department to match projects in design stage with submissions for advice and certificates.

f) A similar monitoring system for in-house projects in the Housing Department.

g) The inclusion in the design brief of a requirement to consider energy efficiency.

h) A monitoring system for projects designed by outside consultants.

i) A "safety net" procedure for "exceptional" design projects.

j) (Possibly) The formation of an Energy Committee.

k) Procedures for courses in energy efficient design within the existing CPD (Continuing Professional Development) framework.

l) Implementation of scheme(s) for increasing tenant awareness.

m) Transfer of the "ELF" energy analysis facility to be used "in-house" by the designers.
10.4. Resolution of the change relationship.

As the institutionalization stage of the change process is reached, there is a need to reconsider the role of the change agent in relation to the change adopter system.

In some cases, there is a predetermined time, or resource, limit on the involvement of the change agent so that the relationship has to be terminated. In this case however, although the special funding for the demonstration project was finite and predetermined (although one extension to it was obtained from the DoEn.) funding of the SLCEG itself by the four local authorities is on-going and the consultancy/certification/supervision roles are self-financing through fees from each building project. The decision makers within the adopter system have indicated that they desire a continuing, though changing, role for the SLCEG as change agent.

Discussions between the decision makers (Councillors and chief officers) and ourselves have led to the development of a scenario for the future which includes continuation of activities aimed at bringing about the desired change and meeting the goal of all the housing in the authorities being energy efficient and also of institutionalising the change as described in 10.1 and 10.3 above. They (decision makers/clients) also wish us to continue with R & D in energy efficiency and to diffuse the results into the local authority structures in order to improve the energy efficiency practices still further. This activity could include
diversification into areas other than housing - public buildings, street lighting, refuse management, combined heat and power, etc.

As the change has not yet been fully adopted and as there is the facility for continued efforts, this project remains an ongoing activity and therefore has no neat conclusion at this stage. However, in the next (last) chapter I attempt to draw together the various threads: the theoretical basis for Planned Change, the process of diagnosis and setting of goals and objectives for this project, the choice of change strategies and the specific activities/elements used in the change programme and to relate these to the results to date and the proposals set out above for development of the programme and institutionalisation of the change.
Chapter 11

Retrospection and Critical Summary

As suggested in the previous chapter, it is not possible at this stage to say either, that the planned change has been adopted or, that it has been rejected - the process of trial and evaluation (by the potential adopter system) continues. As also suggested in chapter 10, there are a number of modifications which need to be made to the programme in the light of experience and evaluation of the activities included in the programme to date.

In this chapter I intend to recap on the previous chapters to relate the theory with the practice and results and at the same time to provide a critical appraisal of my own performance as a change agent. This critique is divided into five sections:

11.1 My own development as a change agent and the SLCEG's development as a change agency.

11.2 The Programme of Planned Change as implemented and its relationship to the Theoretical base.

11.3 Evaluation - methodology and results.
11.4 Future development of the programme and plans for institutionalisation - possible pitfalls.

11.5 Areas for further study

11.1 My own development as a change agent and that of SLCEG as a change agency

When I first started this project I was a complete novice so far as planned change was concerned. In fact, I was under the misapprehension that, in order for more energy efficient dwellings to be designed, the need was for a change in attitude amongst designers. However, this view was fairly short-lived as I discovered two things: first, by reading the literature on attitudes and attitude change (eg. Warren and Jahoda, 1979; Kahle, 1984) I discovered that changing attitudes was very difficult and, even if achieved, would not necessarily result in the corresponding change in behaviour (due to, for example, lack of skills, knowledge or opportunity). Secondly, by talking to more of the people involved in commissioning, designing and building housing, I found that the general attitude towards energy efficiency was a positive one in any case. At the same time I knew that it was possible to build energy efficient housing which was affordable in terms of capital cost, aesthetically acceptable and comfortable for the occupants. I also felt strongly that energy efficiency should be encouraged, both for the good of the individual householders and for society as a whole.
The Concept of Planned Change allowed for all these elements in that its ethos was of non-coercive modification of various elements of a situation so that individuals or groups would change their behaviour to the benefit of (the same or another part of) society. This appealed both to my own value structure and to my reading of the situation. (see chapter 2)

One problem I encountered almost immediately was that the definitions of planned change included the idea that change agents (implementers of planned change programmes) should work together with the Client and/or potential change adopter at all stages of the process. This was not a real proposition in this case as there was not a real Client and the potential change adopter system was not yet sufficiently aware of the problem/need or the solution. Therefore I had to try to act as a change agent in all other respects but with this exception. It could be argued that this idea is such an inherent part of the planned change concept that it is not possible to have a planned change programme without it. This thesis, however, shows that it is possible to bring about a planned change without this element and that, under certain circumstances it is possible to proceed with a planned change programme only if this element is left out.

It obviously took time for me to develop my own knowledge about planned change and even longer to fully appreciate the complexities of the role(s) of a change agent. As a result, the programme was slow in getting started and some opportunities missed though I (optimistically) feel that these were not of major importance and
will tend to lengthen the timescale for full adoption rather than prevent it. Movement towards the desired change may also have been slowed by the inexperience of other members of the change agency. As suggested in chapter 10, I now plan internal training in the roles and skills of change agency for all members of the group (and I suspect that I will learn/develop as much through this as the other members.)

I took a very pragmatic approach to the problem in the diagnosis, the setting of goals and objectives and in designing the activities if the change programme i.e. I considered only those objectives and activities which I knew were feasible within the given conditions. This seemed the logical approach at the time, both because the framework of the planned change concept seems to encourage this and because, being in the midst of the problem, I could easily perceive the impracticality of other options. However, it might be more valuable to stand back a little in dealing with some or all of these and try to be more objective although this too has drawbacks in that a close knowledge of the existing situation is vital for the diagnosis stage and the objectives and activities will, sooner or later, have to be modified to take account of the existing situation and available resources.

One difficulty was to be sufficiently objective. This must always be a problem for change agents as they are, by definition, (see 4.3) involved in and believers in a cause and this tends to detract from objectivity. This comes into play most in interpersonal situations but can also colour decisions made during diagnosis, etc. I
therefore had to consciously "distance" myself when involved in diagnosis, development of the programme and evaluation. There would be advantages to having the programme evaluated by someone not as closely involved in the cause as they would be able to maintain their objectivity more easily but there are also advantages to change agents carrying out their own evaluation as they can be more interpretive and can make small modifications to the programme to reflect nuances that an outsider would be unlikely to pick up. Also, the evaluation can be continuous, at least as far as the subjective forms of evaluation are concerned, and therefore affect the programme continuously.

Other problems which arise due to involvement in the cause are the effects of disappointment when the potential change adopter does not respond to the efforts of the change agent. Kotler (1973) gives an example of Peace Corps volunteers - a large proportion of whom gave up and went home - probably due mainly to their having unrealistic expectations of the effects (or speed of the effects) of their efforts. I have been aware of this type of response in myself on a number of occasions during this project but not too often as I expected it to be a lengthy/slow process and, to meet resistance. I am aware however, that some of my colleagues become frustrated quite frequently with the apparent intractability of some elements of the potential adopter system but, they persevere due to their belief in the cause. This is another reason why we require some internal training - so that we all understand our own and others' responses better.
As a "change agency" the SLCEG is still developing and the lack of training in change agency skills and knowledge may have been detrimental to the change effort where our staff have relied only on empirical-rational strategies and not understood the motivations for resistance. No disastrous effects have been seen but it is likely that the rate of adoption may have slowed for this reason and, the staff themselves are in danger of becoming disillusioned. The planned internal training should improve this situation and enable me to extend my own knowledge and skills.
11.2 The Programme of Planned Change as implemented and its relationship to the Theoretical Base.

A. The Theoretical Base.

The theoretical base for this Planned Change project was derived both from literature on Planned Change (eg Lippitt et al (1958), Bennis, Benne, Chin and Corey (1976) and Zaltman and Duncan (1977)) and also innovation diffusion (eg. Bhola, 1982), communication (eg. Bettinghaus, 1973), attitudes (Kahle, 1984) and more.

As suggested above, there was one respect in which this project did not fulfil the criteria set out by Bennis et al (1976,p7) in that it was not possible to have collaboration between the change agent and the potential adopter system. In all other respects, however, the criteria were met.

The definition of Planned Change derived from the literature (in Chapter 2) was:

Planned Change is a conscious and deliberate attempt, by an individual or group of individuals, who employ social knowledge to modify the behaviour of individuals or the characteristics of systems in order to bring about a specified improvement in one or more aspects of a social system.

There was a "conscious and deliberate attempt" by myself and by the SLCEG, utilising knowledge of change strategies, motivation, learning, communication, etc., to modify the behaviour of building
designers and others so that they would design energy efficient houses for local authority tenants.

Within the theoretical framework there appear to be two commissions and another area which, in my opinion, deserves more attention:

The first omission is the category of Beneficiaries of the Change which I identified early in this project. The majority of writers appear to assume that the individual or group who benefits from the change is synonymous with the change adopter and/or with the Client (the instigator of the change). Whilst this may frequently be the case, there are exceptions, usually where the potential beneficiary lacks full awareness of the problem and/or feels there is no solution, or lacks the resource to commission help. In this case there were clear Beneficiaries of the required change - the occupants of the houses - who could not be the Client due to lack of awareness and resource and, could not be the adopters as they were not the designers of the buildings. (see 2.3 and 4.5)

The second area which seems not to appear in the literature is the need for training of change agents - apparently they are born, not made! Whilst sounding flippant that comment may be more true than otherwise but, whilst some of the characteristics that change agents need have to be pre-existing, there are some skills and areas of knowledge for which they require training. This training may be of the "learn as you go along" type, learning through individual study or a training programme. The first of these options is probably undesirable as it may be counterproductive to the change effort.
From my own experience and my observation of my colleagues I feel that training is necessary and should be group-based - utilising seminars and workshops to discuss issues, compare experiences and exchange knowledge and skills.

The area which I feel deserves more attention is that of diagnosis - it is hardly mentioned by Lippitt et al and not dealt with in much detail in the "standard work" on the subject - "The Planning of Change" (Bennis et al, 1976). It is generally indicated to be necessary, but little information given as to models or perspectives which could be used or the categories to be considered, especially in relation to diagnosis by the change agent alone, rather than collaboratively with the client or adopter. An exception is that Zaltman and Duncan (1977) do consider it in some detail, proposing two perspectives which could be used (Metatheory Perspective and Open Systems Perspective). I utilised both of these plus a derivation from the CLER model for innovation diffusion put forward by Bhola (1982).

B. Diagnosis (see chapter 5)

I found that each of the perspectives gave different insights into the problem and the course of action to solve it. The Metatheory perspective provides for defining the problem in terms of causes, relationships between causes and the reasons for these relationships. For example, I identified one of the causes of the problem as the designers' lack of appropriate skills and knowledge, another was the lack of an energy efficiency policy. The first
perpetuated the second as the Councillors were reluctant to initiate a policy which could not be implemented. The reasons for the lack of skills and knowledge were lack of training, either during the designers’ college/university course or as in-service training, plus insufficient motivation to train themselves.

The Open Systems Perspective concentrates on the characteristics of the potential change adopter system – its past history, environment, organisational structure and process and the characteristics of individuals within the system and thus drew attention to such elements as interdepartmental rivalry, the hierarchical nature of local authorities, political stance and the values, attitudes, existing knowledge, openness to change, etc. of the individuals and groups within the system.

Using the CLER model as another perspective overlaps the other two to some extent – looking at the relationships between various parts of the adopter system, the change agent and the rest of society and the physical, social and psychological environment in which the change process is to take place. However, this perspective introduces the need for resource in a much clearer manner than the others and shows up the change agent’s need for resource for carrying out the planned change programme as well as resource for the adopter system. It also incorporates the concept of linkages between different parts of the systems and the idea that some of these may need to be broken, weakened or strengthened in order to advance the change process.
Each of these perspectives added different elements to the overall situation/problem and it is tempting to suggest that it might be beneficial to attempt to amalgamate them into one, but this would tend to lose the clarity of the existing perspectives and result in one which was either, overcomplex or, simplified and therefore lacking some of the elements.

The evaluation of the planned change programme has indicated that the diagnosis was fairly accurate in identifying, for example, the basic causes of the problem, the varying degrees of openness to change in different sub-groups and the areas which were likely to be resistant to the change. However, I omitted to give sufficient consideration to the element of time and the way that the characteristics of the adopter system would affect the time taken for the change to be adopted.

C. Goals and Objectives (see chapter 6)

The goals set were directly related to the problem as defined in chapter 5 (diagnosis) and included both long-term and intermediate goals. The long-term goal was that all public housing in the three (now four) local authorities should be energy efficient. The intermediate goal was that all dwellings which were newly built, rehabilitated or subject to major maintenance should be energy efficient. These goals are still valid and, whilst progress has been made towards the intermediate goal, it has not yet been reached.
The objectives set were directly related to the causes of the problem identified through the three diagnostic perspectives (see chapter 6). These objectives were then translated into strategies and concrete activities to overcome each of these contributory factors so that progress could be made towards the goals. The most difficult objectives to meet were to develop an environment more conducive to energy efficient design (6.2.8) and, to develop the awareness and expectations of some of the client departments (6.2.11). For the first, the problem arises due to the lack of control/influence which we (as change agents) have over most elements of this environment (fuel prices, oil gluts, etc). For the second, the problem is more complex but also, potentially more soluble and is partly to do with lack of Linkages (Bhola) between the change agency and this sub-group of the adopter system and partly a "gatekeeper" effect where both senior officers and other departments are preventing communication of the message to these departments. Therefore this objective should probably be broken down into sub-parts: to strengthen (or form) linkages between the change agent and this sub-group and, to find alternative routes for communication which avoid the gatekeepers (such as through councillors or tenants direct to specific officers or groups).

D. Choice of Strategies and Design of Specific Activities of the change programme. (see chapters 7 and 8)

The choice of change strategies was governed by both ethical and pragmatic considerations, for example, power-coercive strategies were rejected (with a minor exception) for ethical reasons whilst
the "ideal" strategy group, normative - re-educative, could not be used as it relies in full co-operation by the adopter system in the change process. The strategy groups seen to be most appropriate were Facilitative, Empirical-Rational and Persuasive.

Within the framework of the strategy groups, the selection of activities to make up the elements of the change programme was directly related to the objectives, so that for each objective there was at least one corresponding activity, although some activities contributed to meeting more than one objective. For example, the setting up of the Demonstration Suite met the objectives of providing a special environment, raising the awareness of designers, raising the awareness of the client departments as well as providing a location for seminars, etc. aimed at developing knowledge and skills. The choice and development of activities was also governed by practicalities, such as the resource available (time, money, space). In this respect one problem which arose was that I had to divide my time between my role as change agent and my other roles within the organisation such as financial control and budgetting, personnel, supervision of clerical staff, deputising for the Director, etc. This is liable to be a problem for many change agents as they will tend to be attached to similar small groups where roles are not so clearly delineated as in large organisations and all members have to share in running the group and, even, keeping it afloat!
E. Effectiveness of the various activities

The evaluation of the questionnaires (9.1.2) indicated that the Demonstration was successful in developing awareness, modifying beliefs and increasing knowledge, leading to intended changes in behaviour - towards more energy efficient design - to the extent of 46% of the possible maximum change. As the demonstration was only part of the overall programme, this result is satisfactory as it could be expected that the other elements would then reinforce and develop this change. No evidence was found of any change in the direction opposite to that desired.

However, the questionnaires also indicated significant gaps in the exhibition, particularly in respect of the content of the information but also in the forms of communication used, for example, more constructional details and examples of energy efficiency packages for different dwelling types were required, and other formats wanted included the use of film and slides. The new exhibition, currently under development, will attempt to make good these deficiencies (see 10.1.1).

The strategies used (persuasive plus empirical-rational) to bring the Councils to formulate Energy Policies were very successful but the associated requirement for all designs to have Energy Certificates was less successful due to the lack of sufficiently rigorous procedures for monitoring this (within the local authorities) together with a degree of obstruction by some chief/senior officers. Nevertheless, this procedure has been
adopted to some extent and the increase in the numbers of dwellings getting certificates suggests that it is continuing to take hold. The increase in the average saving per dwelling also suggests that the change to energy efficient design is being adopted by the designers. Efforts are currently being made to improve the success rate of this activity by improving procedures, providing more feedback on savings and enabling the designers to increase their involvement by using the ELF energy analysis program themselves (see 10.1.2).
11.3 Evaluation - methodology and results. (see chapter 9)

Both subjective and objective methods were used to evaluate the change and the change programme. I feel that the subjective evaluation (9.3 & 9.4) is a satisfactory way of assessing the progress of the change programme as it also gives useful insights into sources of resistance and areas for improvement. In many ways the subjective evaluation is like a re-diagnosis, reconsidering all the various elements and interactions of the situation in the light of the change efforts which were implemented.

I feel the objective evaluation was less satisfactory in that my design of the questionnaires did not make it easy to assess the level of change or to compare "before" and "after" attitudes, beliefs, etc. very accurately. This was partly due to my decision that the questions in the two parts of the questionnaire should not be obviously comparable as the time between answering them was only three hours or less. It was also partly due to my own inexperience in questionnaire design.

Another error in the design of the questionnaires was that there was too great a concentration on building designers, with a number of questions dedicated to them - this was done deliberately as I considered that the majority of respondents would be designers and that they were the group towards whom the bulk of the change effort was addressed. In the event, designers only accounted for some 48% of the respondents and I therefore feel that an opportunity to discover more about the other groups was missed.
11.4 Future development of the programme and plans for Institutionalisation - possible pitfalls. (see chapter 10)

Overall, the evaluation of the programme to date (chapter 9) has shown that the programme has been moderately successful in bringing about the desired change BUT that there is still a need to continue the programme. A number of modifications were proposed in 10.1, including improvements to the exhibition, alterations to procedures and provision of more feedback on energy savings to the adopter system so that the adoption of the change becomes more widespread. Proposals were put forward in 10.3 for activities which will contribute to stabilising and institutionalising the change, such as further feedback on energy savings, setting up monitoring systems within the borough departments, extending Council Policies, etc.

Both the further development of the programme and the steps towards institutionalisation may be subject to even greater difficulties than those experienced so far due to the overall environment in which local authorities (especially those politically opposed to central government, like the SLCEG member boroughs) currently exist. They are subject to many and increasing pressures - reduced finance, the Housing Bill, ratecapping and increasing problems of homelessness, poverty, etc. amongst their tenants. The net result of these stresses on an organisation is a subject for a whole separate study but seems to be similar to the effect of stress in individuals in that it actually reduces the ability to concentrate on non-critical issues or to plan improvements to the system in any coherent way.
At the same time, there may be compensatory effects such as, that the need to be seen to be providing a good service to their tenants and to the community can encourage councillors to embrace energy efficiency, or any other matter which enhances the quality of life for people. They may also be encouraged to look for energy efficiency in their own (non-housing) buildings - offices, libraries, pools, etc. in order to save dwindling resources (as one borough has already done).
11.5 Areas for further study

One question I would like to pursue as a result of this study is to look at the question of what I will call "personalisation" of the change - it was noticeable, particularly during seminars but also from the questionnaire responses, that designers' interest and motivation increased many-fold when the principles of energy efficiency were related directly to their own homes, their own fuel bills, draughts, etc. It is therefore a reasonable hypothesis that this would act positively to increase the likelihood of their adopting the change.

It would be interesting to test this theory and, if proved, to go one stage further and provide the designers with a "free" analysis and report on their home or even, free installation of the energy measures and see if this would result in faster and/or greater or more widespread adoption of the change.

It will also be interesting to watch developments over the next two or three years and see whether the planned change will finally be adopted or rejected and try to assess whether this is due to the above factors or in spite of them - i.e. is it possible for this type of change, (almost) unrelated to the crisis, to be adopted within what is felt, by the potential adopter system, to be a crisis situation? Or perhaps as Bhola (1984) suggests, "The problem of change is never fully and finally solved: the old problem turns into a new problem requiring new commitments and interventions. Thus, planned change is a continuous experiment."
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Appendix I


1. Introduction

One of the aims of my research is to develop the most effective method(s) of disseminating information about energy conservation to all the various groups, professionals and others, involved in the building process, in a manner which allows for the diversity in the attitudes, experience and needs of the various individuals and groups so that they will develop an awareness of the desirability and practicality of energy saving in buildings and consequently take steps to achieve this in their own work.

The setting for this will be a "Demonstration Suite" to be set up in one of three old houses which have been refurbished to a low energy standard and will be based on this scheme and its counterpart in new houses on the opposite side of the road.

It will be seen, therefore, that we are dealing here with non-formal education of adults and therefore the material required may be somewhat different than that which might be used in a formal education situation.

As it was felt that the needs of the various professions regarding both content and form of the information presented would differ from each other and from the needs of the non-professionals - clients, building occupiers etc. - the first step seemed to be to attempt to ascertain what these needs might be. I therefore decided to interview a number of representatives of some of the relevant groups.

2. Aims of the pilot interviews

The first aim, and the only stated aim of these interviews was to discover the opinions of the interviewees on both the content and the format of informative material which they felt their own profession/group would find of value and that which they felt other professions/groups would find of value.

The other, co-incidental aim, less defined, was to discover the level of awareness and the attitudes and beliefs of the subjects in relation to energy conservation.

Unsurprisingly, neither of these aims was met in total and, conversely, a number of other considerations came to light - for instance the subjects' cognition of their own (professions) role and responsibility within the framework of the building process and consequently in relation to energy conservation.
More details of the information so far derived from these interviews are given later.

3. Choice of Interview Technique

There are a variety of techniques which can be used for interviewing ranging from the highly structured verbalisation of a questionnaire approach to the completely unstructured situation where a question or hypothesis is posed at the start and the interview allowed to take its natural course from then on. Various typical methods and problems with each one are outlined in the Rediguide on Interviewing and considerations of questionnaire design and other methods of measuring or discovering attitudes in particular can be found in Oppenheim (1966).

After considering the various options in relation to my particular requirements, I considered that a 'semi-structured' interview was the appropriate approach as there are too many inherent problems in the questionnaire type of approach for it to be valid at this stage (although at later stages it will probably be of value and indeed necessary in order to reach sufficient numbers of people). On the other hand, I felt that a completely unstructured approach could easily result in us not considering the necessary points at all.

I therefore prepared a series of fairly open questions, intended to encourage the interviewees to talk fairly freely but within some framework. (Appendix i). I necessarily had to 'set the scene' to begin with - explaining a little about the nature of the Demonstration project itself and also obtaining the subjects' agreement to tape record the interview.

Choice of Interviewees

The intention was to conduct between 6 and 10 interviews at this pilot stage - covering as many of the professions/groups involved as possible. I started off with the expectation of talking both to people who (I thought) had positive attitudes to energy conservation and to those who had neutral or negative attitudes. In the event, it was considerably simpler to arrange interviews with people with whom I had already worked in one way or another, on projects related to energy conservation. They could, therefore, be expected to be fairly aware of the subject and probably have a positive attitude towards it. In the event, this was not entirely the case!
Interviews were carried out with seven subjects:

Two Architects - one in Local Authority
- one in Private Practice

One Building Surveyor - from a local Authority

One Quantity Surveyor - in Private Practice

Two representatives of the client - one a local authority Senior Housing Officer.
- one the Leader (Councillor) of a Local Authority (who was previously P.R. Officer with an Oil Company).

One Service Engineer - In Private Practice.

4. The Interviews - some problems in practice

One difficulty I expected to experience, namely, resistance to tape recording of the interview, did not arise at all! Only one subject suggested that it might be a good idea if I sent him a copy of the transcript, but was otherwise quite happy for the recording to be made. All the others seemed to instinctively understand that I only wanted this for my private use. (Perhaps they 'trusted' me because they knew me - would the same apply with strangers?) In the majority of cases, the presence of the recorder did not appear to restrain the subjects from saying whatever they felt inclined to say - only one person refrained from actually mentioning names when making somewhat derogatory statements! This was a direct result of the presence of the recorder, as when I had turned it off he was quite happy to refer to the same people again - this time by name.

The only difficulty I did encounter in the use of the tape recorder was related mainly to the equipment itself - for the first three interviews I had to use the 'built-in' microphone on the recorder - this was simply not adequate as it allowed for the reception of a very high level of background noise which made transcription very difficult - practically impossible in one case where the subject spoke extremely softly and tended to lean back away from the recorder. Once I had obtained a small ('tie-clip' type) remote microphone, (which was unidirectional) the quality of the recordings was improved immensely.

The other problem I found with the interviews was in actually sticking to the structure I had prepared - and frequently, even in sticking to the point at all! I suspect it could be partially because of involvement with the subjects in my everyday work that they frequently digressed onto points of detail regarding various
other building projects and so on. However, this was not necessarily a waste of time as it often gave me some insight into their levels of knowledge, awareness, opinions and their opinions of other peoples attitudes.

Also there were a number of occasions where I found it difficult to guide the conversation without unduly influencing the response. On a few occasions I was, I think, guilty of accidentally influencing the response by asking questions which were too detailed or specific.

5. Information abstracted from the Interviews

This is in two parts : that information which relates directly to the stated aims of discovering the required content and format for the demonstration and, secondly, other information/understanding on such matters as the subjects own awareness and attitude, reported attitudes/behaviour of others, subjects awareness of his role and responsibility etc.

The stated aims : content and format

Although it was expected that some of those interviewed - particularly the 'design professionals' would have concrete ideas about the format of presentation, there was actually greater emphasis, by all those interviewed, on the content and where format was discussed it tended, in general, to be in rather general terms. The suggestions made on both content and format were directly related to whom each person felt to be the 'target population'. This varied from one person to another - some concentrating on their own profession/group, some considering that other professions/groups needed educating more!

Content

There was a fairly good concensus of opinion as to the content of the demonstration - but with different emphases and assumptions related both to the profession of the speaker and the group to whom he was assuming the demonstration was directed. One exception, in relation to both content and form was the quantity surveyor who would make few suggestions as he felt it was unlikely that we culd persuade any quantity surveyors to visit it!

The Services Engineer felt that the demonstration should be aimed primarily at Architects (and possibly 'spec' builders) and that highlighting practical possibilities for energy conservation and the possibilities for incorporating solar water and space heating were the main items. He did not feel that costs - either capital or running costs - were of much interest to services engineers but that they should be included for others' benefit.
In contrast, both architects indicated the areas which they thought architects would be interested in and both seemed to include everything possible; both mentioning construction details, specification of materials, overall costs, cost-effectiveness and payback periods. The local authority architect felt the saving in use aspect was of primary importance to the client department and to the architects to assist them in convincing the client department to allow novel designs. Both architects were greatly concerned with the specification of materials and felt that detailed information on alternatives would be valuable together with lists of manufacturers. The private architect felt that bibliographies and lists of relevant trade associations were also useful. He also suggested concentrating on visual appearance and design implications and that displays showing differences in treatment of rehabilitation and new buildings should be included.

Cost effectiveness and reductions in running costs were also mentioned by others as being vital for inclusion - the council leader felt this to be the main item for presentation to Councillors providing it was related to their local environment and conditions. At the same time, he felt that there should also be some technical information available to Councillors so that they could converse informatively with their technical officers.

The Building Surveyor felt that it was the council tenants and other local residents whom we should be addressing and again, the cost effectiveness aspect was seen as being of vital importance. On the other hand, so far as his own staff (of building surveyors) was concerned he saw them as requiring details of the energy conservation measures, though not with details of construction except where these were unusual. He also felt it was worth drawing attention to constructional advantages of certain energy saving measures - for example, that if you are using a dry-lining system for walls, you may have space behind it to accommodate pipes, electric cables etc.

The private architect suggested that many architects have a strong preoccupation with condensation problems and that showing how energy conservation can improve these would be a strong persuader. The local authority architect suggested information on items that were not used and the decision-making process, together with differences from standard designs and some examples of very simple things which can be done to save energy - such as turning down thermostats.

Nearly everyone interviewed thought something on solar energy should be included, though many felt it was of doubtful value. The Councillor thought it's value was probably as an "imagination-catcher".
Format

On format, almost everyone mentioned nearly all the possible items: film, slides, photographs, models, samples, 'moving' exhibits, leaflets/pamphlets, drawings.

However, some items received more consideration such as the use of film (or tape/slide production). This was felt by the Housing Officer (from his own experience) to create a 'captive audience' and to be useful in presenting ideas to councillors. The Councillor also felt that this could be the primary medium for Councillors - perhaps being shown as a 'special event' at the Town Hall and could encourage councillors to follow it up with a visit to the demonstration. The majority felt that a film was most appropriate for lay people and should be kept simple and 'light' in tone.

Both architects and the services engineer considered drawings to be a useful medium although the architects wanted more detail, though not actual working drawings - except for innovations. It was interesting to note, however, that the private architect assumed 'nearly everyone can read drawings' whereas the Councillor and the Building Surveyor suggested that Councillors and other lay people would not be able to get much information from (architectural) drawings.

The Private Architect was the most forthcoming on the matter of format and the sum of his suggestions seems to be that architects would like a presentation which is both visual and tactile - with full size and scale models, working mock-ups of systems, photographs and drawings and samples of materials. He also twice mentioned "coffee and biscuits" as being an important factor within the whole. It is possible that this is a shorthand way of expressing the need for an attractive venue which is welcoming and encouraging?

The quantity surveyor suggested that one useful display would use a series of identical 'exloded views' of a house, showing different ways of treating the building for different degrees of energy conservation, with specification, capital costs and running costs for each.

Both the Councillor and the Building Surveyor addressed themselves to the question of how the project might be publicised initially and suggested using the local authority offices which deal directly with the public, the local newspaper and the departmental chief officers in the local authority, Chairs of relevant committees and the local authority PRO (Public Relations Officer).

Information from the interviews not directly related to content and format of the demonstration.

As mentioned earlier, a number of interesting things came to light during the course of the interviews.
One of these was an indication of the subject's own level of awareness of, and commitment to, energy conservation. For instance, although the services engineer is working (with us) on an energy conservation project and professes to be committed to it, his actual knowledge seems extremely limited and his ideas derive almost exclusively from two reports of ours he read some 12-18 months ago and on another scheme in which he is involved he "doesn't know if it is energy conserving or not"! This seems to be connected with his view of the service engineer's role in the process - that he should be 'told to do an energy conserving (services) design'.

The Building Surveyor was obviously well informed and expressed commitments on his own, and his departments', behalf but there was, perhaps, some contradiction in that he also expressed some reservations as to whether the measures would work - due, in part at least, to a previous negative experience with solar water heating. He felt that his staff only needed details of the measures to take and confirmation that they work and then they would use the appropriate measures for each building they dealt with. However, the surveyor who is concerned with the Lawrie Park Road scheme itself is also designing some other rehabilitation projects and he seems not to be utilising any of the ideas on these!

Several people were aware that information needs to be presented to different people and at different levels of complexity. The Councillor was aware that energy conservation was of more value than solar (water heating) but also realised the publicity and imagination-catching value of solar energy. He felt that councillors are generally well-motivated towards energy conservation, but often cannot influence it because they need a little technical knowledge in order to influence the technical officers.

The Quantity Surveyor displayed a certain amount of awareness, but restricted by his definition of his own role. He feels that he is flexible in his attitude but also feels that most quantity surveyors are not very flexible!

Another question which received attention from several subjects was their own role within the whole building process and their level of responsibility for the design and for energy conservation. The quantity surveyor first saw the role of his profession as being an intermediary - merely translating the designers requirements into a form suitable for costing. He said that he did not see them contributing to the design process. However, he then described an incident where he had made a positive suggestion to the building surveyor which actually amounted to partaking in the design process! At the other end of the scale, the Building Surveyor saw his role as central to the process and his responsibility to encourage energy conservation. He also felt that it was the responsibility of local authorities to do research and experiment in this area "or else no-one's ever going to know".
Most people used anecdotes to make points. Two types specifically stand out: those which reported straightforward incidents but tended to give clues to their own attitudes and awareness such as the architect (L.A.) describing how he had draughtproofed his house using silicone and then told a colleague about it. The colleague then did his house with ordinary mastic and stuck all his windows shut!

The other kind related to the attitudes of other groups - such as (from the L.A. architect):

"A friend bought a house which includes a heat recovery unit, cavity insulation ... very, very highly insulated....the heating engineers put in a normal heating system - which assumes none of it (energy saving measures) works!"

and,

"...quantity surveyor....has a different approach because, 'anything extra is more expensive' - he doesn't necessarily note the subtractions....When the quantity surveyor looks at a design, anything that's more complicated than a simple box - he'll comment, 'that is expensive'."

and, from the Housing Officer,

"The thing that does concern me, of course, is that: In a meeting on CHP a little while ago, and talking to people who should know better they more or less considered that energy conservation just didn't matter anyway you know.... Because I was the person who raised it, because it hadn't been broached at all by the lead consultant - I wanted to know why he hadn't even mentioned energy conservation and they said, "well, it's not cost effective" and all this sort of thing. I said, "Oh, I see, we have unlimited resource do we?" I mean, once you get to that level, you realise you're wasting your time - but that (story) is quite true. I won't mention the name of the consultants - you'd be astounded, I tell you that.

And also, there was another local authority officer sitting there, the Engineer - and he was of the same opinion. I think the stupid comment that was made to me was, "Well, if energy conservation meant everything then everybody would double-glaze"!

I think, quite honestly, with respect, this is what you're up against. And these are people who are responsible for energy programmes."

6. The next stage.

The first inevitable question is, Have those particular people given me a realistic insight into the needs, awareness, beliefs and so on of their particular groups - or only of their individual selves?
(albeit as a part of the group). It was encouraging to note the high degree of correlation between the two architects, but nevertheless I am doubtful whether this could in any way be termed a representative sample.

So should the next stage be:

(i) Conduct more interviews in a similar vein?

or (ii) Prepare some alternative formats of information and then interview these and/or others as to their opinions on the relative merits of each?

(iii) Devise a questionnaire, based on the information gathered so far, which could reach a wider sample?

or (iv) a combination of any of these?

At the same time, I have recently read an article by Mark Lipsey (in Oskamp (1977) entitled "Attitudes Toward the Environment and Pollution" which outlines some work done in the USA between 1965 and 1977 and indicates some interesting points which are relevant to my research, such as, stated concern not resulting in action; choice of outdoor recreational activities corresponding to greater environmental concern; the effects of large scale 'incidents'; and the (very low) level of personal sacrifice people are prepared to accept for the sake of the environment (in both cash and convenience terms).

I am consequently considering whether any of these parameters can be investigated - by interview, questionnaire or whatever - to give a greater understanding of peoples attitudes and likely behaviour vis-a-vis energy conservation.

Bibliography

Rediguide "Interviews"


APPENDIX (i)

Interview schedule

1. Introductory remarks by interviewer:

SLC is developing an exhibition on energy saving housing - as you (interviewee) may know -

The demonstration will use various means to let people know what measures have been used to save energy, their cost-effectiveness and other implications.

The people we are concerned with are all those involved in the (house) building process; architects/surveyors, client/client body; builders, quantity surveyors, services engineers and so on.

Now (I am) doing a study to attempt to discover what sort of information people want/need and how they might like the information presented and I am hoping you (and others) may be able to help me in this.

Obviously, I myself am biased towards the idea of incorporating energy saving in buildings, but if you feel this is not a particularly important aspect, please feel free to indicate this.

I would like to tape record this conversation if you don’t mind as this will be a better record for me than trying to take notes while we’re talking?

2. What are your views on energy conservation? (generally).

3. Ask interviewee’s opinion of the needs of other professions eg if he/she is an architect:

"Now, you are an architect, so you will work closely with all these people, can you give me some idea of the sort of thing which might convince, say, a quantity surveyor, that energy saving measures should be included?

.............

"And, in what sort of form would a Q.S. like it presented?"

If help needed here - "would Q.S. prefer it in graphic or written form? from a computer or manual? as an exhibition or a written report?" etc.

Similar Questions for other professions.

(If help needed here - "would Q.S. be interested in, for instance, details of the building construction, overall costs, detailed costs,
costs-v-savings, maintenance aspects, changes in quality of life for occupants, or ......?")

4. Ask interviewee's opinion of the needs of his/her own profession. eg.

"Coming back to your own profession can you tell me how we should approach (architects) about this?"

Then, "How would you approach a senior architect -

Would you need any help before you approach him?

and, "likewise, how would you approach architects working under you?"

5. "I am hoping to talk to a number of people in this way and to use some, (if not all because it may be conflicting) of their advice in preparing graphics, booklets, computer displays, models and so on for the Exhibition. Would you be prepared to then look at some of this material and tell me to what extent, in your opinion, it is likely to serve its purpose?"

6. Lastly, would you mind telling me whether you, yourself, have incorporated/ been involved in energy saving measures in any buildings? (over and above those required by Building Regulations at the time).

Don't spare my feelings if you disagree - that would not be doing me a service.

If yes ask for brief details, and ask if he/she would, or is, doing it again.

If no, then ask whether he/she would have liked to and why they didn't or if they intend to in future.

(Answers to this may be unreal because of my known bias).
APPENDIX II

Energy Policies of the Local Authorities

The following document is the SLCEG report which formed the basis for the energy policies adopted by the SLCEG Member Boroughs in 1984/85 as described in 8.3.
6.0 ENERGY EFFICIENCY (Housing) POLICY FOR SLC BOROUGHS

6.1.0 Background

During the SLC meeting held on 8th December 1983 the Members requested the Director to prepare a policy statement on Energy Efficiency for consideration by the Boroughs.

A preliminary report was presented to the SLC meeting held on 20th March 1984 when it was decided to enhance the report in several different ways.

This report is an attempt at meeting those requirements.

6.2.0 Rationale

There have been various arguments for energy efficiency, some financial and some based on patriotism. Whereas energy efficiency does conserve resources for the tenants, for the local authority and nationally a major implication has come to the forefront only recently.

It is abundantly clear now that major hardship can and does result from 'fuel poverty': The cost of fuel is such that a substantial portion of family income goes towards fuel bills. Energy efficiency in most publicly owned dwellings tends to be low and this adds to the hardship resulting from fuel poverty and leads to further problems such as condensation. The main causes of high energy consumption are excessive draughts, cold structures and badly tuned heating systems and, in the case of district heating, badly maintained boiler houses. Of course some authorities have a better record than others, but most of these causes of high consumption exist to a greater or lower degree in the three Boroughs which make up the South London Consortium.

It is in the nature of things that the means required to improve thermal comfort are the same as those required to conserve energy (bar the trivial example of no heating). Some tenants suffer thermal discomfort because they cannot afford enough fuel, some suffer because of the inefficiency of the heating system but a large number of them suffer because they live in dwellings which, either due to poor specification, or poor maintenance, are difficult to heat, a few being impossible to heat adequately without major remedial action.

An improvement in thermal performance of a dwelling should result in elimination of, or at least a significant reduction in condensation which is currently responsible for a large proportion of maintenance costs.

It can be seen that energy efficiency in housing results in counteracting fuel poverty, improving living standards and thermal comfort for the tenants and a reduction in expenditure on maintenance by the Councils. And, in due course, a reduction in revenue expenditure on heating costs by the Councils.
6.3.0 Current Energy Work in the Boroughs

6.3.1 A considerable amount of work in energy conservation has been carried out by the Boroughs. SLC have also been active in the field for a number of years. The conclusion from the combined effort is that it is now technically realistic to implement energy conservation measures in all the building stock owned by the three Authorities as well as to include them in future developments for new buildings, rehabilitated houses and as a part of major maintenance.

6.3.2 SLC produced a proposal for the Borough Architect of London Borough of Lewisham for energy saving in all their non-domestic buildings. (Jan 1983). A rolling programme with an expenditure of £200,000 per year for three years was implemented as a result.

The Borough Development Officer in Lambeth is carrying out work on both non-domestic buildings and on some housing estates.

L.B. Southwark have just completed a major programme of expenditure on energy saving measures for their non-domestic buildings.

On the housing side, the Director of Housing, L.B. Southwark, initiated a programme in the summer of 1982 to include energy saving measures in all their rehabilitation jobs from then onwards. The programme is now being developed to include major maintenance projects.

The Borough Architect of Lewisham presented a report to the Policy and Resources Committee on the subject of energy conservation in Housing. (Nov. 1983). As a result of this initiative the committee agreed ‘that a statement describing the energy proposals to be incorporated in all housing projects be included in client department briefs and subsequent reports’. In addition the Borough Architects Department practices a policy of draughtstripping doors and windows and loft insulation.

The Demonstration Suite at Lawrie Park Road, S.E.26, funded by EEC, DoEn, and SLC, has been operational since October 1983. Regular seminars have been held there for the officers of the three Boroughs. Some 200 officers have attended these half day seminars so far.

All the three Boroughs have now appointed energy conservation officers.

Thus it can be seen that the three Authorities are becoming increasingly active in this field. The time is therefore ripe for the Councils to consider developing a policy for energy conservation.

6.4.0 Scope for Energy Saving

There are large areas of activity where energy is consumed by Local Authorities. Energy is consumed in Council owned housing, office buildings, social services buildings, in transport, in swimming baths, in street lighting and in many other activities. This report, however, deals only with housing as it is suggested that this is the area where an energy policy be first developed. The other areas can be addressed at a later stage. On the question of energy policy, housing may be looked at in the following categories:
(a) Existing stock served by Council owned heating systems: district heating, block heating etc.

(b) Existing stock where the tenants have direct control over the heating.

(c) New houses planned or under construction.

(d) Rehabilitation of old houses planned or under construction.

(e) Existing stock undergoing package improvements.

(f) Major maintenance on existing stock.

In formulating a realistic energy conservation policy various factors have to be considered for each category:

6.4.1 Existing Stock

6.4.1.1 Existing stock with Council Controlled Heating Systems:
In these Estates there are three main areas for energy conservation:

(i) Efficiency of the District Heating Plant and distribution.

(ii) Efficiency of heating and hot water distribution systems within the dwellings.

(iii) Energy conservation elements applied to the fabric of the dwellings.

6.4.1.2 Existing stock where the tenants have direct control. In these dwellings energy conservation elements can be applied to the fabric of the building and advice given on effective use of heating systems/appliances.

6.4.1.3 District Heating Schemes

It might be useful to develop a policy to improve the performances of district heating systems. The Boroughs are already doing a considerable amount of work in this area. Southwark housing have brought the charges for central heating down to between £4 and £6 per week averaged over all their schemes, by management and by application of controls and other energy saving measures.

The Energy Conservation Officer of Lambeth has started looking at the District Heating Schemes among other things. However, before a consistent policy can be developed a clear understanding of the problems related to District Heating Schemes needs to be developed. Fortunately efforts are underway locally and nationally to define clearly the problems and their solutions. It is therefore premature for the Boroughs to develop a policy in this area at this stage.
6.4.1.4 Treatment of Fabric of the Existing Housing Stock

The approximate number of Authority owned dwellings is:

- Lambeth 47,000 dwellings
- Lewisham 43,000 dwellings
- Southwark 62,000 dwellings

There are various elements of energy conservation that can be applied to the fabric of existing dwellings for varying costs and benefits. Loft insulation is quite effective. Some of the properties owned by the Boroughs still have either no loft insulation or have inadequate insulation. Ventilation control, by draught stripping outside doors, windows, draught lobbies if possible, modification of permanent ventilation, mastic around various holes in the ceiling, outside walls and floors can pay large dividends. There are occasional opportunities to dryline walls but this can cause major disruption. This option therefore cannot be taken up as a rule.

The cost of roof insulation and ventilation control averages about £250 per dwelling and cash savings of energy at the present gas prices would be about £110 p.a. Applying these figures to the existing stock of each Borough comes to

<table>
<thead>
<tr>
<th>Borough</th>
<th>Capital Saving</th>
<th>Annual Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lambeth</td>
<td>£11.8 m</td>
<td>£5.2 m</td>
</tr>
<tr>
<td>Lewisham</td>
<td>£10.8 m</td>
<td>£4.7 m</td>
</tr>
<tr>
<td>Southwark</td>
<td>£15.5 m</td>
<td>£6.8 m</td>
</tr>
</tbody>
</table>

Attractive though this is, it can be seen that there is a need for large amounts of capital investment. A programme of work can be developed which lasts say 4 or 5 years. The personnel requirements to supervise the work is also large and will be additional to the existing staff of the Boroughs.

The only decision the Boroughs can take at this stage is to initiate a study to define various methods of raising funds for the capital expenditure and personnel support required for this programme.

6.4.1.5 New housing, rehabilitation, package improvements and major maintenance.

The picture relating to new developments, rehabilitation, package improvements and major maintenance is different from the application of energy saving measures to existing stock. The extra sums of money required for energy saving measures in these projects is small and rewards in thermal comfort and cash savings on energy consumption large. Sometimes imaginative design and alternative specifications can lead to energy savings without additional capital costs. It is difficult to assess to what extent the current developments have taken energy conservation into account as the reports to the committees do not include this
information. It is possible that a large percentage of the technical staff are not fully aware of the potential of energy conservation in new developments. However, a Policy relating to new developments, rehabilitation, package improvements and major maintenance works is now possible.

6.5.0 Policy Development

In the light of the foregoing discussion it is suggested that Policy on Energy Efficiency in Housing should be developed in stages:

Stage 1: Policy covering dwellings where work is currently underway, i.e. newbuild, rehabilitation, package improvements and major maintenance.

Stage 2: A policy for rationalising district heating systems and their maintenance, together with treatment of the fabric of the dwellings served by these District Heating schemes.

Stage 3: A policy for upgrading the existing housing stock including ways of financing such work.

It may also be desired to develop policies regarding energy efficiency in public buildings and to cover other energy uses under the Councils' control such as street lighting, horticulture and council vehicles.

Whilst the various stages of policy are being implemented some form of energy handbook should be developed to assist tenants in gaining maximum thermal comfort for least expenditure.

6.6.0 Policy Options

After dramatic successes in pilot projects in Southwark and Lewisham it is very tempting to set limits of energy consumption for various types of new dwellings and for rehabs. (Gas bills for Wingfield Street, Southwark, show the cost of central heating for 5 person dwellings to be £72 p.a. plus standing charge and the expected cost for Lawrie Park Road (Lewisham), is £80 p.a. for new 5/6 person houses and £110 p.a. for rehabilitated flats plus standing charge).

However, setting limits for design energy consumption has problems. If they are set low, the chances are that there will be many exceptions to start with while the technical officers are getting used to the new standards. If the standards are set high to avoid this situation the energy saving will be marginal and perhaps will not encourage those officers who might have the expertise to do better. The variations in standards for different types are also large and are not easily defined without some corporate experience in this field.
There is however an indirect method of achieving the object. The reports to the committees on new developments, rehabs, etc. should include a statement of energy consumption per year for each dwelling type. This will achieve the following objectives:

- The Technical Officers will become aware that they have to include energy conservation with other considerations.
- After a few reports officers and members will become aware of what standards are being achieved. This will rule out any proposals for 'energy guzzling' developments.
- As more and more schemes are presented to the Committees, Members will be able to ask for better standards.
- This will give a chance to technical officers to get used to the discipline of energy conservation.

There are two options as to the format this report on design energy conservation can take. The first is that the energy conservation is defined in kwh p.a. or other energy units. For example one might say that a dwelling has design consumption of 10,000 kwh a year. This format has two difficulties. This consumption will result in different bills for the tenants for different fuels. For gas it is £150.00 p.a., without standing charge and for full price electricity it is £450.00 p.a. without standing charge. Thus even a low energy house can cost a lot to heat. Further this format assumes that all the Members and others such as tenants representatives have all brushed up their physics before coming to the meetings.

The other alternative of reporting the energy consumption in cash terms might be more acceptable. All interested can ask questions if a proposal reports a design consumption of, say, £250 p.a. when previously consumption of £150 p.a. was reported for a similar dwelling type. In other words this format takes the mystique out of the information for decision taking.

If the foregoing is accepted then the policy can be stated as:

'All new developments, rehabilitation and package improvements proposals for housing will include a statement indicating design energy consumption per year in cash terms, without the standing charge, for each dwelling type.'

A number of assumptions, however, need to be stated with design energy consumption figures. One deals with the average temperature assumed during the heating season. Another deals with the assumed number of hours heating is on during the day.
A standard format for the report is being developed which includes spaces for all the elements and will be circulated later.

It will be important to initiate some form of simple monitoring/follow-up procedure to assess the relationship between the design energy consumption and reality.

Recommendation:

The report be received.
Dear Visitor,

I would be very grateful if you would spare the time to complete this questionnaire. The purpose of it is two-fold: to find out to what extent this exhibition meets the needs of visitors to it and, to discover how it could be improved.

The questionnaire is in two parts - one to be completed as you arrive and the other just before you leave.

All the information given will be strictly confidential - i.e. it will not be used in any form which could allow its source to be recognised.

Thank you for your help.

Mary E. Bull.

---

Part 1. To be completed BEFORE you visit the exhibition

Please complete the following details about yourself:

004 Occupation. (Please tick one).

<table>
<thead>
<tr>
<th>004/A</th>
<th>Architect</th>
</tr>
</thead>
<tbody>
<tr>
<td>004/B</td>
<td>Building Surveyor</td>
</tr>
<tr>
<td>004/C</td>
<td>Quantity Surveyor</td>
</tr>
<tr>
<td>004/D</td>
<td>Housing Management</td>
</tr>
<tr>
<td>004/E</td>
<td>Building Contractor/Sub Contractor</td>
</tr>
<tr>
<td>004/F</td>
<td>Services (H &amp; V) Engineer</td>
</tr>
<tr>
<td>004/G</td>
<td>Administration/Policy</td>
</tr>
<tr>
<td>004/H</td>
<td>Local Government Politician</td>
</tr>
<tr>
<td>004/J</td>
<td>Researcher</td>
</tr>
<tr>
<td>004/K</td>
<td>Student</td>
</tr>
<tr>
<td>004/L</td>
<td>Other (Please state)</td>
</tr>
</tbody>
</table>

005 Age Range (please tick one)          006 Sex

<table>
<thead>
<tr>
<th>005/A</th>
<th>18 or under</th>
</tr>
</thead>
<tbody>
<tr>
<td>005/B</td>
<td>19 - 25</td>
</tr>
<tr>
<td>005/C</td>
<td>26 - 35</td>
</tr>
<tr>
<td>005/D</td>
<td>35 - 50</td>
</tr>
<tr>
<td>005/E</td>
<td>50 - 65</td>
</tr>
<tr>
<td>005/F</td>
<td>Over 65</td>
</tr>
<tr>
<td>005/G</td>
<td>I prefer not to say.</td>
</tr>
</tbody>
</table>
To see how far these 'low energy' flats and houses are succeeding.

To find out what techniques have been used in these 'low energy' flats and houses.

To find out more about the techniques for saving energy in buildings.

To discuss some of the problems that arise with some energy saving measures.

To find out how effective solar heating is.

To find out the opinions of the occupants about these dwellings.

To confirm that the techniques I am using are effective.

To find out about 'alternative' forms of energy.

If you feel strongly that none of the above fit your reason then please give it here.

---------------------------------------------------------------

Below are some reasons for putting energy conservation measures in buildings. Please put a '1' by the reason you feel is most important, '2' against the next most important, and so on up to '5'.

Increasing the value of the property.

Reducing fuel costs.

Increased thermal comfort.

Saving energy.

Providing higher temperatures at the same fuel cost.

Which of the following do you believe may result from energy conservation measures? (tick as many as you like).

higher living standards

lower living standards

warmer buildings

colder buildings

condensation

less condensation

higher running costs

lower running costs

more comfortable buildings

less comfortable buildings

higher risk of infection

less risk of infection
of the following groups do you feel should be responsible for initiating this? (tick one or more).

- politicians
- local councillors
- civil servants
- chief executives/town clerks
- architects/building surveyors
- planners
- services (H & V) engineers
- the fuel supply industries
- the occupants of the building(s)
- others (please state)...................................................................................

Questions 011, 012 and 013 are for building designers only - i.e. architects, building surveyors.

011

The Building Regulations require certain standards of thermal insulation to various elements of buildings. These standards are changed from time to time. In the buildings you have designed over the past 3 years or so, have you provided for HIGHER thermal standards of construction than required by the Building Regulations? (please tick one).

- Yes, in a few of the buildings
- Yes, in many of the buildings
- Yes, in nearly all of the buildings
- Yes, in all of the buildings
- No

If your answer was 'yes' and you would like to give some details please do so here.

- ........................................................................................................
- ........................................................................................................
- ........................................................................................................
- ........................................................................................................
- ........................................................................................................
- ........................................................................................................
Do you think the Thermal part of the Building Regulations should require higher standards than at present? (please tick one).

012/A  Yes, now
012/B  Yes, in a year or two
012/C  Yes, in 5 years time
012/D  No
012/E  Don’t know

Have you included any of the following in any of your projects? (tick as many as applicable).

013/A  Solar water heating
13/B  Passive solar heating
13/C  Photovoltaics
13/D  Heat pump
13/E  Waste heat recovery
13/F  Wind power

This is the end of Part 1 of the questionnaire. Please deposit it with the receptionist.

Please retain Part 2 of the questionnaire and complete it after you have viewed the exhibition.
During your visit, what has made the most impact on you? (Please answer in your own words).

<table>
<thead>
<tr>
<th>(a) very useful</th>
<th>(b) quite useful</th>
<th>(c) not very useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/A Building details of these houses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/B Information on costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/C Information on energy savings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/D Monitored data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/E Monitoring system demonstration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/F Film</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/G General information on energy saving techniques and materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/H Leaflets to take away</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/I Seminar (if applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/K Other (please state)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/L</td>
<td></td>
<td></td>
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<tr>
<td>05/M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05/N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are there any categories of information which are missing and which you feel should be included? (please state).
Are there some items of information which you feel should be covered in more detail? (please give details).


In your opinion, are there other techniques which should be used in this exhibition to convey information? (please give details).


Is there anything else you could suggest to improve this exhibition? (please give details).


Do you wish to investigate the subject of energy conservation further?

110/A [ ] Yes - Go to Question 111
110/B [ ] No - Go to Question 112

If your answer to the above question was 'yes' how would you like to proceed? (tick as many as you like).

111/A [ ] Read books on the subject
111/B [ ] Read journals on the subject
111/C [ ] Discuss with colleagues
111/D [ ] Approach 'experts' for advice
111/E [ ] Attend relevant conferences/seminars
111/F [ ] Join a relevant University/Polytechnic Degree or Diploma Course.
111/G [ ] Other (Please state) ..................................................

410
In what order do you rate the following reasons for designing 'low-energy' buildings? (Please put a '1' against the reason you feel is most important, '2' against the second most important and so on, up to '6').

113/A  to reduce running costs
113/B  to increase thermal comfort
113/C  to reduce maintenance costs
113/D  to conserve the supply of fossil fuels
113/E  to control condensation
113/F  to reduce atmospheric pollution

*Question 114 is for designers only.*

114  As a result of this exhibition, I will in future projects (Please tick one)

114/A  continue to design low energy buildings as I have been doing.
114/B  make sure I include energy conservation measures.
114/C  make sure I consider energy conservation.
114/D  include energy conservation measures if this is part of the client's brief.
114/E  include energy conservation measures and maximise solar gain.
114/F  include energy conservation measures, solar gain and waste heat recovery.
114/G  probably not include energy conservation measures because...

(please state).
This exhibition was designed for the following groups. Please show whether or not you think each group would benefit from visiting it.

<table>
<thead>
<tr>
<th></th>
<th>would benefit</th>
<th>would not benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>116/A</td>
<td>architects/building surveyors</td>
<td></td>
</tr>
<tr>
<td>116/B</td>
<td>services engineers</td>
<td></td>
</tr>
<tr>
<td>116/C</td>
<td>quantity surveyors</td>
<td></td>
</tr>
<tr>
<td>116/D</td>
<td>politicians</td>
<td></td>
</tr>
<tr>
<td>116/E</td>
<td>housing managers</td>
<td></td>
</tr>
<tr>
<td>116/F</td>
<td>building contractors/sub-contractors</td>
<td></td>
</tr>
<tr>
<td>116/G</td>
<td>teachers of building related subjects</td>
<td></td>
</tr>
<tr>
<td>116/H</td>
<td>students of building related subjects</td>
<td></td>
</tr>
<tr>
<td>116/J</td>
<td>general public</td>
<td></td>
</tr>
<tr>
<td>116/K</td>
<td>others?</td>
<td></td>
</tr>
<tr>
<td>116/L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>116/M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you very much for filling in this questionnaire. Just one question:

Would you be prepared, at some point during the next few months, to respond to a few more questions by post? **Yes/No**

If you are prepared to help in this way, please give your name and address on the right.

Assure you that the valuable information you have given here, and any you may wish to give in the future, will be kept entirely confidential and your anonymity is guaranteed.

(Please use block capitals).

Name: ...........................................

Address: ...........................................

Telephone No: .........................................
APPENDIX IV

Questionnaire Analysis - Categorisation of "open questions" - Procedure used.

Part 2 of the questionnaire includes a number of 'open' questions. In order to analyse these it was necessary to categorize the answers to these questions. (Copies of the questionnaire at Appendix III)

The procedure used was as follows :-

1. The first 50 completed questionnaires were separated from the rest in an attempt to elicit at least 20 answers to each of the open questions.

   There are 6 open questions, nos. 104, 106, 107, 108, 109 and 112. Of these, 20 answers were obtained for questions 104, 107 and 108, only 17 answers for question 106 and 18 for questions 109. Question 112 elicited only 2 answers and was therefore rejected from this process (Appendix A).

2. The lists of answers were considered by two people : myself and a colleague (Geoffrey Pitts - Research Architect) and we independently prepared categories for each question. (Appendix B).

3. I carried out an analysis of the level of agreement between our two original sets of categories. (Appendix C).

4. We then met to discuss the categories we had developed and discussed the differences which were found. At this point further agreement was reached.

5. We also carried agreed that it seemed appropriate to merge the answers from questions 106 - 109 as it appeared that there had not been sufficient differentiation between the questions and consequently the answers tended to overlap.

6. Agreement was reached regarding the categories for question 104 as follows :

   a) That there should be a separate category for "condensation control" as proposed by my colleague. (Because this subject is addressed in detail in seminars and is very topical).

   b) That, because this demonstration suite is, in itself, an experiment in communications, it is important to identify answers which reflect the overall impact of visiting the demonstration and therefore my category (3)
should remain rather than being absorbed into other categories as proposed by my colleague.

Consequently there would be 5 categories for answers to this question:

1. **Overall Low Energy Design**
   cost effectiveness, practicality and sound basis of low energy design.

2. **One specific area/item of energy conservation**
   eg. insulation, draught control solar energy.

3. **The experience of visiting the low energy houses and the demonstration suite (exhibition)**
   i.e. remarks regarding presentation, seeing energy measures in reality etc.

4. **Monitoring**
   Level of monitoring, monitoring system.

5. **Condensation Control**
   approach to condensation control, measures to control condensation.

7. For questions 106 - 109 I prepared a modified list of categories based on both original sets but grouping them together as follows :-

   **Group A** - includes all answers which deal with the **CONTENT** of the Demonstration :

   i) **Costs/Performance/Target savings**

   ii) **Construction** - details, techniques, materials, DIY information.

   iii) **Energy Efficient Design** - theory, modelling, other building examples, options for heating systems/fuels, comfort, alternative energy sources (eg solar, wind, biomass etc).

   iv) **Indirect effects of energy conservation practice** - on occupants, building fabric etc., eg. any requirements on change of lifestyle, effect on external skin of fabric when insulation installed internally.

   v) **Condensation Control**

   **Group B** - includes all answers which deal with the **FORMAT** of the demonstration :
vi) Visual ('2 D') information - slides, film, drawings, display of monitored date on VDU etc.

vii) '3 D' and 'tactile' information - models, samples etc.

Group C - answers OTHER than Content and Format.

viii) Organisation of Demonstration Facility eg. opening times, 'signposting' of features of interest.

8. The same colleague was then asked to attempt to fit all the answers to questions 106 - 109 into these categories.

He was able to fit all the answers into a category, but found some difficulty in a number of cases in choosing between one category and another. (Appendix D). When we discussed this he said the problem had arisen either where the answers had mixed 'content' and 'format' or, where 'content' answers had been given to 'format' questions (or vice-versa). This was, of course, the difficulty which had led to the grouping of these questions. It is felt that coding the answers into the categories will not present this problem if the responses are read independently of the original questions and assumed to be answering the more generalised question: "Is there anything you can suggest to improve this exhibition?"
During your visit what has made the most impact on you?

1. 3 tap solar water heating.

2. (a) Amount of thought and effort which has gone into the presentation - very good. (b) I am surprised at how little extra, the extra insulation has cost.

3. The need for insulation when heating installed.

4. The cost savings in fuel consumption terms that can be achieved from energy conservation and that this requires little additional expense or alteration in design.

5. (a) "Integrated" and practical approach.  
   (b) A complete facility not readily available elsewhere.

6. The professionalism of the whole organisation.

7. Greater awareness of extent to which relatively simple measures can contribute to energy savings.

8. The close monitoring being done on the whole project.

9. Seeing such a large and sensible scheme actually built and monitored - (knowing the pitfalls and problems).

10. Depth of research and calculations resulting in dramatic reduction in energy consumption.

11. Seeing buildings with low energy measures applied.

12. (a) Potentially negative effect of vents on condensation is they cool the structure.  
    (b) Observing approach to preventing condensation problems.  
    (c) Speed of evaluating large numbers of permutations on small computers.

13. The opportunity to have the house as an experiment and to know how the things work in it (laboratory).

14. The details, condensation "tricks".... etc.

15. How the work has been shown, very complete and efficient, easy to understand, and to follow. Most important the measurement devices and accuracy of them.

16. Monitoring system.

17. The extent to which it is possible to reduce energy consumption in housing by simple and economic measures.

18. The dramatic effect of draught stripping.

19. The emphasis given to draught control.

20. The cost/benefit ratios and the realisation that the '4 Rules' when applied simply and without a great expense can make considerable savings on energy consumption.
Are there any categories of information which are missing and which you feel should be included?

1. No.

2. Costs of producing the Lawrie Park Road houses and flats.

3. Some information on building construction details - as sections through walls etc. for take-away by visitors.

4. Target standards for each element and building as a whole.

5. Films/visual of other cases.

6. I am not sufficiently well informed about energy conservation to answer this question at this stage.

7. (a) Data on air change frequency and comfort particularly related to different types of household.
   (b) The most efficient methods of achieving the balance of ambient and radiant temperatures.

8. No.

9. I would be interested in more examination of very cheap and perhaps D.I.Y. for ordinary tenants insulation or draught stripping of old property.

10. Pay back period, ie. no. of years to recover the outlay.

11. None.


13. No.

14. None.

15. Most information was geared to new houses and rehabs, it would be useful to consider flats also for housing management.

16. Comparison of electric heating costs.

17. Different heating systems.
Are there some items of information which you feel should be covered in more detail?

1. More details on control of condensation

2. Costs generally - in connection with the works rather than cost in use.
   ie. high light cost savings of drylining rather than making good existing plaster etc.
   (b) Effect of reducing temperature on external pointing etc. ie. explore other related effects of energy saving.

3. Computer techniques (but I appreciate that there was not enough time).

4. The theory and method of vapour pressure release to exterior

5. Contribution of solar heating etc.

6. Actual energy consumption in the occupied houses

7. (a) The broad physical principals of building design, eg. lightweight, vs.
   heavyweight building fabric - the relative advantages/disadvantages of different locations for insulation within each building element.
   (b) Also, target standards made explicit would be helpful.
   (c) Discussion of potential of novel/unconventional building methods and problems of solar overheating

8. Computer programm algorithms and assumptions, (not a listing, but the modelling methods.)

9. How materials and ventilation and heating devices stands to peoples use, and how do they approach this kind of machine.

10. Perhaps more details in the construction aspects, about how the different insulation materials are installed, with what precautions, if they have to be sticked or must be with some kind of nails for example, and also details of the steps to follow in the construction.


13. (a) Solar gain problems in summer.
    (b) Comparison of range of structural materials for external envelope.
    (c) Relation between 'ventilation', draught control' and condensation.


15. The effects of warm air heating (ducted) on residents.

16. Warm air heating, types of insulation, types of draughtproofing, anti condensation techniques.

17. Solar gain decay rate.

18. Cost benefit analysis or internal rate of return.

19. Standard structural drawings would be useful.

20. Relative proportions of insulation in various surfaces or elements.

418
In your opinion, are there other techniques which you feel should be covered in more detail?

1. Slides.

2. A VDU for general use.

3. Information of a working house's energy consumption displayed on a digital monitor.

4. (a) Heat detection photo before and after application of various conservation measures.
(b) More samples (eg draught stripping) and mock-ups (eg section thro' cavity wall with fill, or through solid wall with 'partial pressure' tubes and internal insulation.

5. (a) I think a continuous slide show would communicate more effectively than mounted photos.
(b) I look forward to the computer graphics illustrating monitored data.
(c) More illustrations of the construction in progress would be interesting.

6. No.

7. More study cases exhibition.

8. No.

9. no.

10. Wet heating systems.

11. Axonometric drawing of say a space or element before conversion or energy saving and after.

12. No.


14. Greater technical detail of solar energy use for pre-heating of water for c.h. circulation.

15. Detailed drawings of jobs.

16. Film.

17. Film showing actual examples of houses/flats where such systems are being implemented.

18. How to go about the simpler heat loss reduction ie. where to get materials.

19. More samples of insulation materials., in case of attendance by trainees etc.

20. More links between the lecture and the visit to the new house, ie. someone to point out various features which we might miss.
Is there anything else you could suggest to improve this exhibition?

1. One thing - Open at weekends.
2. More visual display, eg. films.
3. More on the spot check of energy consumption in various flats to be available instantly.
4. More illustrations of the construction in progress would be interesting.
5. To show some more examples of where low energy design has been used.
6. A film or slides to show details of the steps to follow in the construction how it has been built.
7. (a) More study cases, comparison and probably relation with more sophisticated passive and low energy systems. ie. Trombe wall/green-houses, solar collectors and heatings etc.
8. A section illustrating a range of typical wall constructions with a good assessment of the problems and benefits and U values - more than is available from product reps.
9. No.
10. More models of construction details showing awkward junction.
11. Film
12. None.
13. None.
15. More details on control of condensation. Greater technical detail of solar energy use for pre-heating of water for c.h. circulation.
16. Display of types of material used.
17. A fuller explanation of how these methods work in practice.
18. Film show.
19. 

420
Proposed categories - first stage (own)

Q. 104 During your visit, what has made the most impact on you? (24 Answers.)

Categories:

1. Cost effectiveness, practicality and sound basis of energy saving design.
   Answers : 2a, 2b, 3, 4, 5a, 6, 7, 10, 12c, 14, 17, 20.

2. One specific area/item of energy conservation
   Answers: 1, 12a, 12b, 18, 19.

3. The experience of visiting the low-energy houses and the exhibition.
   Answers: 2a, 5b, 9, 11, 15.

4. Monitoring
   Answers: 8, 13, 16.

Q 106 Are there any categories of information which are missing and which you feel *underline should be included? (12 Answers.)

Category:

1. Costs - further details
   Answers: 2, 10

2. Target Standards
   Answer: 4

* underlined words are not underlined in actual questionnaires.
3. Information on other energy conservation/alternative energy sources and alternative heating systems.
   Answers: 12, 16, 17.

4. Construction:— details of these houses or to fulfil equivalent criteria, and for DIY purposes.
   Answers: 3, 7, 9.

5. Information on other dwelling types.
   Answers: 5, 15.

Q. 107 Are there some items of information which you feel should be covered in more detail?

Category:

   Answers: 1, 10, 12, 13b, 14, 16, 19

2. Low energy design— theory and modelling (R+D).
   Answers: 3, 4, 7a, 7c, 8, 13c, 17, 20.

3. Costs and performance
   Answers: 2a, 5, 7b, 11, 18.

4. Occupants interaction with dwelling/systems.
   Answers: 9, 15.

5. Effects of energy saving measures on building fabric.
   Answers: 2b, 7d, 13a.
Q. 108 In your opinion, are there other techniques which should be used in this exhibition to convey information? (17 Answers)

Categories:

   Answers: 1, 4a, 5a, 5c, 11, 15, 16, 17.

2. '3 D'/'tactile' - models, samples etc.
   Answers: 4b, 4c, 18, 19.

3. Displays linked to monitoring - digital or VDU
   Answers: 2, 3, 5b.

4. Pinpointing of features of interest.
   Answer: 20.

Q. 109 Is there anything else you could suggest to improve this exhibition? (16 Answers)

Categories:

1. Different opening times.
   Answer: 1.

2. More visuals
   Answers: 2, 4, 6, 11, 18.

3. More examples
   Answers: 5, 7a, 16.

4. More samples/models
   Answers: 10, 14.
5. More technical/construction details
   Answers: 7b, 8, 15,

6. Real time feedback of energy consumption
   Answer: 3
Proposed categories - first stage (colleagues)

Q. 104 During your visit, what has made the most impact on you? (24 Answers.)

Categories:

1. Overall low energy design
   Answers: 2, 3, 4, 5, 6, 7, 9, 11, 13, 17, 20.

2. Specific saving measures - insulation, ventilation control, solar supplements.
   Answers: 1, 18, 19.

3. Condensation Control
   Answers: 12, 14.

   Answers: 8, 15, 16.

Q. 106 Are there any categories of information which are missing and which you feel should be included? (12 Answers)

Categories:

1. Consumption targets and economics.
   Answers: 2, 4, 10.

2. Heating options and comfort
   Answers: 7, 12, 16, 17.
Appendix B2 Page 2

3. DIY rehabilitation
   Answer: 9

4. Construction details
   Answers: 3, 5, 15.

Q. 107 Are there some items of information which you feel should be covered in more detail? (25 Answers.)

Categories:

1. Overall: low energy design
   Answer: 7.

2. Computer assessment and monitoring - costs, benefits, consumption (predicted/actual), user reaction.
   Answers: 2, 3, 6, 8, 9, 18.

3. Condensation Control
   Answers: 1, 4.

4. Specific saving measures. - solar, details and materials, heating options.
   Answers: 5, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20.

Q. 108 In your opinion, are there other techniques which should be used in this exhibition to convey information? (17 Answers)

Categories:

1. Slides/film actual construction
   Answers: 1, 2, 5, 16, 17.
2. Materials/samples - technical information/suppliers
   Answers: 14, 18, 19.

   Answers: 7, 11, 15.

4. Greater link between theory presentation and practice
   Answers: 3, 13, 20.

Q. 109 Is there anything else you could suggest to improve this exhibition?

Categories:

1. Exhibition opening times
   Answer: 1

2. Construction details - progress on site (films), sketch details with performance, material samples, 3D models, details for condensation control, solar water heating.
   Answers: 2, 4, 6, 8, 10, 11, 14, 15, 16, 17, 18.

3. Other low energy examples including passive solar.
   Answers: 5, 7.

4. Access to monitored information (instant access)
   Answer: 3.
### Analysis of Categories proposed by Self and by Colleague

<table>
<thead>
<tr>
<th>Own Category</th>
<th>Colleagues Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cost effectiveness, practicality and sound basis of energy saving design.</td>
<td>a) Overall low energy design</td>
</tr>
<tr>
<td>2a / 2b, 3, 4, 5a, 6, 7, 10, 12c, 14, 17, 20.</td>
<td>2, 3, 4, 5, 6, 7, 9</td>
</tr>
<tr>
<td>2. One specific area/item of energy conservation</td>
<td>b) Specific energy saving measures</td>
</tr>
<tr>
<td>1, 12a, 12b, 18, 19.</td>
<td>1, 18, 19.</td>
</tr>
<tr>
<td>3. The experience of visiting the low energy houses and the exhibition</td>
<td>(all except 15, included in category a)</td>
</tr>
<tr>
<td>2a, 5b, 9, 11, 15.</td>
<td></td>
</tr>
<tr>
<td>4. Monitoring</td>
<td>d) Monitoring</td>
</tr>
<tr>
<td>8, 13, 16.</td>
<td>8, 15, 16.</td>
</tr>
<tr>
<td>(12 was split into 3 parts - a/b to Category 2, /2c + 14 to Category 1).</td>
<td>c) Condensation control</td>
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<tr>
<td></td>
<td>12, 14.</td>
</tr>
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**Note**: (i) Circled answer numbers are those which do not correspond.  
(ii) I subdivided some of the answers whereas my colleague did not (hence 2a, 2b etc)
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<thead>
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<th>Colleagues Category</th>
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<tbody>
<tr>
<td><strong>Q. 106</strong></td>
<td></td>
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<tr>
<td>1. Costs</td>
<td>a) Consumption targets and economics</td>
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<td>2, 10.</td>
<td>2, 4 10.</td>
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<td></td>
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<tr>
<td>2. Target standards</td>
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<td></td>
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<tr>
<td>3. Information on other e.c. techniques alternative energy sources and alternative heating systems</td>
<td>b) Heating options and comfort</td>
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<tr>
<td>12, 16, 17.</td>
<td>7 12, 16, 17.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Construction, DIY</td>
<td>c) DIY Rehabilitation</td>
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<tr>
<td>3 7 9.</td>
<td>9</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>5. Information on other dwelling types</td>
<td>d) Construction details</td>
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<td>5 15</td>
<td>3 5 15</td>
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## Q. 107

<table>
<thead>
<tr>
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<th>Colleagues Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Construction techniques and materials</strong></td>
<td>d) Specific energy saving measures</td>
</tr>
<tr>
<td>10, 12, 13b, 14, 16, 19.</td>
<td>5, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20.</td>
</tr>
<tr>
<td><strong>2. Low energy design - theory and modelling</strong></td>
<td>a) Overall low energy design</td>
</tr>
<tr>
<td>3, 4, 7a, 7c, 8, 13c, 17, 20.</td>
<td>7.</td>
</tr>
<tr>
<td><strong>3. Costs and performance</strong></td>
<td>b) Computer assessment and monitoring</td>
</tr>
<tr>
<td>2a, 5, 7b, 11, 18.</td>
<td>2, 3, 6, 9, 5, 18.</td>
</tr>
<tr>
<td><strong>4. Occupant interaction with dwelling/systems</strong></td>
<td>c) Condensation control</td>
</tr>
<tr>
<td>9, 15.</td>
<td>1, 4.</td>
</tr>
<tr>
<td><strong>5. Effects of energy saving measures on Building fabric</strong></td>
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<td>2b, 7d, 13a.</td>
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Q. 108

<table>
<thead>
<tr>
<th>Own Category</th>
<th>Colleagues Category</th>
</tr>
</thead>
</table>
   1, (4a) 5a, 5c, 11 15  
   16, 17. | a) Slides/films – actual construction.  
   1, 2, 5, 16, 17. |
| 2. 3D/'tactile' and models, samples etc.  
   4b 4c 18, 19. | b) Materials, samples/tech. info/Suppliers.  
   18, 19. |
| 3. Displays linked to monitoring.  
   2, 3, 5b. | d) Greater link between theory presentation and practice.  
   3 20. |
| 4. Pinpointing features of interest.  
   20. | c) Before and After construction details  
   11 15 |

(Answer no. 4 not categorized)
<table>
<thead>
<tr>
<th>Own Category</th>
<th>Colleagues Category</th>
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</thead>
<tbody>
<tr>
<td>1. <strong>Different opening times</strong></td>
<td>a) Exhibition opening times.</td>
</tr>
<tr>
<td>2. <strong>More visuals</strong></td>
<td>1</td>
</tr>
<tr>
<td>2, 4, 6, 11, 18</td>
<td>b) Construction details</td>
</tr>
<tr>
<td>5. <strong>More technical/construction details.</strong></td>
<td>2, 4, 6, 8, 10, 11, 14, 15, 16, 17, 18</td>
</tr>
<tr>
<td>3. <strong>More examples</strong></td>
<td>c) Other low energy examples incl.</td>
</tr>
<tr>
<td>5, 7a, 16</td>
<td>passive solar.</td>
</tr>
<tr>
<td>4. <strong>More samples/models</strong></td>
<td>5, 7.</td>
</tr>
<tr>
<td>10, 14</td>
<td></td>
</tr>
<tr>
<td>6. <strong>Realtime feedback of energy consumption</strong></td>
<td>d) access to monitored information</td>
</tr>
<tr>
<td>3</td>
<td>(instant access).</td>
</tr>
</tbody>
</table>
Appendix D

Categories for Questions 106 - 109 - Allocation of answers to grouped categories (by colleague).

A CONTENT of Demonstration/Exhibition

1. Costs/Performance/Target savings.
   106/2, 106/4, 106/10, 107/2, 107/6, 107/18, 108/3, 108/5(b), 109/17

2. Construction details, techniques, materials, DIY.
   106/3, 106/9, 107/10, 107/12, 107/13(b), 107/14, 107/16, 107/19, 107/20,
   108/5(c), 108/11, 108/18, 108/19, 109/10, 109/16.

3. Energy Efficient Design - theory, modelling, other building type examples,
   options for heating systems/fuels, Comfort, alternative energy sources (solar et
   106/5, 106/12, 106/15, 106/16, 106/17, 107/3, 107/5, 107/7, 107/8, 107/11,
   107/13(a), 107/16, 107/17, 108/7, 108/10, 108/14, 108/15, 109/5, 109/6,
   109/7, 109/8, 109/15.

4. Indirect effects of energy conservation practice - on occupants, lifestyles,
   building fabric etc.
   106/7, 107/9, 107/15.

5. Condensation control.
   107/1, 107/4, 107/13(c), 107/16, 109/15.

B. FORMAT of Information

6. Visual ('2D') information - slides, film, drawings, displays on VDU's etc.
   108/1, 108/2, 108/4, 108/5(a) (b) (c), 108/11, 108/15, 108/16, 108/17,

7. '3D' and "tactile" information - models, samples etc.
C. OTHERS

8. Organisations on the Demonstration facility - eg. opening times, 'signposting' of features of interest etc.

108/20, 109/1, 109/3

Note - answers underlined are those which he was not sure about allocating.
Energy Efficiency Demonstration Scheme Report

Energy Efficient Housing
A Demonstration of the Integrated Approach to Energy Efficient Housing at Lawrie Park Road, Sydenham, London SE26

SLC Energy Group
125 Camberwell Road
London SE5 0HB
Telephone: 01-701 0326

ENERGY EFFICIENCY OFFICE
Demonstration of The Integrated Approach to Energy Efficient Housing at Lawrie Park Road, Sydenham, London SE26

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<td>7. Monitoring</td>
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<td>8. Epilogue</td>
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<tr>
<td>10. Credits and Acknowledgements</td>
<td>Inside Back Cover</td>
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Introduction

This Demonstration project was first conceived by the SLC Energy Group* in late 1979. Its purpose is to make information on principles, practicalities, costs and savings of the Integrated Approach to Energy Efficient Housing easily accessible to designers and decision makers in the housing field.

The Energy Efficiency Office of the UK Department of Energy and the EEC are funding the monitoring and demonstration aspects of the project. The balance of the costs of the monitoring and demonstration is being met by the SLC.

Three large Victorian houses were rehabilitated and converted to fifteen flats and eighteen new family houses built—all to energy efficient standards—by the London Borough of Lewisham. With the exception of two flats and one house being used directly for demonstration purposes, all the dwellings are occupied by local authority tenants.

A Demonstration Suite has been set up in two of the flats, and contains a permanent exhibition and the monitoring equipment. It is open to the public from 1.00-5.00pm, Monday to Friday (until 31st December 1985) and there are facilities for seminars to be held there for 8-20 persons.

This booklet has been prepared by the SLC Energy Group and produced by the Energy Efficiency Office to give an overview of the project for those unable to visit the Demonstration Suite.

Acknowledgements

Thanks are due to:
Funding Organisations (for monitoring and demonstration): Energy Efficiency Office of U.K. Dept. of Energy; Commission of the European Communities; South London Consortium

and to
the members of the Technical Advisory Group whose expertise has been most valuable in setting up the project: John Britten (BRECSU) Project Officer; Peter Campbell (DoE); Steven Hiscocks (DoEn) and Bill Smith (Rutherford Lab.)

also to
London Borough of Lewisham for use of their building sites and two flats for the Demonstration Suite

and to
the occupants of the flats and houses for their co-operation.

*SLC—South London Consortium—A joint committee of the London Boroughs of Lambeth, Lewisham and Southwark set up in 1969 to carry out research and development in housing.
The Integrated Approach to Energy Efficient Housing and the Four Rules

The Principle

There are many possible combinations of measures, of varying degrees of effectiveness, which save energy in houses. Loft insulation, wall insulation, under floor insulation, draught-stripping of outside doors and windows, draught lobbies, heat recovery from ventilation air, passive solar gain, active solar gain, interseasonal heat storage, heat pumps, heating controls and many others can all help to reduce the heating load of a house. The aim of the Integrated Approach is to use the most appropriate set of the measures for a specific building to save the maximum amount of energy at the minimum cost whilst providing thermal comfort and freedom from condensation.

Integration of various energy conservation measures for the fabric of the building, incidental and solar gains AND rationalisation of heating and ventilation result in:
(a) Higher percentage of energy saved at lower capital cost
(b) Improved thermal comfort for the occupiers
(c) Control of condensation.

It is not always realistic to integrate all the desirable elements in the design—particularly in the case of rehabilitation. However, experience has shown that 30-50% savings on space heating are practicable for rehabilitation and up to 70% for new houses compared with the current Building Regulations standards. The extra costs can be minimal when care and effort are used at both design and supervision stages.

SLC carried out analysis on various house types, using the integrated approach, to discover any consistent patterns of energy performance by application of particular energy-conserving elements to the fabric. The patterns thus discovered have been defined as "The Four Rules" and were previously applied to a development of six new houses at Wingfield Street, London Borough of Southwark. These houses have now been occupied for three years and although the sample is small, the monitored results confirmed the validity of this approach.

The Four Rules

1. **Insulation** applied evenly to the whole building envelope achieves more than the same volume of insulation applied to only one element.

2. **Draught reduction** is a major factor in energy saving.

3. **Solar gain**, heat recovery etc. must be considered in context.

4. '**Comfort**' is improved by balancing ambient (air) and radiant (surface) temperatures.

The diagrams below and overleaf show the effects of implementing each of these four rules. The basic house type assumed was a two bedroom, two storey centre-terrace house of 100m² (929sq.ft.) floor area. The Modified Degree Day Method was used for the calculations.

1. **INSULATION** applied evenly to all elements achieves more than the same volume of insulation applied to only one element.

Assuming:
- 20°C thermostat setting (68°F)
- Two air changes per hour
- E-W orientation

Very high level of insulation in the loft
- 400mm (16") in the loft
Annual Consumption 13,242 kWh

Same volume of insulation evenly distributed round all elements
- 200mm (8") in the loft
- 100mm (4") to the walls
- 50mm (2") under the floors
Annual Consumption 9,259 kWh
2. DRAUGHT REDUCTION is a major factor in energy saving

Assuming:
- Evenly distributed insulation
- 20°C thermostat setting
- E-W orientation

Standard Structure
- No draught-stripping
- Two air changes per hour
Annual Consumption 9,259 kWh

Draught controlled structure
- Windows and doors draught-stripped
- Draught lobbies front and back and caulking*
- One air change per hour
Annual Consumption 4,769 kWh

3. SOLAR GAIN in context

Assuming:
- Evenly distributed insulation
- 20°C thermostat setting
- One air change per hour
E-W orientation
- Window sizes remain the same
Annual Consumption 4,769 kWh

N-S orientation
- Window sizes remain the same
Annual Consumption 4,782 kWh

N-S orientation
- Same area of glazing redistributed:
  - Southside increased
  - Northside decreased
Annual Consumption 4,529 kWh

4. "COMFORT" is improved by balancing ambient (air) and radiant (surface) temperatures [see Technical Notes 1 and 2 (pages 27 & 28)]

Assuming:
- Comfort achieved by resultant temp. of 20°C (68°F)
- Resultant temp. simply expressed as half the sum of ambient and mean radiant temperatures

Mean radiant temp. 10°C (50°F)
- Ambient temp. required to give comfort is 30°C (86°F)
Large net radiant heat loss from occupants to "cold" surfaces

Mean radiant temp. 19°C (65°F)
- Ambient temp. required to give comfort is 21°C (70°F)
Minimal net radiant heat loss from occupants to "warm" surfaces

*see Technical Note 4 (p.28)
Condensation Control

Control of condensation is achieved through a combination of three factors: rational ventilation, adequate heating and warm surfaces without cold bridges. If the Four Rules are applied these factors will generally be achieved if care is taken to cover the following points:

- **Remove water vapour at source:** by providing adequate ventilation in kitchens and bathrooms (designed so as to extract moist air).
- **Reduce the spread of water vapour from main sources to other parts of the house:** by making kitchen and bathroom doors draught-stripped and self-closing.
- **Allow right amount of ventilation for the rest of the house:** eg. by providing trickle ventilators in the windows (2,000mm²) AND by draught-stripping the windows and doors.
- **Raise the temperatures of internal surfaces of external walls:** by insulating external walls and by distributing heating evenly.
- **Avoid cold bridges in new constructions and take steps to mitigate their effect in rehabilitation.**

---

**Key**

- **Insulation**

---

**Before**

- Spread of water vapour throughout the house
- Cold bridge around air-brick resulting in condensation
- Cold internal surfaces of external walls

**After**

- Minimum ventilation
- Trickle ventilator in the window
- Warm internal surfaces of external walls through insulation
- Direct exhaust of water vapour
- Draught stripped, self-closing doors to kitchen and bathroom
Confirmation of the Integrated Approach:

Six New-Build Energy Efficient Houses
Wingfield Street, London SE15

This terrace of six, three bedroom, houses was designed by SLC and built for the London Borough of Southwark in Timber Frame construction. They have now been occupied for over three years and the average fuel consumption for space heating has been consistently low—around 7,136 kWh/year with average, whole house, temperatures of 20°C (68°F) and no incidence of condensation, thus confirming the expected results of the use of the Integrated Approach.

**Energy Efficient Specification**

*Ground Floor:* 50mm (2") expanded polystyrene under concrete G.F. slab.

*External Walls:* 80mm (3") mineral wool quilt to timber frame.

*Windows:* Timber, double glazed.

*Roof:* 140mm (5½") glass fibre quilt between ceiling joists.

*Ventilation Control:* Windows and external doors draught-stripped; draught lobbies to both external doors; all gaps in/through structure caulked against air infiltration; minimum (2000mm²) trickle ventilators in window heads to provide 0.5ac/hr; Additional 0.5 ac/hr provided by fresh air intake to heating system giving warm fresh air.

*Heating:* Gas-fired warm-air system to give fast warm-up, redistribution of heat gains, equal distribution of heat, and positive removal of water vapour from kitchen and bathroom through larger window vents (4000mm²).
Area of each house: 102m² (948 sq.ft.)
Average internal temperature: 20°C (68°F)
Metered fuel consumption: April '82 to March '83
Average fuel consumption (space heating): 7,136 kWh/year
Average cost (gas) for space heating: £71.36 per year excluding standing charge

<table>
<thead>
<tr>
<th>House No.</th>
<th>Total metered gas consumption kWh</th>
<th>Deduct for water heating kWh</th>
<th>Deduct for gas cooking kWh</th>
<th>Gas consumption for space heating kWh</th>
<th>Annual space heating cost (gas) £</th>
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<td>Average</td>
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<td>7,136</td>
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The average annual space heating cost is therefore £71.36 (excl. standing charge). Internal temperatures range from 15°C to 25°C.
Energy Efficient Rehabilitation

15 Flats at 31, 33 and 35 Lawrie Park Road, London SE26

Each of these large, double-fronted houses has been converted to five flats—four 2-person flats and one 3-person flat. Energy saving measures were included in the design of the rehabilitation with the aims of increasing thermal comfort, reducing condensation risks and reducing fuel bills for space and water heating.

Calculations show a saving in fuel use for space heating of 60% compared to a basic rehabilitation or 45% compared to current Building Regulations standard. (Saving £165 or £97 per annum per flat respectively.)
Each of the three houses is on three floors and has been divided into five flats. On both the ground floor and the first floor are two 2-person flats with a 3-person flat on the second floor. Because the rooms were very large it was possible to insulate the external walls on the inside without reducing the area of the rooms appreciably. The whole of the ground floor was timber, which needed total replacement, and as there was also a large void underneath it was a very simple exercise to fit insulation between the floor joists.
Energy Saving Specification

Insulation

The central, flat, portion of the roof was insulated with 140mm mineral wool quilt laid between the ceiling joists. Sloping ceilings were insulated with 80mm mineral wool quilt faced with polythene as a vapour check and allowing for ventilation of the roof structure.

The timber ground floor was insulated with 100mm mineral wool quilt between the joists—supported on plastic netting.

The 325mm (13") brick outside walls received two types of treatment: main areas were insulated by fitting "Paramount" partitioning some 8" (200mm) inside the room and hanging a 4" (100mm) thick mineral wool quilt in the centre of the cavity between the partition and the wall. Small and awkward parts of the external walls could not receive this treatment and in these positions 40mm polyurethane foam-backed plasterboard was fixed onto battens on the walls.

---

Key

- ● Draught stripping
- ○ Insulation
- ▼ Vapour release

---

FIRST FLOOR PLAN
Ventilation Control

All windows and doors were draught-stripped and have the minimum size permanent ventilation slots (2,000mm²) in the window frames. Draught lobbies were provided inside the external doors. All holes through the building fabric (round waste pipes etc.) were caulked to reduce draughts*. A proportion of warmed fresh air is provided through the heating unit to ensure a total air change rate of one air change per hour, half of which is pre-warmed.

A larger area of permanent ventilation (4,000mm²) is provided in kitchens and bathrooms to allow water vapour (and cooking smells) to escape direct to the outside air. This process is aided by the (small) positive pressure inside caused by the warm air heating system. There is no “return air” duct from these areas.

*see Technical Note 4 (p.28)
WALL AND FLOOR INSULATION

The detail below shows how the majority of the external walls were insulated: A 100mm (4") thick glass fibre quilt was fixed to ceiling and floor inside the external walls, with an airgap of 50mm (2") between the quilt and the face of the wall. Paramount partitioning was then erected on the room side of the quilt, again leaving a 50mm air gap.

To reduce the possibility of “interstitial condensation” ie. condensation occurring within the new wall construction, it is necessary to equalise the vapour pressure between the newly created cavities and outside. To achieve this, one airbrick has been inserted in each run of wall – sometimes through to the outside and sometimes into one of the existing chimneys.*

DETAIL/WALL AND FLOOR INSULATION

Space Heating

The space heating is provided by a gas-fired warm-air system in each flat. This has several advantages for energy-efficient dwellings:

The system incorporates a proportion of warmed, fresh air – allowing other natural ventilation to be reduced to a minimum, thus reducing heat loss through ventilation.

By not providing return air ducts from high-humidity areas – kitchen and bathroom – the moist air from these rooms is made to flow out of the building, so reducing the possibility of condensation.

The circulating warm air keeps all parts of the rooms warm and fresh and will redistribute incidental gains – from the sun, people, electrical appliances – so that some rooms do not become overheated whilst others are cooler.

In these dwellings the return air is ducted back to the heater unit. In a single occupation house this would not be necessary, the return air moving back to the unit by natural convection. Because of the nature of the wall insulation it has been possible to fit most flow and return ducts behind the paramount partitioning, avoiding the need for surface mounted ductwork.

*see Technical Note 3 (p.28)
Energy and Cost Analysis

Predicted Energy Saving - Capital Cost Analysis

The following pages show the Analysis for Energy Saving versus Capital Costs for three alternative specifications. The first shows a typical specification for the rehabilitation - to the same design but as if it was to London Building Act Thermal Standards, or, 1976 Building Regulations ie. the only energy saving measure is 50mm (2”) insulation in the roof space. The energy use per year for heating a flat (averaged over the five flats per house) is calculated at 19,120kWh which would cost £287 p.a. at 1980 gas prices (excl. standing charge).

The second analysis shows the differences required to comply with Current Building Regulations. The capital cost is increased by £540 per flat and the energy use reduced by 4,910kWh - a saving of £74 p.a. (26%).

The third analysis relates to the rehabilitation AS IT WAS CARRIED OUT. The extra capital cost over Building Regulations Standard was £415 per flat and the additional energy saving is calculated as 6,455 kWh (£97 p.a.), the fuel cost being reduced to £116 per year (excl. standing charge).

To London Building Act Thermal Standards

<table>
<thead>
<tr>
<th>Element</th>
<th>‘U’ value W/m² °C</th>
<th>Annual Heat Loss through element - average per flat kWh</th>
<th>Built Cost of element - average per flat £</th>
</tr>
</thead>
<tbody>
<tr>
<td>50mm insulation</td>
<td>0.60</td>
<td>956</td>
<td>836</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.70</td>
<td>5,354</td>
<td>715</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.30</td>
<td>3,633</td>
<td>1,372</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation - two air changes/hour</td>
<td>0.75</td>
<td>1,147</td>
<td>1,090</td>
</tr>
<tr>
<td>No special measures</td>
<td>-</td>
<td>8,030</td>
<td>-</td>
</tr>
<tr>
<td>Space Heating - gas-fired boiler + radiators</td>
<td>-</td>
<td>-</td>
<td>Nil</td>
</tr>
<tr>
<td>Total cost for these elements</td>
<td>-</td>
<td></td>
<td>5,663</td>
</tr>
<tr>
<td>Annual Heat Loss</td>
<td>-</td>
<td>19,120</td>
<td></td>
</tr>
<tr>
<td>Annual Space Heating Cost</td>
<td>-</td>
<td>£287</td>
<td></td>
</tr>
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</table>
To Current Building Regulations Thermal Standards

<table>
<thead>
<tr>
<th>Element</th>
<th>'U' value W/m² °C</th>
<th>Annual Heat Loss through element – average per flat kWh</th>
<th>Built Cost of element – average per flat £</th>
</tr>
</thead>
<tbody>
<tr>
<td>100mm insulation</td>
<td>0.44</td>
<td>568</td>
<td>840</td>
</tr>
<tr>
<td></td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50mm thermal board</td>
<td>0.60</td>
<td>1,847</td>
<td>1,251</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>530</td>
<td>5.30</td>
<td>3,269</td>
<td>1,372</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation – two air changes/hour</td>
<td>–</td>
<td>7,531</td>
<td>–</td>
</tr>
<tr>
<td>No special measures</td>
<td>–</td>
<td></td>
<td>Nil</td>
</tr>
<tr>
<td>Space Heating – gas-fired boiler + radiators</td>
<td>–</td>
<td></td>
<td>1,650</td>
</tr>
<tr>
<td>Total cost for these elements</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Heat Loss</td>
<td>–</td>
<td>14,210</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>Annual Space Heating Cost</td>
<td>–</td>
<td>£213</td>
<td>–</td>
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<tr>
<td>Annual Saving</td>
<td></td>
<td>Reduction in space heating cost = £74 p.a.</td>
<td>(26%) at extra capital cost of £540</td>
</tr>
</tbody>
</table>
As Built
31, 33, 35, Lawrie Park Road

<table>
<thead>
<tr>
<th>Element</th>
<th>'U' value</th>
<th>Annual Heat Loss through element—average per flat kWh</th>
<th>Built Cost of element—average per flat £</th>
</tr>
</thead>
<tbody>
<tr>
<td>140mm insulation</td>
<td>0.44</td>
<td>465</td>
<td>856</td>
</tr>
<tr>
<td>50mm insulation</td>
<td>0.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100mm quilt 'Paramount' partition</td>
<td>0.27</td>
<td>1,008</td>
<td>1,465</td>
</tr>
<tr>
<td>40mm Carbene backed pled.</td>
<td>0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draughtstripped</td>
<td>5.30</td>
<td>2,869</td>
<td>1,464</td>
</tr>
<tr>
<td>100mm insulation</td>
<td>0.24</td>
<td>233</td>
<td>1,140</td>
</tr>
</tbody>
</table>

Ventilation— one air change/hour
Draught lobbies, draught-stripped external doors (and windows)
Space Heating— gas-fired warm air system

Total cost for these elements
Annual Heat Loss

Annual Space Heating Cost
Annual Saving Reduction in space heating cost of further £97 p.a. (46%) at extra capital cost of £415

Summary

<table>
<thead>
<tr>
<th>Case</th>
<th>Capital Cost</th>
<th>Annual Fuel Cost Saving</th>
<th>Simple Payback Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>£540 more than Case 1</td>
<td>£ 74</td>
<td>7.3 years</td>
</tr>
<tr>
<td>3</td>
<td>£415 more than Case 2</td>
<td>£ 97</td>
<td>4.3 years</td>
</tr>
<tr>
<td></td>
<td>£955 more than Case 1</td>
<td>£171</td>
<td>5.6 years</td>
</tr>
</tbody>
</table>

*excluding standing charge
Features of the Design

Features of the Energy Saving Design which can be identified within the Demonstration Suite—Ground Floor, 31 Lawrie Park Road, London SE26.

1. Draught-stripped front door.
2. Draught lobby to front door.
3. Draught-stripped windows.
4. Deep window reveal due to thickness of wall insulation.
5. Wall insulated with 100mm quilt behind new paramount partition.
6. Draught lobby to back doors.
7. Draught-stripped back doors.
8. Wall insulated with urethane/plasterboard laminate.
9. Permanent ventilation slot in window head—2000mm² as per London Building Act requirement.
10. Airbrick in kitchen—larger area of ventilation (4000mm²) to allow water vapour to be driven directly to the outside air.
11. Multipoint heater for instantaneous hot water.
12. Warm Air Heating/Ventilation unit, takes in fresh air, mixes with recirculated air, heats and distributes through ducts.
13. Warm Air Outlet.
14. Return Air Duct—stale air from rooms ducted back to heater unit—mixed with fresh air, reheated and recirculated.
15. (View from outside.) Airbrick to provide vapour pressure release to insulated walls—reduces risk of condensation on inside face of brickwork. Some walls have this pressure release through an airbrick into the chimney.
Energy Efficient New Houses

18 Family Houses at Colvin Close, 68-72 Lawrie Park Road, London SE26

These eighteen new family houses have been designed to be energy efficient, thermally comfortable and condensation-free following the principles of the Integrated Approach; the houses have:

- A high level of insulation evenly distributed, ventilation control by draught-stripping, draught lobbies and other measures.
- Appropriate heating systems, a proportion of passive solar gain and passive solar water heating.

The fuel used for space heating is calculated to be only 32% of the amount it would have been if the houses had been built to London Building Act standard (no specific thermal requirement) – a saving of £134 per year for each house. Compared with houses built to the current Building Regulations thermal standards there is a calculated saving of 61% – £98 per year. Saving on water heating is calculated to be 40% – around £50 per year.
The houses are set in three terraces, oriented North-South to maximise solar gain into the living rooms in Winter and to the solar panels in Summer. As far as practicable, circulation and service areas are on the North side with living and bedrooms to the South. The extended part of the living room is designed to absorb solar gain into the floor and wall, giving short-term storage. Warm air heating/ventilating systems are installed to provide even temperatures throughout the house and redistribute solar gains. There is no return air path from kitchens and bathrooms so that the moisture in these rooms is encouraged to pass out of the house through the ventilators thus considerably reducing the likelihood of condensation problems. There are high radiant temperatures—allowing the ambient (air) temperature to be comparatively low for the required comfort level.
Energy Saving Specification

Energy Saving Specification: Summary

Roof: 200mm (8") insulation

Ground Floor: 19mm (¾") insulation

Walls – Ground Floor: 50mm (2") cavity insulation plus 25mm (1") dry-lining
  First Floor: Foam-filled blockwork plus 25mm dry-lining

Windows: Double glazed

Ventilation Control: Draught lobbies and draught-stripping.
Energy Saving Specification

**Insulation:** The main roof is insulated with 200mm (8") mineral wool quilt. The roof over the rear draught lobby is insulated with 25mm (1") urethane board plus 100mm (4") quilt and the underside of the solar panels is insulated with 50mm (2") expanded polystyrene plus 50mm (2") quilt.

The ground floor is insulated with 19mm (¾") expanded poly styrene between the screed and the suspended pre-cast concrete floor.

The outside walls on the North elevation and the Gable walls are traditional brick-block cavity construction to the ground floor with 50mm (2") expanded polystyrene insulation in the cavities and 25mm (1") “Thermalboard” dry-lining. On the first floor these walls are 215mm (8½") foam-filled blockwork with “Thermalboard” dry-lining and external cladding. On the South elevation the ground floor is fully glazed and the first floor is timber frame with 100mm (4") mineral wool quilt and external cladding.

The windows and the glazed door are all double-glazed.

**Ventilation Control:** All windows and doors are draught-stripped and there are draught lobbies to both front and rear external doors. All holes through the building fabric (round waste pipes, ceiling roses, etc.) were caulked to reduce draughts. A proportion of warmed fresh air is provided through the heating system, allowing permanent ventilation to be kept to a minimum except for kitchen and bathroom where more ventilation is provided for extraction of moisture.

*see Technical Note 4 (p.28)*
Passive Solar Space and Water Heating

Space Heating—the large windows to the South-facing living rooms allow for a proportion of solar gain. When the sun shines in, the air inside the room is heated up. This 'free' heat will be naturally distributed around the house by the warm air heating system. In summer, very little sun will enter because it is at a higher angle and so there would not be any problems of overheating.

Solar Water Heating—three tap, thermosyphon system—the solar water heating panels are on the sloping roof over part of the living room. The system is described on page 22.

Space Heating

Space Heating is provided by a gas-fired, warm air system. The heater unit is on the first floor. A proportion of fresh air (drawn in from the roof space so it is slightly pre-heated) is mixed with recirculated air from the house, reheated and distributed to each room via ducts in the floor space.

This fresh air provides partial ventilation (0.5 ac/hr) thus allowing other permanent ventilators to be kept to the minimum size (2,000 mm²) and consequently reducing the energy loss through ventilation.

Air from the rooms returns to the heater unit by natural circulation through air gaps left at the bottom of the room doors.

The exceptions to this are the kitchen and bathroom where no allowance has been made for return air. This means there is then a small positive pressure created in these rooms so that air is exhausted through the permanent ventilators (4,000 mm²) carrying water vapour (and cooking smells) with it. This should ensure that no condensation occurs in the house.

Another advantage of this type of heating system is that it redistributes "incidental gains"—the heat put into the house by the sun, appliances and people. This means that it is less likely for one room to be overheated while others are cooler.
Three-tap Solar Water Heating System

In these houses the water heating is separate from the space heating in order to take full advantage of the solar water heating system. The solar panels, mounted at low level, provide heat to the solar cylinder (in the roof space). This thermostyphon system operates naturally whenever the panel temperature is higher than the cylinder. Solar heated water can be drawn directly through the "third" tap and when the "hot" tap is used the hot water cylinder is replenished with solar heated water rather than the usual cold water. Thus, whether the solar heated water is hot, or only warm, it can be used, either directly or indirectly. The hot water heater is a combined heater/storage unit giving high efficiency. Both cylinders are insulated to reduce heat loss from the stored water. It is estimated that there will be savings of about 40% on the water heating fuel costs - due to the solar system - around £50 per year for each household.

Energy and Cost Analysis

The following pages show the Analysis for Energy Saving versus Capital Costs for three alternative specifications. The first shows a typical specification for houses to the same design as those built but as if they were basic houses built to London Building Act Thermal standards or 1976 Building Regulations ie: the only insulation is 50mm in the roof space. The energy use per year for heating the house is calculated at 13,120kWh which would cost £197 at 1980 gas prices (excl. standing charge; houses heated to 18.3°C). The second analysis shows the differences that building to the Current Building Regulations brings about for the same design of house. The capital cost is increased by £314 and the energy use reduced by 2,404 kWh/year – a saving of £36/year.

The third analysis relates to these houses AS THEY WERE BUILT. The extra capital cost over the Building Regulations standard was £640 and the additional energy saving is 6,503 kWh/year (£98/year) – the fuel cost being reduced to £63/year.
### To London Building Act Thermal Standards

<table>
<thead>
<tr>
<th>Element</th>
<th>'U' value W/m² °C</th>
<th>Heat Loss through element - per year kWh</th>
<th>Built Cost of element - per house £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof</td>
<td>0.60</td>
<td>1,055</td>
<td>3,190</td>
</tr>
<tr>
<td>External Walls</td>
<td>0.94</td>
<td>2,426</td>
<td>2,916</td>
</tr>
<tr>
<td>Windows</td>
<td>1.00</td>
<td>4.70</td>
<td>1,931</td>
</tr>
<tr>
<td>Ventilation - two air changes/hour</td>
<td>0.71</td>
<td>1,216</td>
<td>1,907</td>
</tr>
<tr>
<td>Space Heating - gas-fired boiler + radiators</td>
<td>—</td>
<td>—</td>
<td>1,996</td>
</tr>
<tr>
<td>Total cost for these elements</td>
<td>—</td>
<td>—</td>
<td>11,940</td>
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<tr>
<td>Annual Heat Loss</td>
<td>—</td>
<td>13,120</td>
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</tr>
<tr>
<td>Annual Space Heating Cost</td>
<td>—</td>
<td>£197</td>
<td>—</td>
</tr>
</tbody>
</table>

### To Current Building Regulations Thermal Standards

<table>
<thead>
<tr>
<th>Element</th>
<th>'U' value W/m² °C</th>
<th>Heat Loss through element - per year kWh</th>
<th>Built Cost of element - per house £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof</td>
<td>0.34</td>
<td>552</td>
<td>3,233</td>
</tr>
<tr>
<td>Insulated walls</td>
<td>0.59</td>
<td>1,412</td>
<td>3,002</td>
</tr>
<tr>
<td>Insulated cavity walls</td>
<td>0.60</td>
<td>4.70</td>
<td>1,931</td>
</tr>
<tr>
<td>Ventilation - two air changes/hour</td>
<td>0.60</td>
<td>952</td>
<td>2,092</td>
</tr>
<tr>
<td>Space Heating - gas-fired boiler + radiators</td>
<td>—</td>
<td>—</td>
<td>1,996</td>
</tr>
<tr>
<td>Total cost for these elements</td>
<td>—</td>
<td>—</td>
<td>12,254</td>
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<tr>
<td>Annual Heat Loss</td>
<td>—</td>
<td>10,716</td>
<td>—</td>
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<tr>
<td>Annual Space Heating Cost</td>
<td>—</td>
<td>£161</td>
<td>—</td>
</tr>
<tr>
<td>Annual Saving</td>
<td>Reduction in space heating cost = £36 p.a. (18%) at extra capital cost of £314</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
### As Built

**Lawrie Park Road**

<table>
<thead>
<tr>
<th>Element</th>
<th>'U' value W/m²°C</th>
<th>Heat Loss through element per year kWh</th>
<th>Built Cost of element per house £</th>
</tr>
</thead>
<tbody>
<tr>
<td>200mm insulation foam filled slotted blocks</td>
<td>0.18</td>
<td>209</td>
<td>3,344</td>
</tr>
<tr>
<td>25mm Thermalboard</td>
<td>0.50</td>
<td>650</td>
<td>3,104</td>
</tr>
<tr>
<td>50mm cavity insulation</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draught stripped double glazed</td>
<td>2.50</td>
<td>1,279</td>
<td>2,477</td>
</tr>
<tr>
<td>19mm EPS</td>
<td>0.50</td>
<td>522</td>
<td>2,115</td>
</tr>
</tbody>
</table>

- **Ventilation** — one air change/hour: 522
- **Draught lobbies, draught strip external doors (and windows)**: 1,553
- **Space Heating** — gas-fired warm air system: 436

**Total cost for these elements**: £12,928

**Annual Heat Loss**

**Annual Space Heating Cost**: £63

**Annual Saving**: Reduction in space heating cost of further £98 p.a. (61%) at extra capital cost of £674

### Summary

<table>
<thead>
<tr>
<th>Case</th>
<th>Capital Cost</th>
<th>Annual Fuel Cost Saving*</th>
<th>Simple Payback Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>£314 more than Case 1</td>
<td>£36</td>
<td>8.7 years</td>
</tr>
<tr>
<td>2</td>
<td>£640 more than Case 2</td>
<td>£98</td>
<td>6.5 years</td>
</tr>
<tr>
<td>3</td>
<td>£954 more than Case 1</td>
<td>£134</td>
<td>7.1 years</td>
</tr>
</tbody>
</table>

*excluding standing charge
Features of the Design

Features of the Energy Saving Design which can be identified within the Demonstration House—6 Colvin Close, 68-72 Lawrie Park Road, London SE26.

1. Draught-stripped front door.
2. Draught lobby.
3. Draught-stripped kitchen door to reduce water vapour entering rest of the house.
4. Three taps on sink—tap with yellow top supplies solar heated water.
5. Warm air outlet.
7. Passive solar gain here. Some heat stored in floor and wall and released later. This area could be turned into Conservatory by addition of internal wall.
9. Rear draught lobby.
10. Draught-stripped back door.
11. (View from outside or above.) Solar panels for water heating. Solar heated water stored in cylinder in roof space.
12. Warm Air Heating/Ventilation unit. Takes in fresh air, mixes with recirculated air, heats and distributes through ducts.
13. Draught-stripped bathroom door to reduce water vapour entering rest of the house.
14. Gas water heater. Fed from Solar cylinder so as to reduce amount of gas required to achieve required temperature.
15. Three taps on bath and washbasin. Taps with yellow tops provide solar-heated water.
16. External wall-insulating blockwork with Thermalboard inside and cladding externally.
17. External wall-insulated timber frame, cladding externally.
Demonstration of Energy Efficient Housing

A Demonstration Suite has been set up as the focal point of these projects. The purpose is to actively encourage visitors to the projects so that they can obtain information about the design, practicalities, costs and savings in a more direct and meaningful form. The suite is located in one of the rehabilitated houses, thus giving direct experience of the development; and it is also possible to visit one of the new houses (on the opposite side of the road).

The suite has a permanent exhibition detailing all aspects of these buildings together with brief information on other examples and the background theory. Care has been taken in both format and content to present information that is relevant to all professionals who are involved in the building process (architects and surveyors, heating engineers, quantity surveyors), to decision makers (politicians, clients) and to housing managers.

The suite also accommodates the central part of the monitoring system for the fifteen flats and eighteen houses. This produces a daily summary of temperatures in each space within each dwelling and gas and electricity consumption. There is also a visual display of temperatures in each space on an hourly basis for any selected dwelling and day.

A computer program, “Elf,” on a micro-computer, is available to visitors for energy analysis and optimisation of energy conservation measures for a specific building, providing information on capital costs and savings. The suite is open to visitors Monday to Friday (1.00-5.00 p.m.), manned by a receptionist. If technical expertise is required to be available or a seminar (for a group of 8-16 people) is required, this can be arranged with SLC (01-701 0326).

(In the first year of operation, 50 seminars were held for different groups etc: housing managers, architects, building surveyors, students, interest groups. The total number of visitors was 780.)

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Monitoring

Each of the houses and flats is being monitored in detail from June 1984 to December 1985. Daily summaries of the data are displayed in the Demonstration Suite. The data is being analysed at regular intervals and the results will be formally published in early 1986. Interim findings to date are included at the back of this booklet. Measurements being taken include:

- temperature in each room/space (seven per dwelling)
- central heating on time
- gas consumption (in the flats this is measured separately for cooking, heating and hot water)
- electricity consumption
- window opening times (houses only)
- weather data—solar gain
  - external air temperature
  - wind speed
  - wind direction
  - ground temperature.

The measurements are taken every two seconds and averaged hourly. The data is collected by a minilogger in each dwelling. These are connected on a ring to a central computer in the Demonstration Suite which collects the hourly data, stores it and aggregates it to provide the daily summary. A colour graphics terminal is connected to the computer to provide an animated display of hourly temperature changes against outside temperature and fuel use—for any specified dwelling and day. Close contact is kept with the occupants of the dwellings and their reactions are being monitored, on an informal basis.

Epilogue

Full monitoring of these dwellings has been in operation since July 1984. Initial study of daily summaries, backed up by manual weekly meter readings, suggest that the predicted fuel use/costs will be achieved. The pocket at the back of this booklet is intended for storage of results from the monitoring which will be issued as separate bulletins.

The response to this Demonstration Project, in terms of visitors and enquiries, has been most encouraging and a study is being made of the effectiveness of the project in increasing awareness of ways and means of energy saving and encouraging a more widespread movement towards energy efficient housing. The project is due for completion in December 1985 and a full report will be prepared.

Technical Notes

1. Ambient and Radiant Temperatures
Ambient temperature is the temperature of the air, whereas Radiant temperature refers to the amount of heat being radiated from parts of the structure (walls, ceilings etc.) and from furnishings. It can also be used in relation to heat being given off by people and appliances. The radiant heat from any object is directly related to the surface temperature of that object which in turn is related to its heat loss characteristics, i.e. a material or construction which is a good insulator will have a higher surface temperature than a poor insulator and consequently will have a higher Radiant temperature. High Radiant temperatures assist in energy conservation by causing occupants to feel warmer and thus requiring lower air temperatures. As it is the air temperature which the heating system raises, any lowering of the required air temperature will result in reduced fuel use. Luckily, the (insulation) measures used to reduce heat loss from the house also increase the Radiant temperature of the structure. The effect is increased the further the insulation is placed towards the interior of the building.
2. Thermal Comfort
Thermal comfort is a term used to describe a state of being neither too hot nor too cold and being free from cold draughts or excessive heat from one particular source. If you are thermally comfortable you will not notice the temperature because it is perfect for you. There are a wide range of factors which contribute to thermal comfort and these are variable, related to what you are wearing or what activity you are involved in and the ‘resultant’ temperature (combination of Ambient and Radiant temperatures) at which comfort is experienced varies widely between individuals. The most important components of thermal comfort are: radiant temperature, ambient temperature, lack of draughts.

3. Interstitial Condensation and Vapour Pressure Release
When insulation is applied to the interior of an outside wall it can have the effect of moving the “dewpoint” into the middle of the wall structure. The dewpoint is the point at which the structural temperature has fallen to a point where water vapour will condense and varies according to internal and external temperatures, the amount of vapour being produced, the heat loss characteristics of the structure and the permeability (to water vapour) of the various elements of the construction. (For calculations purposes an internal to external temperature difference of 20°C is assumed.)

For a wall built of 13” (300mm) brick and plastered internally for example, calculation shows that, in “normal” domestic conditions, the dewpoint coincides with the outside surface of the wall. Water vapour condensing at that point will not adversely affect the construction.

However, if insulation is applied to the inside surface of the same wall, the dewpoint will occur within the brickwork or on the internal surface of the plaster (according to the amount of insulation) or even within the insulating layer itself. Obviously water vapour condensing at any of these points will affect the construction, leading to mould growth/dry rot, staining, inefficiency of insulation etc.

In the past it has been assumed that incorporating a vapour resistant material (such as foil or polythene) would preclude the possibility of condensation occurring within the construction. However, it is now understood that even the most effective of these materials cannot provide a vapour barrier—due to the need for joins, site damage, holes made for fixing fittings to walls etc., and there have been instances where interstitial condensation has been found to have occurred despite the use of a vapour check.

To overcome this problem, a simple procedure was devised for releasing the vapour pressure within the construction to the outside—based on Dalton’s Law of Partial Pressures.

The theory is that, if two spaces are linked by a comparatively small opening, and the air in one space is more heavily laden with water vapour than the air in the other space, the water vapour molecules will move from one space to the other until the concentrations are equalised but the air molecules will not be exchanged—consequently if the air in the first space is warmer, heat will not be lost by this process.

In practice, the space which contains the air with the higher concentration of water vapour is the cavity or cavities within the structure (eg. between dry-lining and original wall) and the outside air has a lower concentration of water vapour. These two spaces are linked by means of small openings and the diffusion of water vapour can take place. The openings can be arranged either:

- by providing a simple airbrick in a fairly large continuous expanse of wall (say 15m²) or
- by providing a 1” diameter hole for every 3-4m² at mid-height
  (alternatively, perpends can be replaced by mini-ventilators at intervals at the same height).

NB. It is extremely important not to locate these holes at both high and low level as ventilation will then take place—exchanging the whole air and therefore losing heat as well as water vapour.

4. Caulking
This expression is used to denote the careful sealing of all extraneous gaps in the structure, in addition to draught-stripping of doors, windows and loft hatches. The purpose is to reduce the ingress of cold air, causing draughts, and of course the egress of heated air.

It should perhaps be emphasised that the result of reducing draughts is two-fold—first, direct heat loss is reduced, and secondly, occupants feel more comfortable at a lower air temperature if air movement is minimal and particularly if there are no shafts of cold air entering the dwelling.

Caulking a dwelling will include sealing (generally with a mastic sealant) around waste pipes which pierce the skin of the building.

- Incoming service pipes, conduits etc.
- Pipes and conduits passing through floors and ceilings.
- Ceiling roses.
- Door and window frames.
- Any other holes through the structure which link the outside (or unheated areas) with the inside (or heated areas).
Credits

Energy Efficient Dwellings:

Built for: London Borough of Lewisham, Housing Department.
Robert Hammond, Borough Housing Officer

Architects: London Borough of Lewisham, Architects Department.
David Butterworth, BArch (L'pool), Borough Architect
Job Architect, New Houses: Joe Szarowicz
Job Surveyor, Rehabilitation: Peter Rice

Quantity Surveyors: New Houses: Peter Twyford, Chief Quantity Surveyor, L.B. Lewisham
Rehabilitation: William C. Inman & Partners.

Builders: New Houses: Croudace Construction Ltd.
Rehabilitation: Newest Construction Ltd.
Solar Hot Water Systems: Westair Ltd.
Warm Air Units: Johnson & Starley Ltd.

Energy Consultants: SLC Energy Group
Energy Advice: Lali Makkar and Mary Ince; Supervision: Lionel Skilton

Monitoring

Design: Lintronic Ltd and SLC Energy Group
Equipment: Miniloggers: Lintronic Ltd
Microcomputer: PDP11/23 with 30 Mbyte Hard Disc and 8" floppy disc
Cartridge drive: Data Design
Printer: Prism 130
Colour Graphic Terminal: Ramtek High Precision

Software: Operating System: Xenix
Applications: Peter Wan (Lintronic)

Ventilation measurements and associated investigations: British Gas

Demonstration:

Demonstration Suite
Design: Mary Ince (SLC)

Exhibition: Design: Mary Ince
Graphics: Andrew Burke (SLC)
Reprographics: Geoprint Ltd.
Colour Photographs: J.W. Films
"Elf" Software: Daniel Hamn
Colour Graphics Software: Ed Ling and Peter Wan
Architectural Model: Ellie Yannas