WORKING PAPER 372

LOCAL AUTHORITIES AND ENERGY CONSERVATION : THE STRUCTURE OF THEIR INVOLVEMENT

Abstract

In this paper basic concepts of the methodology known as q-analysis are used to expose aspects of the involvement of local authorities in energy conservation. The involvement of 333 local authorities is examined in respect of 48 different energy conservation activities of potential relevance to them. A great deal of variability is found between different local authorities in terms of the conservation activities they pursue, a variability far exceeding what can be accounted for purely in terms of different statutory functions of different tiers of local government. The q-analysis brings out this variability quite explicitly and can also be used to suggest where the most useful or plausible modifications in the current pattern of involvement can be sought. Since we invoke only the more elementary aspects of q-analysis in this paper, we do not explicitly consider notions of so-called traffic - the degree of involvement by each authority in each of the individual conservation activities, expenditure thereby incurred (or saved) or net energy requirements thereby reduced. This is on the agenda for future work.

Acknowledgement

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LOCAL AUTHORITIES AND ENERGY CONSERVATION: THE STRUCTURE OF THEIR INVOLVEMENT

Chairman: "If you had a magic wand, or real resources available to your committee were increased significantly in the short term, in what direction would you particularly allocate them in the energy field?"

Michael Posner: "... Conservation policy, that is where I would have a bit of your magic wand".

(Select Committee on Energy, 1983)

Introduction

Michael Posner is not alone in recognising the undeserving neglect of energy conservation in the U.K. As argued elsewhere (see eg. Sheldrick 1983a and 1983b) this low priority is the consequence of a number of factors. Historically energy conservation has been employed in the unglamorous role of a crisis intervention measure, and more recently, it has been turned to as a stop gap to ameliorate economic management difficulties (eg. balance of payments and P.S.B.R.) until "cheaper" forms of supply are available.[1] It is also apparent that there has been an overwhelming institutional concern within the corridors of power (politically and thermodynamically) for factors of energy production, while factors of energy consumption have received markedly reduced status or commitment.

To rectify this situation it may seem appropriate initially, to focus attention at the national, rather than local government level. Yet local authorities could have a key role in pursuing energy conservation objectives, both in the context of their statutory responsibilities (housing, education, social services, transport and planning) and discretionary powers, as well as in partnership with, or as agents of, central government. This potential role is reinforced by central government's attitude that it cannot effectively influence the behaviour of millions of consumers, other than through pricing (DEn.198 Local authority responsibilities provide them with alternative channels of influence.

[1] (in the 1950's, nuclear power was heralded as the cheaper form; in the 1960's it was gas; in the 1970's oil; 1980's PWR's; 2000 FBR's; 2050 fusion).

In this paper the responses to a survey by one of the authors (Sheldrick) undertaken in Spring 1983 into energy conservation activities by local authorities are analysed using elementary q-analysis. (See Chapman (1982), Gould (1980), Beaumont and Gatrell (1982), Macgill (1982), Atkin (1981) for introductions to aspects of the method, the original development of q-analysis being the work of Atkin (1974 and 1977). The survey was concerned with eliciting information on the nature of local authority involvement - policy management structures, commitment and perception. Such institutional factors were considered to be of interest, and as important as the details of possible technical paraphenalia that have been installed by local authorities (see Lamsac (1981 and 1982)). The nature of the analysis afforded should be of interest both to q-analysts and to energy conservationists, though an understanding of q-analysis is not a pre-requisite for an understanding of most of this paper.

Forty-eight energy conservation activity variables of potential relevance to local authorities are given in Table 1. The variables carry a coding between A2, A3, A4 ... A61 (column 4) and are described in column 5. (The additional q-coding - Q91, Q83 ... will be explained below). Two points in particular may be noted. First, the variables were identified as a result of interviews with local authority energy conservation officers and officials of the Department of Energy and the Environment. Secondly, although sixty-three variables were originally identified in this way, after initial categorization the list was reduced for various reasons to the present forty-eight. For the sake of increased analytical clarity this reduction meant that the most commonly identified variable - the perception that the local authority involvement with energy conservation encompassed the fuel consumption in its own buildings (identified by 308 local authorities) was not included in the subsequent q-analysis, though this variable will obviously not be neglected in any final overall interpretation of survey results.

The analysis in this paper focusses on the responses from 333 local authorities. These responses represent 63.9% of all the local authorities (521) in England, Scotland and Wales, and a similar response across the various tiers of local authority - district, shire, metropolitan and region was obtained. A further eighteen local authorities returned the questionnaire unanswered, often accompanied with a note that limited manpower prevented them doing so. It should not be construed that local authorities that did not respond to the questionnaire are concerned with energy conservation than those that did. This is contrary to the interpretation of a poor response to a survey undertaken by one local authority group (S.C.O.E. 1981). Several local authorities that did not respond are known, from personal experience, to be committed heavily, both in finance and manpower, to pursuing energy conservation objectives.

The higher in the table a given variable appears, the greater the number of local authorities that are involved with it. Thus, Table 1 gives a simple rank ordering of activities (see Column 1) by decreasing frequency of occurrence. Column 2, indicates how many of the 333 local authorities who responded are involved with each activity. Subtracting 1 from the numbers in Column 2 provides the Q level identified in the third column (eg. Q144 for A49 denotes that 145 local authorities who responded to the survey perceive their energy conservation role to include waste collection). The ranking is an immediate output of the Q-analysis algorithm though, of course simpler ranking algorithms would do the same job. The Table will be taken as self-explanatory to the interested reader. Q-analysis has been found a useful tool for examining the patterns underlying this simple ranking of local authority involvement and for pointing to particular elements of significance.

In a hypothetical world where local authorities were a homogeneous group, each interpreting legislation and central government policy in a uniform way, there would be no underlying pattern of any interest. The ranking would simply reflect the respective functions of the various tiers of local authority and all authorities within a given tier would be involved with the same activities. The pattern from the real world is more complex. Different authorities interpret legislation and policy and discharge their discretionary powers to suit individual circumstances. Interest in the underlying pattern thus stems from the truism that authorities differ in the priorities they hold and the activities they undertake, and therefore in the activities they do or do not have in common with each other. Exposition of these differences enables pertinent questions to be asked about why they arise, and in a prescriptive mode, permits suitable suggestions as to how greater involvement by particular authorities may come about. In q-analysis parlance the latter would be depicted as seeking changes in the backcloth defined by the current structure of involvement.

The q-analysis reveals what lies behind the ranking in Table 1 simply by indicating for each level (and all intermediate levels) wherever activities are undertaken by a given group of authorities, ie. linkages are identified between activity variables at each level wherever they are undertaken by an identical set of authorities. The most significant features of the resulting pattern will be pointed out by working down the rank order of activity levels.

TABLE 1. Rank ordering of conservation activity variables *

Rank order (1)	Number of authorities involved (2)	Q-level coding (3)	Activity coding (4)	Description of activity variable (5)
1	263	Q262	A22	local authority has undertaken energy audits/surveys on its own premises
2	251	Q250	A27	local authority insulated council dwellings during availability of special money 1978-1980
3	250	Q249	A55	L.A. would be more involved if increased commitment for En. Con. by C.G.
4	240	Q239	A38	L.A. has attempted to encourage En. Con. behaviour in its own staff
5	234	Q233	A18	L.A. has implemented a fuel monitoring system for its own fuel consumption
5	234	Q233	A28	L.A. has insulated council dwellings since ending of special money
7	233	Q232	A44	L.A. perceives its role with En. Con. to include its council dwellings
8	223	Q222	A7	En. Con. activities financed by the individual depts.within the L.A. taking the action
9	197	Q196	A56	Increased C.G. commitment would have to be financial if L.A. were to be more involved
10	192	Q191	A9	L.A. has designated an individual with its En. Con. responsibility
11	176	Q175	A40	L.A. has made special effort to promote Home Insulation Scheme
12	175	Q174	A20	L.A. participates in Energy Manager Groups or L.A. grouping concerned with En. Con.
13	172	Q171	A5	L.A. has vested general En. Con. role within an existing dept.
14	147	Q146	A2	L.A. has an En. Con. Policy
15	145	Q144	A49	L.A. perceives its En. Con. role to include waste collection
16	119	Q118	A17	L.A. has adopted an Energy Management Program
17	118	Q117	A59	L.A. participates in the bottle bank scheme
18	117	Q116	A6	L.A. En. Con. activities funded from special En. Con. budget
19	115	Q114	A4	L.A. has created a special En. Con. Unit
19	115	Q114	A13	L.A. has an Officer group that examines En. Con. activities
19	115	Q114	A57	L.A. has declared itself a nuclear free zone
22	113	Q112	A12	En. Con. responsibilities have been allocated to individuals in different depts.
23	105	Q104	A24	L.A. has used D.En's Energy Survey Scheme to finance energy audits
24	99	Q98	A45	L.A. perceives its En. Con. role to include all the community's buildings
25	92	Q91	A50	L.A. perceives its En. Con. role to include waste disposal
26	84	Q83	A33	L.A. carried out En. Con. works on educational buildings when special finance available
27	81	Q80	A34	L.A. has carried out En. Con. works on educational buildings since special finance ended
28	78	Q77	A51	L.A. perceives its En. Con. role to include land use planning
29	71	Q70	A39	L.A. has attempted to encourage En. Con. behaviour in groups other than its personnel
30	70	Q69	A53	L.A. perceives its En. Con. role to include consumer advice
31	67	Q66	A23	L.A. has undertaken energy audits/surveys in ALL its own buildings
32	66	Q65	A54	L.A. perceives its En. Con. role to include CHP
33	61	Q60	A10	En. Con. Officer is full time post within L.A.
34	57	Q56	A47	L.A. perceives its En. Con. role to include local transport
35	54	Q53	A46	L.A. perceives its En. Con. role to include fuel poverty/hardship matters
35	54	Q53	A52	L.A. perceives its En. Con. role to include education curriculum
37	50	Q49	A15	L.A. has an elected member group that examines En. Con. matters
38	45	Q44	A25	L.A. has undertaken energy audits/surveys of council dwellings
38	45	Q44	A41	L.A. has been involved in sponsoring or initiating a local energy project
40	42	Q41	A48	L.A. perceives its En. Con. role to include public transport
41	37	Q36	A26	Council tenants can ask the L.A. to undertake an energy audit/survey of dwelling
42	29	Q28	A42	L.A. has sponsored En. Con. research
43	22	Q21	A11	L.A. has a designated official to liase with DHSS/fuel boards on fuel poverty matters
44	19	Q18	A61	L.A. has obtained a demonstration project grant
45	11	Q10	A14	L.A. has officer group that examines fuel poverty matters
46	9	Q8	A3	L.A. has a fuel poverty policy
47	8	Q7	A60	L.A. has been involved in Sizewell 'B' inquiry
48	3	Q2	A16	L.A. has an elected member group that examines fuel poverty matters

* Abbreviations used in table

En.Con. - energy conservation
L.A. - local authority
C.G. - central government
CHP - combined heat and power
D.E. - department of energy
D.H.S.S. - department of health and social security

The Q-analysis

Details of the basic q-analysis algorithm will not be given in this paper - see introductory references on q-analysis cited earlier; also Macgill (1984). Instead, the emphasis is on an interpretation of the "results" that are produced by the algorithm. The algorithm reveals that for each of the first 8 conservation activity variables in Table 1 (between levels Q262 and Q222) a different group of local authorities is involved at each level. In other words, at Q233 for example, the group of 234 authorities involved with A28 (the insulation of council dwellings since the ending of special allocation) is not the same as the group of 234 authorities who have implemented a fuel monitoring system for their own fuel consumption (A18). There will be some authorities that belong to both these groups but there will also be some authorities that belong to the first group but not the second, and vice versa. (As we move down the q-levels, the q-analysis algorithm will identify exactly where the differences and similarities between groups lie).[2] Similarly the group of 240 authorities that has attempted to encourage energy conservation behaviour in its own staff (A38 at Q239) are not all part of the group of 250 authorities that would be more involved with energy conservation if there were increased commitment by Central Government (A55 at Q249). Again there will be some authorities who will be in both groups, but others that will either be in one group or the other. It is not until level Q217 (see Figure 1) that a given group of local authorities is wholly involved with two different activities. In other words the q-analysis algorithm reveals a linkage between A27 (the insulation of council dwellings during the availability of special financial allocation) and A28 (the insulation of council dwellings since the ending of the special allocation) at Q217. Of the 251 local authorities that insulated council dwellings during the availability of a specific financial allocation for energy conservation works between 1978 and March 1980 (A27), 218 have continued to do so since the special allocation ended

[2] Although the algorithm itself does not explicitly reveal which individual local authorities are involved in each group and in similarities between groups, this information can be subsequently obtained from the full data set. The q-analysis has provided signposts into the data set and given necessary guidance in terms of where to look for features of significance.

Fig.1
Q217

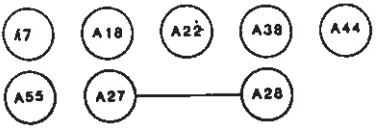


Fig.2
Q205

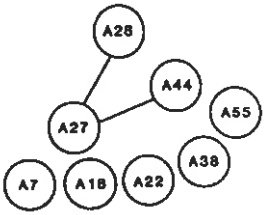


Fig.3
Q198

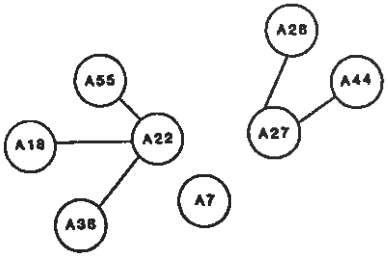


Fig.4
Q195

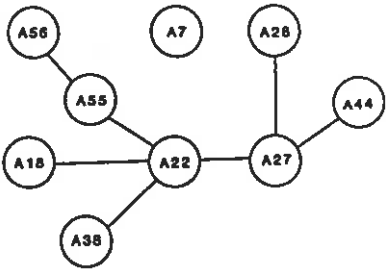
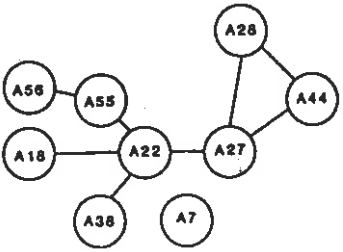


Fig.5
Q193



with the advent of the block grant in April 1980 (A28).

As we continue down the q-levels, further linkages between activities - in terms of being undertaken by an identical group of authorities - are revealed. (Recall that by adding 1 to any given q-level, the number of authorities that are involved with the activities that appear at that q-level can be found.) It turns out that two separate local authority components develop, centering on A22 and A27 respectively. This is first shown at the next q-levels illustrated - Q205 (Figure 2) and Q198 (Figure 3). The former depicts local authorities that have undertaken energy surveys and audits on their own premises (A22), with linkages to monitoring fuel consumption in their premises (A18), encouraging energy awareness in their own personnel through publicity campaigns (A38), though they would be more involved with energy conservation given an increased commitment from central government (A55). This represents an "in-house" orientation amongst local authorities and contrasts with the other group whose focus is on council dwelling insulation - the local authority perception that its role with energy conservation encompasses council dwellings (A44) has linked with A27, though interestingly it has yet to link with A28. Intuitively, local authorities that have continued to insulate council dwellings since 1980 should be more committed to energy conservation than those that did so only during the availability of special finance. Two possible reasons for the counter-intuitive position can be offered. First, although some authorities have insulated council dwellings since 1980, they may have done so for purposes (eg. employment creation or general house renovation schemes), or through external pressures (eg. local groups forcing the continuation of the programs), other than a perception of energy conservation. Secondly, some of those local authorities who insulated council dwellings between 1978-80 may actually have completed the task (this was pointed out in notes attached to returned questionnaires by several local authorities).

These two groupings continue to evolve through the next three q-levels illustrated - Q195 (Figure 4), Q193 (Figure 5) and Q186 (Figure 6) - until each is entirely interconnected at Q186 (ie. the four activities A22, A55, A18 and A38, and the three activities A27, A28 and A44). Two intergroup linkages have also occurred - connecting A27 with A22 and A55, ie. local authorities that have undertaken energy audits/surveys, insulated council dwellings during 1978-80 and would only be more involved with energy conservation given an increased commitment from central government. This group should represent the minimum for local authorities with housing responsibilities - they want to reduce their own fuel bills while the insulation of council dwellings occurred

Fig.6
Q186

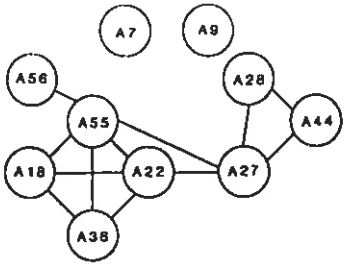


Fig.7
Q184

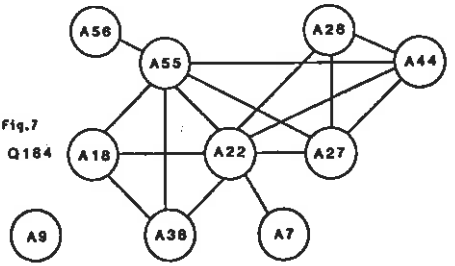
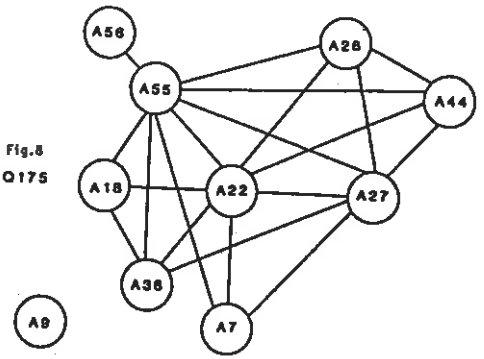


Fig.8
Q175



because of the special financial allocation that could not be spent otherwise. Unless the specific allocation is renewed, it is unlikely that council dwellings will be insulated in comparable numbers to the 1978-80 period. For 59% of local authorities responding to the questionnaire this commitment will have to be financial (A56).

Linkages between the three groups continue to develop. At Q184 (Figure 7) the groups have become three, 4-simplices.[3] The "missing" link between A55 and A28, preventing further merging of simplices, indicates that where local authorities have continued to insulate council dwellings after March 1980, finding the funds from their block grants, they are less likely to be seeking an increased central government commitment. By Q175 (Figure 8) this linkage has happened, so that even these local authorities want an increased central government commitment. This is not unexpected given the dramatic decline in the number of council dwellings insulated annually by local authorities since 1980 (Sheldrick, 1983a).

A further 4-simplex has emerged with the interlinking of local authorities funding their energy conservation activities from the annual budget of the individual department where the measure is being implemented (A7) to A22, A27 and A55. The traditional vertical arrangement of local authority by function (eg. education department had its own buildings, maintenance staff, architects, surveyors, etc.), reinforced by the rate support grant being allocated under 5 expenditure categories (housing, social services, education, transport and other) and to be spent accordingly, has not been entirely swept away by the arrival of corporate management and block grants.

At the Q-level representing 50% of the local authorities - Q167 (Figure 9) there are four overlapping 5-simplices, all having A22, A27 and A55 in common. The simplices labelled 'a' and 'd' retain much of the distinction between local authorities focussing on insulating council dwellings and on in-house activities respectively. The 'b' and 'c' simplices fall between these two positions, displaying characteristics of each, but also having A7 in common; ie. adopting a departmental approach to funding energy conservation activities.

[3] The term simplex (plural simplices) is used to refer to a group of completely interlinked activities. In Figure 7, A22, A27, A44 and A28 form a 4-simplex since all these activities are linked to each other. However A22, A27, A44, A28 and A55 does not form a 5-simplex because activities A55 and A28 are not linked to each other.

Fig.9
Q167*

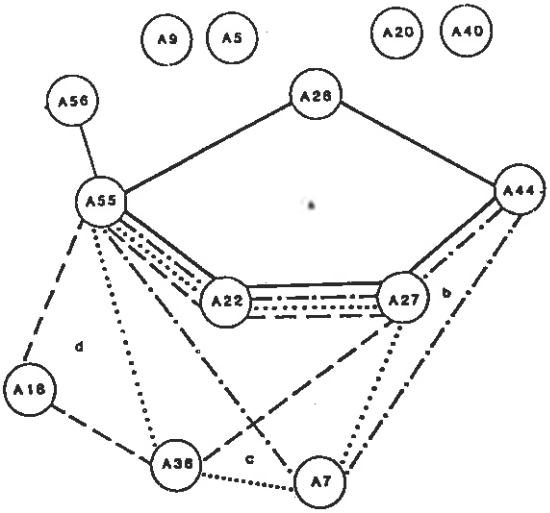
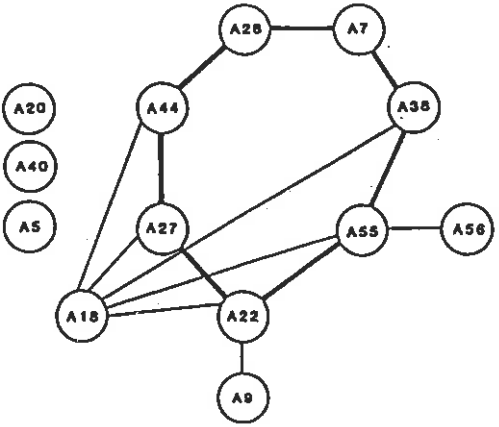


Fig.10
Q163*



* variables connected by bold-type lines are entirely interconnected (eg. A28 is connected to A38, A55 and A27 as well as A44 and A7)

These four simplices quickly merge into one group of local authorities sharing 7 common characteristics - Q163 (Figure 10). Despite this larger grouping, an activity variable not yet entirely interlinked is A18 - the monitoring of fuel consumption in local authority buildings. Without such monitoring the information necessary to evaluate measures undertaken will not be available.

Descending down further q-levels (ie. levels where fewer local authorities are displaying the common characteristics) the incorporation of A18 at Q154 (Figure 11), and A56 at Q141 (Figure 12) occur. The latter may be considered a discouraging state of affairs, as it indicates that local authorities will not be more involved with energy conservation than they already are, unless central government provides a financial commitment to energy conservation - a commitment they have refused to make. Given the generally narrow focus of local authority involvement at this level, many potential benefits arising from energy conservation will go unrealised.

These two q-levels (Figures 11 and 12) also provide further evidence of a distinction between activities associated with an in-house orientation (ie. A22, A38 and A18) and a focus on council dwellings (ie. A27, A28 and A44). Previously disconnected activities (eg. A40, A9, A5 and A20) become linked to the large simplex through one or other of these two orientations; only at lower levels do linkages across these orientations turn up. Up to this point only one variable has not displayed this characteristic - A7. This pattern does continue for the large majority of activities still to be identified.

With the next q-level portrayed - Q136 (Figure 13) - the first linkage between activity variables outside the main simplex occurs, identifying a second significant grouping of local authorities. This new simplex represents another in-house orientated group with a designated officer responsible for energy conservation (A9), though this is not a full-time position, and the local authority's participation in an external information forum (eg. energy manager group of LAMSAC) (A20) - probably through the same person indicated by A9. As no linkages exist with activity variables other than in-house ones at this level, then the officer's brief would appear to be only the local authority's own premises and fuel consumption.

The q-level representing 33% of local authorities - Q113 (Figure 14) - identifies an increasing number of simplices. Four, 9-simplices have emerged, each of which shares eight common characteristics (A28, A44, A27, A22, A55, A38, A18 and A7) - a mixture of in-house and council dwelling

Fig.11
Q154[9]

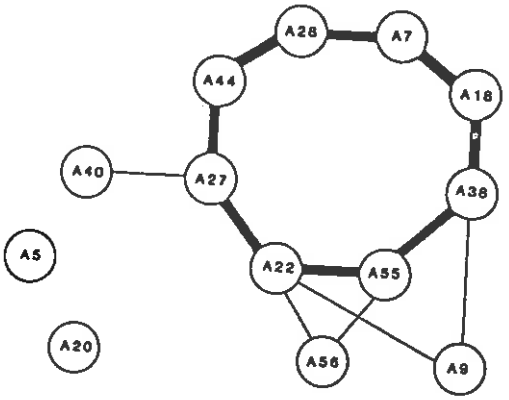


Fig.12
Q141[9]

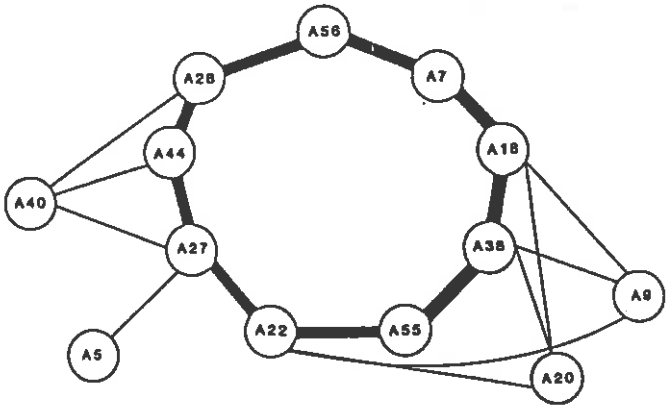


Fig.13
Q136 *

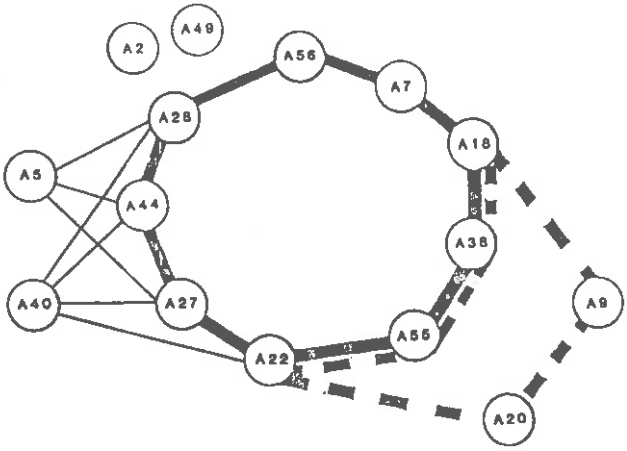
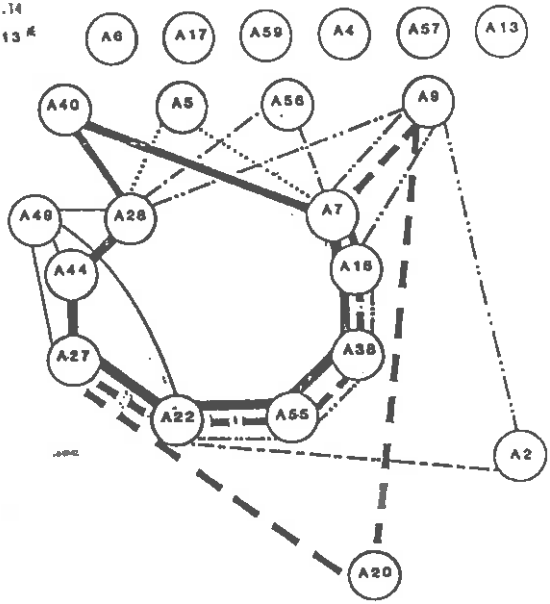


Fig.14
Q113 *



concerns. The variation between these simplices is provided by the activity variables representing a financial commitment from central government (A56), the local authority specially promoting the Home Insulation Scheme (A40), a general vesting of responsibility for energy conservation within an existing department (A5), and the designation of an officer responsible for energy conservation (A9). Though none of these are exclusive, as will be observed at lower q-levels, the lack of linkages between some of these activity variables is intelligible:

(a) A40 and A56 - local authorities making the most of the money available to encourage loft insulation in the community, rather than seeking more money
(b) A5 and A9 - the designation of responsibility for energy conservation within the local authority differs, respectively within an existing department generally or with an individual.

There are two smaller simplices to note - the one identified at Q136 has now extended to include A27. That this group has not continued to insulate council dwellings since 1980 may be explained by the inclusion of A7 - the funding of energy conservation through the budget of the department undertaking the measure. The housing department budget no longer has a separately identified component for energy conservation.

Secondly a new group - (A22, A55, A38, A18, A9 and A2) - reflects those local authorities that have formally adopted an energy conservation policy. The nature of the linkages would indicate that policy implementation has an in-house focus at this level. This is despite the encouragement from within the local authority environment to look beyond their own walls when pursuing an energy conservation policy. (S.T.C.E.E.A., 1980 and 1982).

By Q100 (Figure 15) five of the simplices identified at Q113 have merged into two. The variables A40, A5 and A56 have become interconnected to form one 11-simplex, while the group identified at Q136 (ie. containing A9 and A20) has been subsumed within a second, formed by the linking of A9 and A56. Both groups are characterised by a common mixture of in-house and insulation activities (A28, A44, A27, A22, A55, A38, A18 and A7), so that beyond the understandable separation between A9 and A5 (ie. the adoption of different management techniques) there is no fundamental, or intuitive reason, why local authorities with a designated officer for energy conservation (A9) and participating in information forum (A20) should not be making a special effort to promote the Home Insulation Scheme (A40). The energy conservation policy grouping (ie. the simplex containing A2) remains focussed on in-house activities, though it has extended to incorporate A9 and A20.

Fig.15

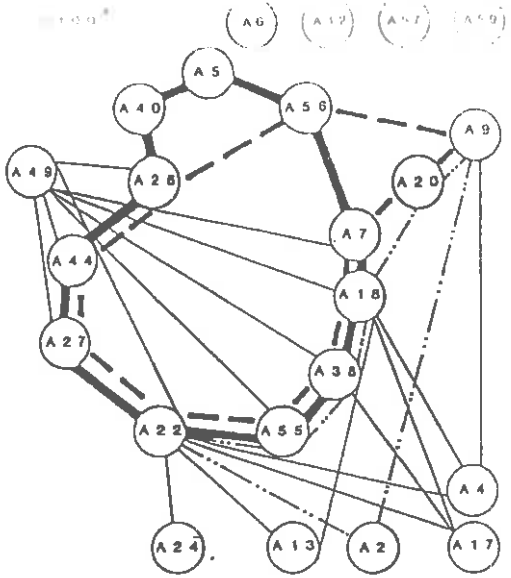
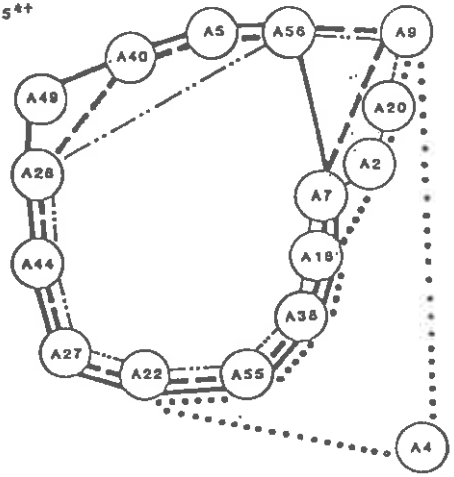


Fig.16

Q85*+



*+ variables that are not entirely interconnected have been omitted from the following figures for the sake of clarity. Thus all variables are interconnected within groups identified by similar connecting lines.

A link between A40 and A9 occurs at Q85 (Figure 16) but only in one of the three 12-simplices. The nine mixed characteristics highlighted at Q100 are common to all three; local authorities with energy conservation policies (A2) now include the insulation of council dwellings among their activities. The variation results from overlapping permutations of A2, A5, A9, A20, A40 and A49. Only the last - the local authority perception that its role with energy conservation includes waste collection (A49) - represents an activity previously unmentioned.

This level also sees the appearance of a simplex encompassing those local authorities that have established a special energy conservation unit (A4) to deal with such matters. The concerns of these units are very much in-house orientated (A22, A55, A38, A18, A2, A20, A9 and A4).

The number of main groupings has increased to six again at Q66 (Figure 17), with the variables common to all reduced to six (A22, A55, A18, A38, A20 and A9 - all in-house activities). While a split between A4 and A5 exists - local authorities that have established a special energy conservation unit, as opposed to the general designation of responsibility within an existing department - there are simplices containing neither. At this level the split is between the special energy conservation units (A4) - (two simplices) and insulating council dwellings (ie. A27, A28 and A44) - (four simplices). The reasons for this divergence are not entirely obvious. There is the separation between A4 and A5. Further, the insulation of educational buildings during the availability of special finance (1978 to March 1982) (A33) and since (A34), and the insulation of council dwellings, represent a division in responsibilities between different tiers of local government (ie. generally, education is vested with the counties and regions, and housing, with the districts). Yet, this leaves three simplices not accounted for by reference to these characteristics, though they all have a designated officer responsible for energy conservation (A9). Given the wide range of activities included within these simplices, a part-time officer (and that is all A9 represents) can only affect a small part of the potential savings even within the local authority, let alone attempting to encourage an energy awareness in the local community (A45).

The split between A27, A28 and A44, and A4 has disappeared at Q50 (Figure 18) though four overlapping simplices remain. The separations now occur through (a) council dwellings (A27, A28 and A44) or educational buildings (A33 and A34) related to the division of responsibilities between tiers of

Fig. 17
Q66 $^{2+}$

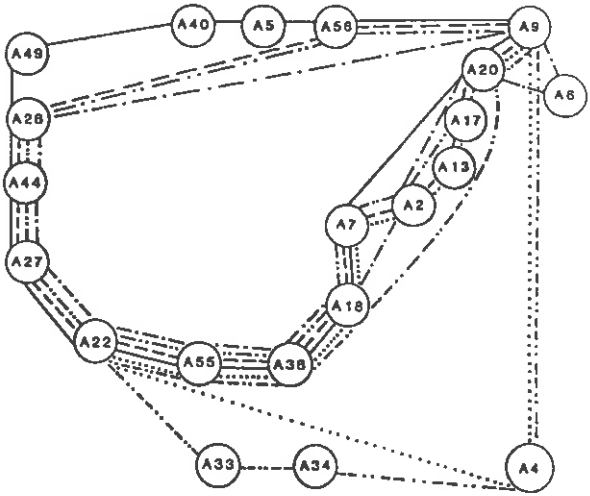
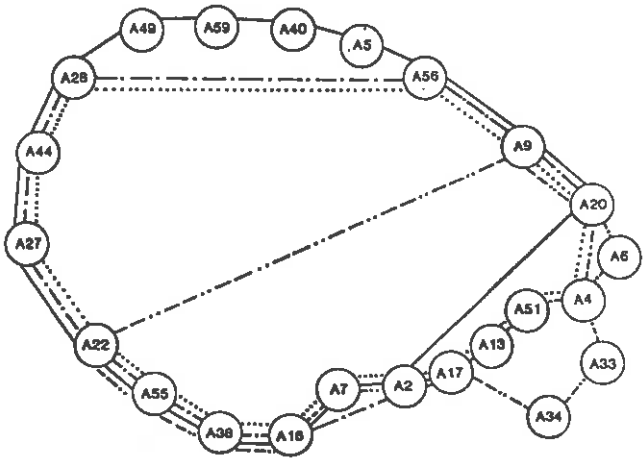


Fig. 18
Q50 $^{4+}$



local government; (b) the existence of a special energy conservation unit (A4) or the general vesting of responsibility within an existing department (A5); (c) the financing of the local authorities energy conservation activities by means of the budget of the department undertaking the measure (A7) or through a special energy conservation budget (A6). The determining variable here is not the existence of an energy conservation unit (A4), as this is linked to both funding arrangements (A6 and A7). The activities representing insulation of educational building (A33 and A34) with regard to funding are attached only to the variable indicating local authorities employing departmental budgets (A7) to finance energy conservation.

At Q27 (Figure 19) both those local authorities responsible for council dwellings, and those for educational buildings, are funding their activities through a combination of special budgets (A6) and departmental budgets (A7). The simplices vary through their linkages with insulating educational buildings (A33 and A34) and some district council functions ie. waste collection (A49 and A59) and promoting the Home Insulation Scheme (A40), but not those associated with insulating council dwellings - and the designation of responsibility for energy conservation (A4 or A5). Two points to note are that only those local authorities insulating educational buildings have a full-time energy conservation officer (A10), yet, at the same level that they are linked to council dwelling responsibilities (ie. A27, A28 and A44) they are not making a special effort to promote the Home Insulation Scheme (A10). At Q10 (Figure 20) the two simplices are differentiated only by the designation of responsibility within the local authority - those with an energy conservation unit (A4) and a full-time officer (A10), and those that have vested the responsibility generally within an existing department (A5).

Further comments

At the lower q-levels local authority involvement with energy conservation is quite wide-ranging, encompassing in-house activities, the insulation of council dwellings and educational buildings, publicity campaigns, promoting the Home Insulation Scheme, recycling, sponsoring research and local energy projects, and the perceptions that their role includes buildings, transport, land-use planning, waste-management and CHP. However Q10, the level at which all these activities are common to a group of local authorities represents only 3% of the local authorities responding to the questionnaire.

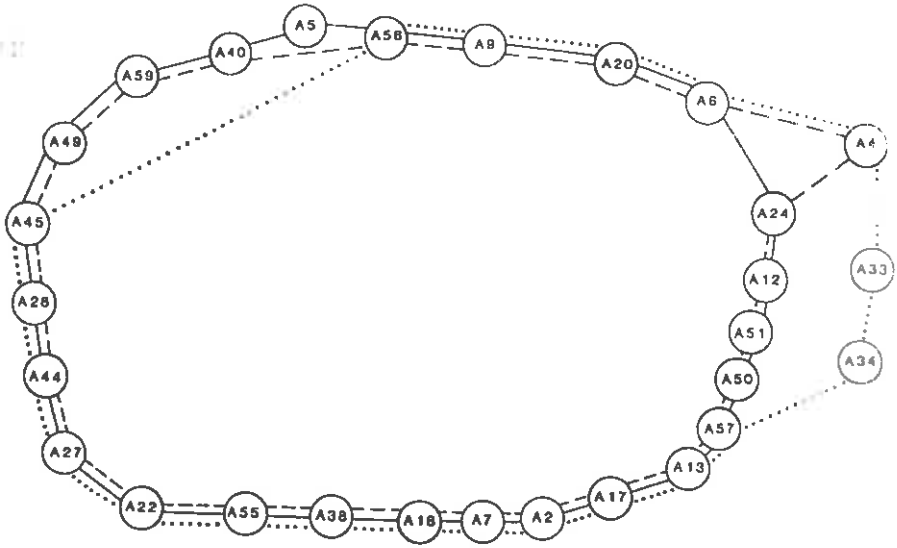
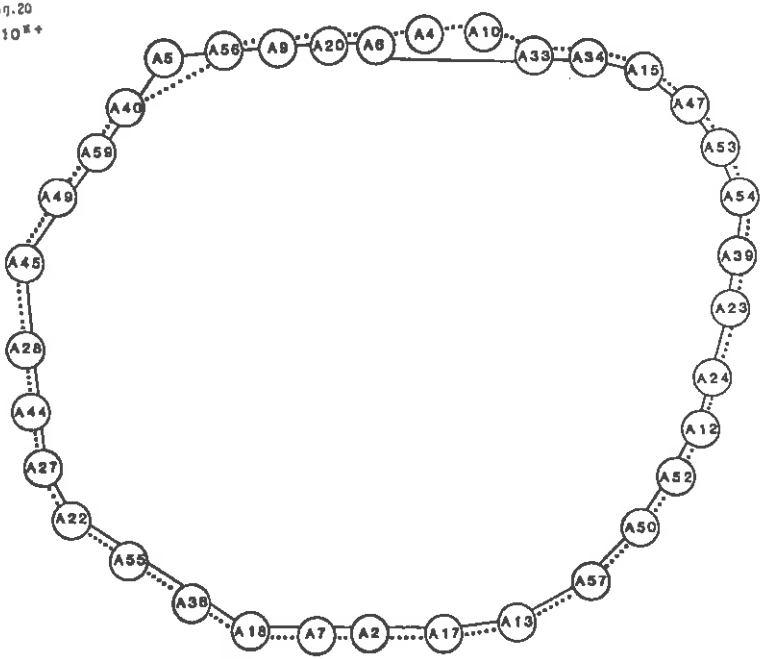

A5
A56
A9
A20
A6
A4
A40
A59
A49
A45
A28
A44
A27
A22
A55
A38
A18
A7
A2
A17
A13
A57
A50
A51
A12
A24
A33
A34

Fig.20
$Q10^{2+}$


A5
A56
A9
A20
A6
A4
A10
A33
A34
A15
A47
A53
A54
A39
A23
A24
A12
A52
A50
A57
A13
A17
A2
A7
A18
A38
A55
A22
A27
A44
A28
A45
A49
A59
A40

Further discouragement is provided by the low priority attached to the issue of fuel poverty and hardship by local authorities. At the highest levels very few activities were being commonly undertaken.

This overall summary does conceal finer details arising from the structure of local authority involvement with energy conservation. Three identifiable groups of activities emerge:

- an in-house orientation (A22, A18, A38)
- a concern for council dwellings (A27, A28, A44)
- a concern for educational buildings (A33, A34)

All but six of the remaining variables connect themselves completely to the vertices of one of these three groups, before establishing links with any other. The strength of association with these entities is not entirely unexpected given the government's exhortations that the local authority's own fuel consumption should be the major thrust of its energy conservation activities, and the special financial allocations targetted at council dwellings and educational buildings in the past. It does reflect that local authority concerns, beyond its own premises, are strongly influenced by the commitment demonstrated for an objective by central government in the form of financial allocation, if only to "prime the pump".

The variables associated with the in-house orientation reveal an evolving development of local authority concern with energy conservation: in-house activities, increasing commitment and identification within the local authority, development of a management structure, and finally, the broadening of focus of the activities and perceptions (Figure 21). Ad hoc programs are implemented initially (an immediate reaction to rising fuel bills and the belief that the local authority should do something), to be followed by the development of information and management structures enabling the identification and pursuit of clearly defined objectives and targets.

This position is illustrated by the lack of a comprehensive approach - the delineation of policy (A2), clarification of program objectives (A17), designation of responsibility for implementation (A9), identification of targets (A22), funding of activities (A6 or A7), encouraging participation and awareness (A38), monitoring results (A18) and the ability to evaluate program (A13) - within the local authorities until below the q-level representing 1 in 3 local authorities. At this point such an approach is only associated with the establishment of an energy conservation unit within the local authority. It is not until Q27 (1 in 12 local authorities) that

Fig.21. Evolution of In-House Orientation

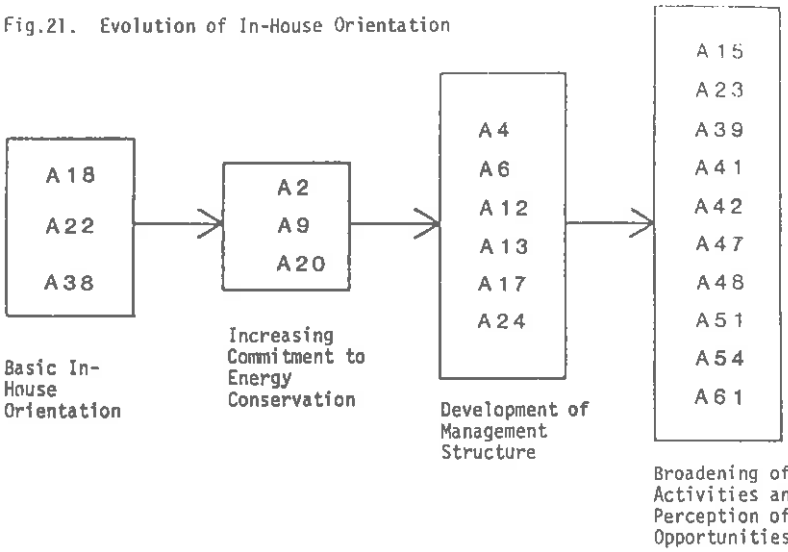


Fig.22. Evolution of Council Dwelling Orientation

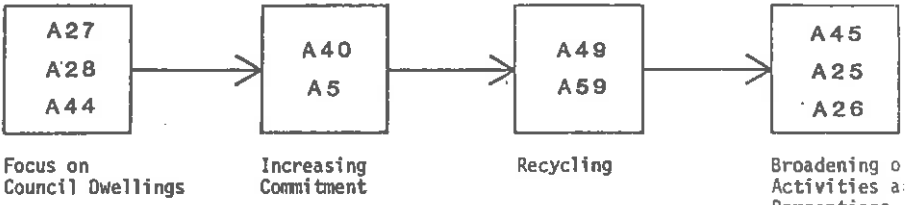
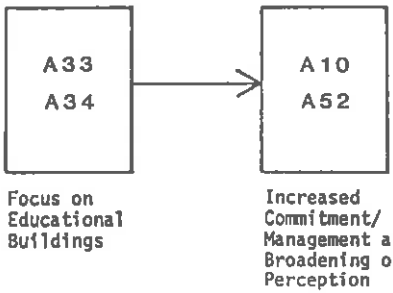


Fig.23. Evolution of Educational Building Orientation



such an approach exists in local authorities without an energy conservation unit. Yet, this evolutionary involvement with energy conservation could indicate that "given enough time" all local authorities will develop a comprehensive approach and management structure.

Hierarchical involvement occurs in the latter two groups identified above (Figures 22 and 23) giving further evidence of the lower frequency of involvement with activities that have not been the subjects of strong central government attention (eg. recycling, education curriculum, domestic energy audits). These two groups are related to the divisions of responsibility between tiers of local government - generally district councils are responsible for housing and waste collection, while the counties are the educational and soci service authorities. However, this division is not enough in itself to account for the split at high q-levels between those local authorities with an 'in-house' orientation, and those concerned with insulating council dwellings - 59 of the U.K.'s 116 local education authorities - also have housing responsibilities (43 out of the 87 educational authorities responding to the questionnaire have housing responsibilities).

Though given enough time local authorities may become more involved with energy conservation the indication would appear to be that even 10 years after the "energy crisis" some local authorities are not involved in any systematic manner in examining their own fuel consumption. This is despite government exhortations and the impetus of significant price increases.

Conclusion

The separation between insulating education buildings and council dwellings is related in part to the division in local government responsibilitie As seen above, this division does not explain all the separation at the higher q-levels. Neither does it account for lower tier being the centre of the community focus (A45), other than through its administration of the Home Insulation Scheme, as the strategic welfare of the community is an upper tier responsibility, nor why the responsibility for educational buildings should be the major impetus for the appointment of a full-time energy conservation officer within the local authority. Some explanation can be found in the system of financing local authorities.

The nature of the rate support grant employed to finance local authorities during the 1970's would appear to have worked against them adopting a holistic approach to energy conservation. The funding of a local authorities energy conservation activities, until well down the q-levels, is taken from the budget of the department undertaking the activity. The allocation of the rate support grant under specific categories, and to be spent accordingly, encouraged "departmental" attitudes to expenditure, and for

examining problems. As energy conservation cuts across traditional departmental boundaries local authorities were denied, at least initially, the opportunity of developing an holistic approach, or even benefitting from the emergence of corporate management structures in local authorities. Further it has been denied the status of being a separately identified component amongst local authority strategic concerns (Sheldrick 1983b).

The advent of the block grants in 1980, and the enabling of local authorities to develop their own expenditure priorities (at least in theory), may have been a catalyst for the development of a more holistic approach. However, the block grants have coincided with central government's determinatio to reduce all public expenditure. The special allocations for energy conservation works have disappeared at the same time that their total budgets have been continually squeezed. In coping with these cuts local authorities with educational buildings may be more concerned with achieving fuel savings (thus a full-time officer) because, in the end, they pay the fuel bill. Insulating council dwellings may be admirable, resulting in increased thermal standards or reduced running costs, but it is not the local authority that reaps the direct benefit.

The lack of an identifiable policy, program and targets, and the ability to monitor, and justify, expenditure and results will make ad hoc energy conservation activities, or achieving broader social objectives through energy conservation measures, vulnerable to being cut. They represent an easy, immediate financial saving. The decline in the number of council dwellings insultated annually, despite the large stock still uninsulated, attests to thi: Local authorities may not be more involved without an increased central government commitment to energy conservation, financial or otherwise, but they can be less involved.

In concluding, attention should be drawn to two points. First, the authors make no claims that this paper represents a deep or sophisticated usag of q-analysis yet the approach has proved useful in exploring the nature of lo authority involvement with energy conservation at different q-levels. Second this paper represents only a partial analysis of a large data set. It makes no use of what in q-analysis terms would be called the conjugate (the categorization of local authorities by the levels of their common characterist though this will be undertaken in the near future), nor does it attempt to comment on alternative styles of analysis of this data that might be afforded by other analytical techniques.

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