# MUNICIPAL ENERGY CONSERVATION PROGRAMS IN B.C.:

# A STUDY OF INNOVATION DECISIONS

by

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B.Sc., University of Calgary, 1976

A THESIS SUBMITTED IN PARTIAL FULFULLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

in the Department

of

Geography

ACCEPTED
F[redacted]
[redacted]UATE STUDIES
DATE 23 Dec 1982 DEAN

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JUNE 1982

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## ABSTRACT

Municipal energy conservation not only has an immediate budgetary impact through the reduced consumption of costly energy, but also may become a very important consideration in future planning. Energy conservation programs are common in many American and large Canadian cities. However, very little attention has been paid to the small municipalities. This study investigates municipal energy conservation in all of B.C.'s 141 municipalities.

Using a diffusion of innovation approach, the research examines the characteristics of innovators and non-innovators. The basic research tool was a mail questionnaire sent to the principal appointed officer of each of B.C.'s municipalities. A response rate of 96% was achieved. The survey showed very little general interest in coordinated conservation programs by the province's councils. However, a wide range of individual energy conservation measures were reported. Innovators displayed characteristics predicted by previous innovation research--large population, near to other innovators and concerned and involved citizens. Such a conclusion indicates that results of studies conducted in other Canadian or American regions will be applicable to B.C. The most important factor leading to the development of comprehensive energy management programs appears to be the presence of hardworking, dedicated and influential individuals.

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# PREFACE

> In 1973, the world crossed the threshold from low-priced energy to high-priced energy and from one way of life to another. Throughout the preceeding 25 years, a principal concern had been to find markets for abundant energy supplies, and to ensure prices were low enough to encourage rapid expansion of the use of oil, natural gas and electricity. . . . The shape of the new era is uncertain, except for a foreboding that the future rests on a very precarious energy situation.[1]

In 1978 the use of energy for space heating and transportation accounted for about 55 percent of total energy use in Canada. A great deal of this transportation and space heating energy is consumed in urban areas. The relative ease of increasing the energy efficiency of these activities has led researchers to suggest that coordinated conservation measures in urban areas should provide very cost-effective and immediate benefits.[2]

In many large Canadian and American cities, as well as many European cities, municipal councils have realized the important role they can play in this area. Such municipalities have been able to provide the research sites and the resources, in terms of manpower and funds, necessary for the development and testing of the many diverse measures which can achieve energy conservation at the municipal level. These measures have already become widely accepted, their effectiveness well proven and the innovative cities well publicized.[3]

In British Columbia, Vancouver has made major commitments to a municipal energy conservation program.[4] Victoria, likewise, has begun considering and testing minor energy conservation measures. These are,

however, only two of the many municipalities in British Columbia. What of the other, smaller communities? Is municipal energy conservation an issue outside of the large cities in B.C.? What measures do these communities consider appropriate? Are there differences between the types of measures considered by smaller municipalities and those considered by larger ones? Do these vary with internal characteristics or external inducements?

These, then, are the questions to which this research is addressed. Their answers may provide valuable insight for municipal decision makers wishing to introduce energy conservation into their community or for officials in senior levels of government whose function it is to advance the cause.

Research of this sort requires the cooperation of many people. I would like to sincerely thank the many people across B.C. who kindly agreed to complete the questionnaires so completely and candidly. Assistance with the theoretical and technical aspects of the research was received from many people, including Dr. W.R.D. Sewell, Dr. C.J.B. Wood and Dr. N.A. Swainson, all of the University of Victoria; Dr. Les Foster, previously of the University of Victoria; Mr. Bo Martin, previously of the Ministry of Municipal Affairs; Mr. Gerald Bachmeyer, Ministry of Energy, Mines and Petroleum Resources; and, Mr. Robert Slobodian, Malaspina College, Nanaimo. Figures were drafted by Gary Crocker. Financial support from the Sara Spencer Foundation is gratefully acknowledged. Finally, I must thank my new husband, Bill, without whose assistance and encouragement, I may never have completed this thesis.

FOOTNOTES

[1]James E. Gander and Fred W. Belaire, Energy Futures for Canadians: Long-Term Energy Assessment Program, Energy, Mines and Resources Canada, Report 78-1 (Ottawa: Supply and Services, 1978).

[2]City of Portland, Oregon, Policy Analysis Section, Bureau of Planning, Energy Conservation Choices for the City of Portland, Oregon, 6 vols., Office of Policy Development and Research, Department of Housing and Urban Development (Washington, DC: Government Printing Office, 1977), vol. 6, Project Overview, p. 14.

[3]See for example, W.R.D. Sewell and H.D. Foster, Analysis of the United States Experience in Modifying Land Use to Conserve Energy, Lands Directorate, Environment Canada, Working Paper No.2 (Ottawa: Supply and Services, 1980); Reg Lang and Audrey Armour, Sourcebook: Energy Conservation in Twenty Canadian Cities (Toronto: Information Services, Planning and Development Department, City of Toronto, 1980); and, U.S., Department of Energy, Local Government Energy Activities, 3 vols., Report DOE/PE-0015/2, Assistant Secretary Policy and Evaluation, Division of Environmental and Institutional Impacts Evaluation (Springfield, VA: National Technical Information Service, 1979).

[4]Lang and Armour, Sourcebook, pp. 20 - 25.

# CHAPTER ONE

## Energy Conservation

> To be semantically accurate, the source should be called conservation energy, to remind us of the reality - that conservation is no less an energy alternative than oil, gas coal, or nuclear.
>
> One can pick up a piece of coal, hold it in one's hand, and say, "This is coal!" Conservation is far harder to grasp and comprehend. While it involves a host of different things - heat pumps, insulation, new engines - it also involves changes in methods, and even more importantly, an ongoing commitment to promote and implement it.[1]

As the established and respected institutions add their voices to the pessimistic forecast that our present society which has evolved in response to abundant, cheap energy is quickly heading into an era of scarce, expensive energy, the call for 'energy conservation' grows. That call is frequently accompanied by the threat that "to deny the transition does not prevent change, it only postpones it, ensuring that when change does come, it will cause intense disruption, pain and conflict."[2] It seems, however, that the days of forecasts of impending doom are quickly fading as the means of accomplishing this transition become better understood and appreciated by both individuals and organizations.

> Energy conservation strategies do not confer some moral uplift or argue that a spartan way of life is inherently good. Demand restraint in energy is just good sense: (a) It saves resources and productive factors for other uses; (b) It reduces the disruption resulting from embargoes and other interruptions to supply; (c) It buys time for research and development into technologies using less non-renewable energy resources and increased usage of renewable energy, and; (d) It reduces negative environmental impacts.[3]

Already the effect on gross consumption figures of the many diverse energy

conservation strategies being carried out is being observed. For example, in B.C., while energy consumption figures grew annually by 6.9% between 1958 and 1973, and 4.3% between 1973 and 1978, the projected growth rate per annum to 1986 was recalculated in 1979 to be 2.8%.[4]

To almost any North American, energy conservation now means not only saving non-renewable energy for future generations passing through the transition period but, more importantly, saving money today. This is not to say that everyone is committed to the idea. In fact, many economists have argued that the benefits gained by an individual's consuming a large portion of a resource will often be perceived by the individual to outweigh greatly the minor negative effect his use will have on the resource collectively.[5] The satisfaction of using many unnecessary electrical appliances in the home may be much greater than that arising from the knowledge that, by giving up these conveniences, one has contributed to the energy security of future generations.

Since the initiative for energy conservation often starts with a concerned individual this incompatibility of individual and collective interests (where the attainment of a large private 'good' is perceived to result in only a minor public (collective) 'bad') suggest the need for more than just appeals that individuals should act for the group's sake.[6] Inducements and support must be offered to individuals by those with the power to do so. In Canada, this responsibility falls on all levels of government.

## Energy Conservation at the Municipal Level

Although the term 'energy conservation' is often used to imply a vague collection of diverse conservation strategies it actually has been given a legal definition. In the United States the Energy Management Partnership

Act of 1979 defines energy conservation as "a program or activity intended to reduce energy consumption, increase efficiency of energy use, or increase the use of renewable resources."[7] This broad definition provides a meaningful description of many of the elements of energy conservation. It is evident that not only are the many obvious strategies for reducing energy consumption included (turning off lights, improving insulation) but also such things as recycling, developing local hydro sources and encouraging developers to build energy efficient houses can be considered conservation activities.

The need for energy conservation is linked with problems of energy supply and pricing. In Canada these are problems which can be, and are being, addressed by provincial and federal governments. At the local level, these problems translate into concerns about rising costs and the reliability of energy supply. The consequences of these problems will have a dramatic and longterm impact on urban settlement.

In 1978 it was estimated that municipalities spent between 8 and 12% of their property tax revenue on energy.[8] In light of the rapidly rising costs of energy this proportion is already certain to be much larger. Thus any reduction in energy consumption in municipal operations will have a direct dollar saving - an important consideration during the current 'tight budget' situation.

In addition to this budgetary concern it is evident that decisions made today regarding the direction and form of a municipality's growth will have serious implications in a future era of scarce energy. For example, zoning regulations on land use and density help determine the average length of the 'journey to work'. This in turn determines the amount of energy that must be consumed in this daily trip. If a large portion

of each citizen's salary must be spent on getting to work, his disposable income and thus the prosperity of tertiary industries will be affected. Therefore, careful planning for energy efficiency may prove vital to a municipality's future well being.

Broadly, there appear to be three essential reasons for municipalities to be concerned about energy conservation. These are (1) government responsibility, (2) municipal cost control and (3) community enhancement.[9] It is important to determine, therefore, the extent to which municipalities actually take such conservation into account.

Energy Conservation Strategies for Municipalities

The strategies for achieving energy savings at the local level are many and varied. In a recent study of energy programs in Californian municipalities Lang and Armour compiled a list of 50 different specific conservation measures which have been adopted.[10] These are shown in Table 1. All of these diverse strategies fall easily within the definition of energy conservation cited earlier.

Municipal energy conservation measures are frequently divided into two convenient groups. The first relates to strategies that are directed inwardly towards municipal operations (Lang's municipality directed measures)[11] tend to result in immediate, measurable reductions in energy consumption. When justified by this immediate reduction in municipal expenditures they are readily adopted by councils. However, they are frequently adopted on a piecemeal basis without a general policy commitment towards energy conservation.

The second group of measures, those directed outwardly towards the community (Lang's community directed measures)[12] require a greater political commitment. Such strategies include both measures designed to provide

TABLE 1 - Fifty Municipal Energy Measures from California

| Category | | Measure |
|---|---|---|
| Municipality directed (in-house) | Management techniques | 1. Energy use profile and audit |
| | | 2. Life cycle costing |
| | | 3. Monitoring energy use |
| | | 4. Council resolution setting conservation target |
| | | 5. Assignment of responsibility/accountability |
| | | 6. Review of department programs |
| | | 7. Incentives to departments |
| | | 8. Staff training and involvement |
| | | 9. Departmental energy curtailment plan |
| | | 10. Municipally owned electric utility programs |
| | | 11. Integrated internal energy management program |
| | | 12. Influencing employee behaviours |
| | Physical modifications to municipal plant | 13. Public buildings/facilities energy management programs |
| | | 14. Energy-efficient vehicles |
| | | 15. Street lights changed to sodium |
| | | 16. Improvements to energy efficiency of road system |
| | | 17. Improvements to public transit |
| | | 18. Improvements to pedestrian facilities |
| | | 19. Use of appropriate vegetation |
| | | 20. Water conservation |
| Community-directed | Plans and policies | 21. Community energy supply/demand studies |
| | | 22. Support for energy research |
| | | 23. Energy objectives and policies in the general plan |
| | | 24. Energy objectives and policies expressed outside the general plan |
| | | 25. Energy-efficient land use plan |

Continued ...

TABLE 1 - Continued

| | |
|---|---|
| Development controls and other regulations | 26. Removal of barriers in existing development controls<br>27. Protection of solar access<br>28. Siting, design and landscaping requirements<br>29. Energy considerations in informal development review process<br>30. Encouragement to energy-conscious large-scale developments<br>31. Energy-oriented building code<br>32. Mandatory solar hot water heating<br>33. Visual guidelines for solar collectors<br>34. Mandatory retrofit ordinance<br>35. Energy impact assessment<br>36. Ordinance to nullify restrictions on solar equipment<br>37. Ordinance encouraging certain home business operations<br>38. Curtailment of business energy use |
| Local energy resources | 39. Recycling and resource recovery<br>40. Use of waste heat<br>41. Exploiting new local primary energy resources<br>42. Protecting existing local energy resources<br>43. Promoting alternate energy use in the community |
| Outreach programs | 44. Public information and education<br>45. Public participation in program formulation and implementation<br>46. Consultation with target groups<br>47. Encouragement of public energy-conserving behaviours<br>48. Feedback on energy use<br>49. Demonstration projects<br>50. Weatherization programs for especially vulnerable groups |

Source: Reg Lang and Audrey Armour, New Directions in Municipal Energy Conservation: The California Experience, (Toronto, Ontario: Ministry of Energy, 1980), p. 100.

incentives for energy conservation (zoning exemptions and building preferences, for example) and measures requiring mandatory adherence to energy efficiency standards such as zoning regulations and design requirements. These measures cannot be justified by immediate dollar savings but must be defended in terms of their longterm benefits to the community. They appear to require strong political leadership and an ability to convince citizens of their eventual benefit. For this reason these measures are much less commonplace.

The results of a study on energy conservation in land use planning in the U.S. conducted by Sewell and Foster illustrated this tendency to adopt the less politically "difficult" strategies first.[13] Table 2 lists the conserving land use strategies instituted by the American cities studied, in order of their decreasing frequency of adoption. Note how the first strategy listed requires only internal action. Also early in the list are the 'PR' actions such as public statements, promotion of car pools and the publication of literature. Near the bottom of the list (the less frequently adopted strategies) are the strategies requiring a strong commitment to energy conservation such as setting energy efficiency standards and requiring energy impact statements. For most North American local governments a commitment to energy conservation requires an innovative approach to municipal management and like most other innovations, acceptance of the concept is only slowly diffusing through the municipal system.

Unlike senior government levels whose authority and duties are constitutionally determined, local governments are creations of provincial legislation. As such, their role as originally envisioned was simply to provide a means of maintaining the 'traditional' services required by 'urban' communities.[14] Traditional services are generally considered to

TABLE 2 - Energy Conserving Strategies in Descending Order of Adoption

Campaign to reduce energy use in municipal buildings

Public statements by mayor in favour of energy conservation

Provision of bicycle paths

Cluster zoning

Promotion of car pools

Publication and wide distribution of literature to encourage public energy conservation

Mixed use zoning

Higher density zoning

Recycling of bottles, cans and paper

Setting of energy efficient standards for new developments

Adoption and publication of municipal energy plan

Redesigning the municipal land use plan to increase energy conservation

Use of energy analysis in the planning of roads, sewer lines and other public facilities

Requirement of impact statement from developers

Construction of a district heating system

Source: W.R.D. Sewell and H.D. Foster, Analysis of the United States Experience in Modifying Land Use to Conserve Energy, Environment Canada, Lands Directoriate, Working Paper No. 2 (Ottawa: Supply and Services, 1980), p. 82.

include such things as sewage treatment, water supply and street lighting. In 1976 Lithwick and Canadian Mortgage and Housing wrote:

> At the local level, there is a lack of overall policy formulation stemming from archaic jurisdictional divisions, a perverse revenue-sharing system, and a strictly environmental concept of planning. No city appears to have any clear set of urban goals; most live from hand to mouth, trying to wrestle with particular problems as they become intolerable.[15]

Gradually this situation appears to be changing. When the necessity to allocate limited resources among competing options is combined with an awareness of the increasing severity of environmental problems, tradeoffs and bargaining may be required to determine 'appropriate' solutions for existing crises.

> It is hardly surprising that the traditional non-political and supposedly neutral role of local government is out of step with the needs and requirements of the present. Increasingly, individuals and groups are asking that aspiring members of city councils abandon the notion of trusteeship and advocate firm positions in particular policy and programme areas.[16]

Such is the situation with comprehensive municipal energy conservation programs. While conserving energy in municipal operations and thus saving money is an obvious responsibility of municipal councils, causing citizens, by by-law, to conserve energy is a political affair and requires an innovative approach to municipal management.

## Municipal Energy Conservation in B.C.

Although energy conservation appears to have become an important activity for many individuals and companies, the lack of media coverage suggests that it is not a pressing issue for most of B.C.'s municipalities. However, perhaps this is not so. Conceivably many of B.C.'s municipalities may have in fact considered the merits of energy conservation and rejected them. Or possibly some municipalities are quietly carrying out conservation measures known only to the local community.

This research is aimed at determining the extent to which energy conservation has become an acknowledged responsibility of municipal governments in B.C. In order to do this it will be useful to begin by looking at how other innovations have been found to diffuse through similar social systems and at the manner in which decisions are made by local governments.

FOOTNOTES

[1]Robert Stobaugh and Daniel Yergin, eds., Energy Future: Report of the Energy Project at the Harvard Business School (New York: Random House, 1979), pp. 136, 138.

[2]Ibid., p. 12.

[3]City of Portland, Oregon, Policy Analysis Section, Bureau of Planning, Energy Conservation Choices for the City of Portland, Oregon, 6 vols. (Office of Policy Development and Research, Department of Housing and Urban Development, 1977), vol. 6, Project Overview, p. 17.

[4]B.C., Energy, Mines and Petroleum Resources, Analysis and Forecasting Division, Energy Resources Branch, British Columbia Energy Supply and Requirements Forecast, 1979 - 1996: Summary Report, February 1979.

[5]Robert Cameron Mitchell, "National Environmental Lobbies and the Apparent Illogic of Collective Action," and Denton E. Morrison, "Uphill and Downhill Battles and Contributions to Collective Action," in Clifford S. Russell, ed., Collective Decision Making: Applications from Public Choice Theory (Baltimore: Johns Hopkins University Press, 1979).

[6]Ir. P.H.H. Leijendendeckers, "Consumer Attitudes" in Non-Technical Obstacles to the Use of Solar Energy, Proceedings of the International Symposium, Brussels, Belgium, May 20 - 22, 1980, edited by A. Strub and T.C. Steemers (Brussels and Luxembourg: Harwood Academic Publishers, 1980), p. 394.

[7]Reg Lang and Audrey Armour, New Directions in Municipal Energy Conservation: The California Experience (Toronto: Ontario Ministry of Energy, 1980), p.14.

[8]Ontario, Ministry of Energy, Energy Conservation Opportunities for Municipalities (1978), p. i.

[9]B.C., Ministry of Municipal Affairs and Ministry of Energy, Mines and Petroleum Resources, Fuel for Thought: a Primer on Energy Management for Local Government (1981).

[10]Lang and Armour, New Directions, p. 100.

[11]Ibid., p.98.

[12]Ibid.

FOOTNOTES

[13]W.R.D. Sewell and H.D. Foster, Analysis of the United States Experience in Modifying Land Use to Conserve Energy, Lands Directorate, Environment Canada (Ottawa: Supply and Services, 1980), p.83.

[14]T.J. Plunkett and G.M. Betts, The Management of Canadian Urban Government: A Basic Text for a Course in Urban Management (Kingston, Ontario: The Institute of Local Government, Queens University, 1978), p. 6.

[15]N.H. Lithwick and Central Mortgage and Housing Corporation, "An Introduction to the Problems of Urban Canada," in L.D. Feldman and M.D. Goldrick, eds., Politics and Government of Urban Canada: Selected Readings, 3rd ed. (Toronto: Methuen Publications, 1976), p. 104.

[16]Plunkett and Betts, Management of Canadian Urban Government, p. 31.

CHAPTER TWO

## Innovations and the Process of Diffusion

> Innovation has emerged over the last decade as possibly the most fashionable of social science areas; a frequently short-lived and perhaps dubious distinction held in recent memory by small group research. Like the latter, the study of innovation has not been confined to any single discipline but is being explored in fields as diverse as anthropology and economics. This popularity is not surprising. The investigations by innovation research of the salient behavior of individuals, organizations, and polities can have significant social consequences. The latter imbue even the most obscure piece of research with generalizability that has become rare as social science becomes increasingly specialized.[1]

The term 'diffusion of innovation' often varies in meaning with the context of the research. Although in some diffusion research innovations are considered to be processes or products new to the entire environment under study (i.e. inventions), for this analysis of municipal energy conservation programs a much broader definition is appropriate. Here 'innovation' is defined as a change in an organization's (municipality's) operation adopted after deliberation on the advantages and disadvantages of the change. Thus, the idea need only be new to the specific community. In this context 'diffusion' refers merely to the "process by which innovations spread to the members of a social system."[2]

All innovation studies have a temporal component. If more than one innovative organization or individual is being studied the relative timing of various processes leading to the change is the dependent variable. The concept of innovation is normally operationalized in one of three ways:

> The first, and by far the most common, is the assignment to each organization of an innovation score based on its time of first adoption or use. The second is simple, dichotomous adoption or nonadoption. This may be seen as merely a crude measure of the time of adoption, allowing many ties. The third operationalization is determined by the extent to which an organization has implemented an innovation, or the degree to which an organization is committed to it.[3]

Disciplinary Orgins

Diffusion of innovations became a widely studied field in sociology in the late 1950's and early 1960's when extensive research was being done on agricultural innovations. These studies tend to concentrate on those characteristics of individuals which enhance or retard innovativeness. Everett Rogers has become perhaps the most widely recognized researcher in this field and has written several comprehensive works on it.[4] The strong initial thrust of the early research allowed the development of a comprehensive model of the individual diffusion process.

Diffusion studies have also been an important part of geographical literature ever since Torsten Hagerstrand began his diffusion studies in Sweden in the early 1950's.[5] Much of the earlier geographical diffusion research deals with diffusion in terms of the spatial spreading of phenomena. These tend to be based on theoretical or game simulations. These conceptual systems are useful when considering the diffusion of diseases and do have some implications in the diffusion of technological advancements for individuals. However, the complexity of the decision making process in organizations such as municipalities exerts far more influence on the diffusion process than that created simply by geographical relationships.

Recently much attention has become focused on the diffusion of innovations in the administrative science field. The initial concentration on individual innovation has been broadened to include the consideration

of innovative processes in businesses and government organizations. Innovation decisions made by organizations are far more complex than individual innovation decisions.[6] Organizational innovation is the focus of this research.

## Theories of Diffusion of Innovations

In a recent review of innovation studies from various disciplines Martin et al suggest that there are basically three foci such studies may have.[7] They may focus on (1) the speed of diffusion through space, (2) the speed of diffusion within a specific social system or industry or (3) on the motivations for a specific organization or individual to adopt. These differing foci suggest the four main types of 'a priori' theories used to explain diffusion.[8]

Epidemiology Models. This approach was originally devised to explain the spread of contagious diseases through a social system. It emphasizes the effect of distance decay where short distances create a higher probability of 'successful' information flows and personal contacts resulting in adoption of the innovation. "The model applies mainly but not exclusively to innovations whose adoption is automatic except for the information factor, as in the case of small innovations used by small firms."[9]

Recently it has been suggested that modern communication systems have reduced the significance of distance decay. Hudson states that

> If it were not for the importance of face-to-face communication, the importance of distance friction would certainly be cast into doubt in any area having a modern communications system. Although the speed of communication has greatly increased in modern societies, there is also evidence of an increased reliance on word of mouth.[10]

Thus he feels the model, though highly theoretical, still has validity.

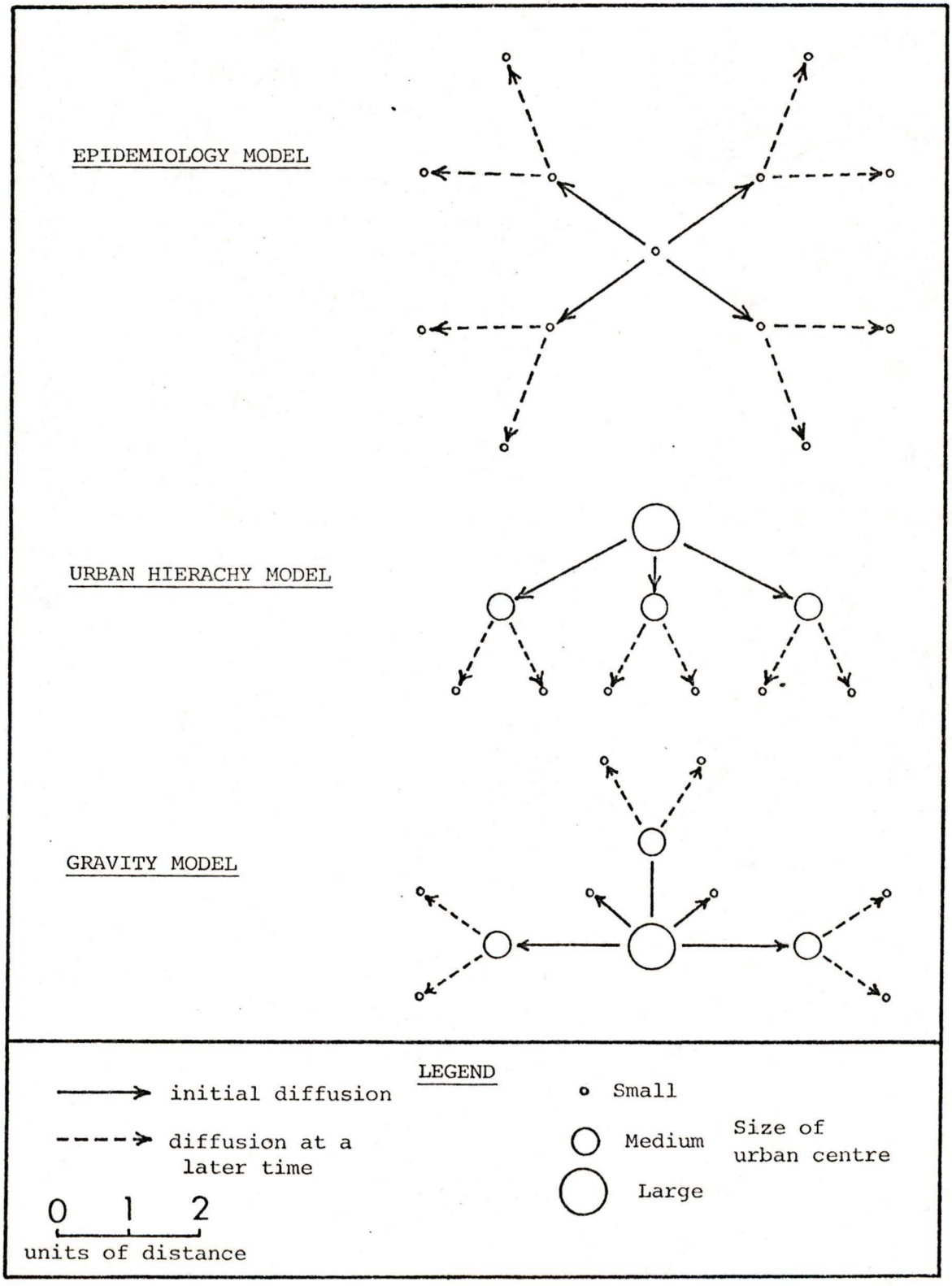
Urban Hierarchy Models. These models, like the epidemiology models, are based on mathematical relationships. They depend upon the assumption that the probability of successful information flows and personal contacts is directly related to the size of an urban centre. Thus the diffusing item tends to reach smaller centres at a later point in time. This approach is useful for studying the diffusion of activities which have a threshold population below which they become uneconomical or risky.[11] A list of such activities would include TV stations, warehouse food stores and shopping malls. Once an activity has proven successful in larger centres it may be seen to spread to smaller ones.

Since this model ignores the important effect of information flows, the urban hierachy model and the epidemiology model have been fused into a third model--a variant of the gravity model. Here both the size (vertical) and distance (horizontal) componants have an effect on temporal and spatial diffusion. All three models are depicted in Figure 1.

Major problems involved with the use of any of these three models relate to the actual measures of distance or size. Although distance is often measured in physical units such a kilometers, it may have more subtle expressions such as social distance (as in the case of various ethnic groups) or economic distance (determined, for instance, by incomes). Similarily size of an urban centre is normally determined by its population. However, size may be measured by the area or by the population of a subset (i.e. a minority group) of the total population.

Diffusion According to Internal Characteristics. Unlike the first two models, the next two do not lend themselves to mathematical modelling but focus rather on the social processes involved. Here an individual's or organization's characteristics are evaluated in terms of innovativeness.

FIGURE 1 - Schematic Illustrating Some Theoretical Models of Diffusion



Evidence is based on empirical studies. Certain characteristics, such as 'cosmopolitism' and availability of uncommitted resources ('slack resources'), often are found to lead to earlier adoption of innovations. This is the approach generally used by sociologists and often requires extensive interviewing of each potential adopter to gain insight into the diffusion process.

Diffusion According to External Environment. In a manner similar to the internal characteristics approach, the external exvironment of individuals or, more frequently, organizations can be examined empirically to uncover common attributes favouring innovative behavior. This is an approach common in marketing studies where the effects of demand and competition have a great impact on a firm's innovativeness.

Since the concern in this study is to identify and compare the characteristics of municipalities which have agreed to take steps to reduce energy consumption with those which have not, the latter two theories here appear to be most relevant to this research.

## Innovation Decision Process

Diffusion of innovations is facilitated by the communication process. Clearly, new ideas must be communicated to innovative individuals before the innovation can be considered. In addition, since there is generally an element of risk and uncertainty associated with this incoming information, an organizational or individual decision making process must occur prior to implementing the new idea.

It is often suggested that the decision to innovate has several stages. Since the concern here is with municipal decision making this analysis will focus on collective innovations and theoretical models that have been devised to analyse them. Table 3 illustrates some of these organizational decision making models. Rogers' model is one of the most frequently

TABLE 3 - Summary of Several Models of Organizational Decision Making

| | |
|---|---|
| Rogers (1962) | 1. Awareness<br>2. Interest<br>3. Evaluation<br>4. Trial<br>5. Adoption |
| Milo (1971) | 1. Conceptualization<br>2. Tentative Adoption<br>3. Resource Getting<br>4. Implementation<br>5. Institutionalization |
| Shepard (1967) | 1. Idea generation<br>2. Adoption<br>3. Implementation |
| Hage and Aiken (1970) | 1. Evaluation<br>2. Initiation<br>3. Implementation<br>4. Routinization |
| Zaltman, Duncan and Holbeck (1973) | 1. Initiation stage<br>a. Knowledge-awareness substage<br>b. Formation of attitudes toward the innovation substage<br>c. Decision substage<br>2. Implementation stage<br>a. Initial implemenation substage<br>b. Continued-sustained implementation substage |

Source: Gerald Zaltman, Robert Duncan, and Johnny Holbeck, Innovations and Organizations (New York: John Wiley and Sons, 1973), p. 62.

used and, as such, is worth examining in greater detail.

Rogers suggests that there are five stages of decision making leading to the adoption of an innovation, namely: 'awareness' of the innovation, 'interest' in its local application, 'evaluation' of the risks involved, a 'trial' period and 'adoption'.[12] Since

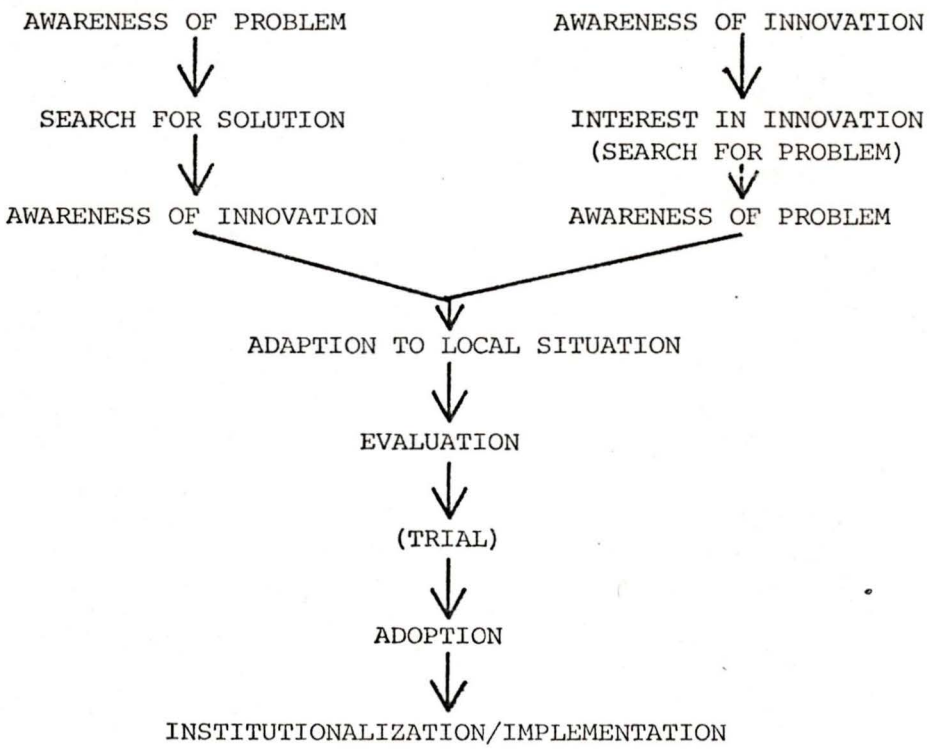
> Organizations often adopt not a specific blueprint for an innovative activity but a general concept whose operational meaning gradually unfolds in the specification process of adopting and implementing the new idea [13]

a sixth stage, 'implementation' should be added to this series. Not all of these stages will necessarily occur and backtracking does take place.

This six-stage approach places awareness of the innovation prior to the recognition of the problem to which it will be locally applied. Another approach to identifying the stages of innovative decision making begins with 'problem recognition'. In this system the initial stage is followed by 'searching' for a solution and 'adapting' the solution to the particular local problem.

Both of these approaches appear to be rational and a combination of the two, where the process begins with either awareness of a problem or awareness of an innovation, seems particularily applicable to this study. A crisis situation of rising fuel oil prices may lead to a search for an energy conservation strategy providing reduction in the level of energy consumption. This is a situation in which the problem precedes the innovation. A federal or provincial government grant offered to subsidize the cost of installing solar water heating equipment may lead to a search for a location where installation of the equipment would be practical. Here the innovation leads to the problem search. Figure 2 illustrates the interrelationship of these two approaches. It should be noted that the motivations for innovation may differ between business and government

FIGURE 2 - Stages in the Decision Making Process Leading to Innovations




Source: Everett M. Rogers and Ronny Adhikarya, "Diffusion of Innovations: An Up-to-date Review and Commentary," Communication Yearbook 3 (1979):67 - 81;

and, Colin J.B. Wood, "Some Characteristics of Searching by Municipal Governments," Geografiska Annaler Series B, Human Geography, vol. 53B (1971):138 - 145.

All stages shown do not necessarily occur and in some cases backtracking may take place before the final stage is reached.

organizations since the latter is not solely interested in profit-making. However, these models apply equally well to both types of organizations.

It is particularly important to distinguish between the two awareness stages since the one which occurs first may affect the timing of adoption and the type of innovation applied to a particular problem. This is directly related to the concepts of 'need' and 'risk'.

The concept of 'need' is related to the decision makers' understanding of the innovation and its purpose. The adoption of a needed innovation will occur much more rapidly than an innovation which appears to be purely an amenity. In a study of innovations within business organizations Knight concluded that organizations in a state of constant crisis will have little time or resources left to consider innovations which will not provide for the alleviation of the critical problems. Any changes will tend to be internally directed--organizational or cost-reducing changes. On the other hand, an organization with plenty of available slack resources will have the opportunity and initiative to conduct wider searches, external to the organization, which will provide more attractive, long-term benefits.[14]

In local decision making the community characteristics (the external environment) will generally determine the extent to which a specific innovation must be considered a necessity. If awareness of the problem precedes awareness of the innovation, the innovation will likely be considered more of a necessity than an amenity. On the other hand, if a problem must be found to justify the innovation it will tend to be considered an amenity.

It has been frequently shown that the amount of risk perceived to be associated with a specific innovation is a very important factor determining its adoption.[15] There will be a certain level of risk related

directly to an innovation determined by such features as cost, local feasibility and rate of payback.[16] Risk, however, varies greatly with the perceiver. What to a conservative individual or organization seems highly impractical may appear sound to an organization which has been successful with similarily unproven practices in the past. The amount of risk perceived can be greatly reduced by the demonstration of the success of an innovation in a nearby or similar community. Thus, awareness of a successful innovation may lead to its application in a local situation.

Key Individuals

In his earlier work Rogers suggests that for innovation to occur within organizations it is necessary to have three separate individuals who perform different roles in communicating the new idea to the decision makers.[17] These individuals help ensure that an innovative decision is made. The 'stimulator', generally someone outside the decision making process who has extensive external contacts, plants the seed of awareness. This could be, for example, a local professional or a newspaper reporter. If successful, the stimulator will be succeeded by an 'initiator'. He is the person who realizes that the innovation can provide a means of narrowing an existing 'performance gap' between the organization's goals or expectations and its actual operation. This individual is often someone who is an insider familiar with the workings of the organization.

After the initiator is successful, a 'legitimizer' is necessary. This individual is one of authority or high visibility who will support the new idea and lend credibility to the initiator's suggestions. In the case of municipal innovation, this role could be played by the mayor or a highly respected alderman. The innovation should now be ready for

serious consideration.

The evaluation stage calls upon the attention of the organization's decision makers. In order that the adoption and implementation stages can be attained, it is necessary for certain resources to be available and other conditions to exist within the organization or in its nearby environment.

## Innovativeness

Considerable research energy has been spent attempting to discover the key ingredients affecting the innovativeness of organizations. Each study appears to discover or reject different parameters. The influences on innovativeness, however, do appear to have three common dimensions:

> (1) the needs, or incentives, for innovation, (2) the mechanisms for bringing innovative alternatives into the decision making process and (3) the absence of organizational barriers to implementation.[18]

It would be fruitless at this time to explore the various specific variables which have been investigated as possible determinants in innovative behavior. In fact, Downs has concluded that

> Factors found to be important for innovation in one study are found to be considerably less important in another study. This phenomenon occurs with relentless regularity.... In spite of the large amount of energy expended, the results have not been cumulative.[19]

In spite of this discouraging statement, Downs goes on to suggest an approach to innovation studies which he feels will eliminate or at least greatly diminish the variability of results. It is necessary, he suggests, to look not only at the innovation process but also at the specific innovations being considered.

## Innovation Types

Innovations are many and varied. In order to simplify studies

examining many innovations simultaneously several classification schemes for innovations have been devised. One approach to classifying innovations is by 'functional' categories. Innovations may be:[20]

1) products or services

2) production/process oriented - equipment or processes for improving services or products

3) organizational structure innovations - such as decentralized decisions making

4) people innovations - training seminars, for example

5) policy innovations - major changes in the strategies for achieving the objectives of the corporation

Studies using this system, Downs and others have argued, do not give consistent results.

Another method classifies innovations according to their role in the organization's operations. Zaltman has recommended the three dimensional typology illustrated in Figure 3. The dimensions are:[21]

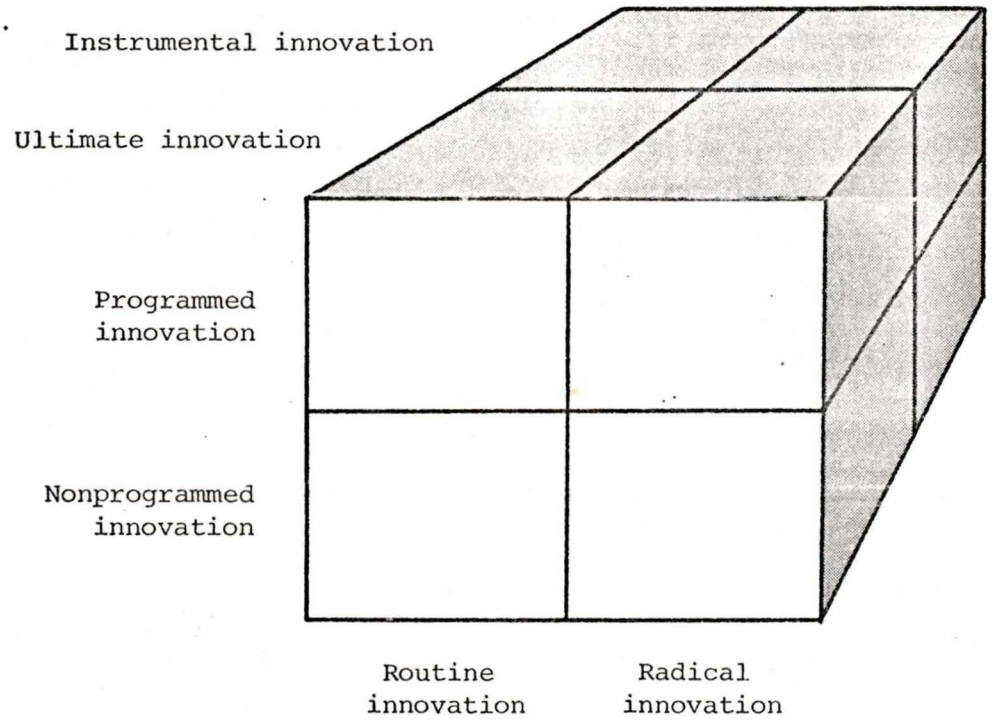
1) Programmed/Nonprogrammed - programmed innovations are those which occur according to a previously devised schedule. An example of this could be air pollution devices for automobiles developed in response to federal regulations. Nonprogrammed innovations come about in response to either crisis situations (needed innovations) or organizations slack where extra time or money is available for considering innovations (amenity innovations).

2) Instrumental/Ultimate - instrumental innovations lead to the eventual realization of the ultimate innovation. Examples would be various technological advancements leading to the eventual development of an inexpensive solar cell for the direct generation of electricity.

3) Routine/Radical - routine innovations will be similar to others which have already been considered and perhaps applied to situations previously encountered by the organization. Radical ones, on the other hand, would be innovations markedly different from any previously considered.

Figure 3 illustrates the interrelatedness of these three dimensions. Although none of the dimensions are mutually exclusive certain combinations

FIGURE 3 - Three Dimensional Typology of Innovations




Source: Gerald Zaltman, Robert Duncan and Johnny Holbeck, Innovations and Organizations (New York: John Wiley and Sons, 1973), p. 32.

are more likely to occur:

> Programmed innovations are usually routine innovations, whereas nonprogrammed innovations, particularily the distress variety, often appear as relatively radical innovations because they tend to produce changes in the subsystems of the organizations.[22]

The difficulty of operationalizing this type of scheme has led Downs and Mohr to caution that any typology of innovations must be based on the attributes of the innovations. These must be defined in terms of primary and secondary qualities:

> Galileo, Descartes, Locke and others divided the qualities of objects and substances into two classes which Locke designated as primary and secondary. Secondary qualities are those which are perceived by the senses, and so may be differently estimated by different percipients; primary qualities are those which are essential to the object or substance and so are inherent in it whether they are perceived or not.[23]

Primary attributes of innovations include physical characteristics such as cost and size. Perceived risk and the effect on productivity are secondary since their magnitudes depend upon the characteristics of the adopting individual or organization.

Downs and Mohr suggest that failure to distinguish a secondary attribute can lead to inaccurate conclusions. If an attribute of an innovation is perceived differently by two organizations the same innovation may then fall into two categories of a typology. In this case it is not the innovation itself but rather its secondary attributes which will show correlations with attributes of the innovative organizations. Attempting to correlate the innovation itself with the organization's environment may explain why some variables which are relevant in theory obtain very low correlations in statistical analyses which use observed data.

Since distinguishing primary from secondary attributes can be

difficult, Downs and Mohr suggest that a more appropriate approach to innovation studies is the 'innovation-decision' design. Each decision to adopt an innovation is considered as a separate unit of study. Thus, when studying several organizations to determine the characteristics leading to innovativeness, each decision to adopt an innovation should be examined separately to determine how both primary and secondary characteristics are related to the outcome. Where several kinds of innovations are included in the study, the research sample size is the total number of innovation-decisions made rather than the number of organizations or the number of kinds of innovations. In this way the attributes of both the organization and its decision makers, as well as those of the adopted innovations, can be considered.

In order to explore further these influences on innovative decision making it is first necessary to examine briefly the literature and concepts of public policy making in local governments. This is the focus of the next chapter.

FOOTNOTES

[1]George W. Downs, Jr., and Lawrence B. Mohr, "Conceptual Issues in the Study of Innovation," Administrative Science Quarterly 21 (1976):700.

[2]Everett M. Rogers and F. Floyd Shoemaker, Communication of Innovations: A Cross-Cultural Approach, 2nd ed. (New York: Free Press, Macmillan Publishing Co. Inc., 1971), p. 12.

[3]Downs and Mohr, "Conceptual Issues," p. 709.

[4]See Rogers and Shoemaker, Communication; Everett M.Rogers, Linda Williams and Rhoda B. West, Bibliography of the Diffusion of Innovations, Exchange Bibliography #1420-22 (Monticelli, Illinois: Council of Planning Librarians, 1977); and Everett M. Rogers and Ronny Adhikarya, "An Up-to-date Review and Commentary," Communication Yearbook 3 (New Brunswick, New Jersey: Transaction Books, 1979), pp. 67-81.

[5]John C. Hudson, Geographical Diffusion Theory, Northwestern University, Studies in Geography, No. 19 (Evanston, Illinois: Northwestern University, 1972).

[6]Rogers and Shoemaker, Communication, p. 275.

[7]F. Martin et al., The Interregional Diffusion of Innovations in Canada (Hull, Quebec: Canadian Government Publishing Centre, 1979), p.12.

[8]These theories are discussed in greater detail in Martin et al, Interregional Diffusion, Chapter 2.

[9]Martin et al., Interregional Diffusion, p. 15.

[10]Hudson, Geographical Diffusion Theory, p. 44.

[11]Martin et al., Interregional Diffusion, p.16.

[12]Rogers and Adhikarya, "Review and Commentary."

[13]Ibid.

[14]Kenneth E. Knight, "A Descriptive Model of the Intra-firm Innovation Process," Journal of Business 40 (1967):478-496.

[15]Lawrence B. Mohr, "Determinants of Innovation in Organizations," American Political Science Review 63 (1969):111-126.

FOOTNOTES

[16]Poul Ove Pedersen, "Innovation Diffusion Within and Between National Urban Systems," Geographical Analysis 2 (1970):203-254.

[17]Rogers and Shoemaker, Communication, p. 276.

[18]Richard L. Daft and Selwyn W. Becker, The Innovative Organization: Innovation Adoption in School Organizations (New York: Elsevier North-Holland, Inc., 1978), p. 9.

[19]Downs and Mohr, "Conceptual Issues," p. 700.

[20]Gerald Zaltman, Robert Duncan and Johnny Holbeck, Innovations and Organizations (new York: John Wiley and Sons, 1973), pp.14-16.

[21]Ibid., pp. 17-32.

[22]Ibid., p. 32.

[23]Downs and Mohr, "Conceptual Issues," p. 702.

CHAPTER THREE

Policy Making in Local Government

> Most people--even poets and ballet dancers--know a good deal about policy making. They know, for example, that the immediate responsibility for policy making has to be delegated to officials, that interest-group and party leaders greatly influence these officials, and that the rest of us play less active (though not insignificant) roles in the policy making drama. Yet many aspects of policy making still need explaining, because almost no one is well satisfied with his understanding of how policy is made.[1]

Public policy making is a process which requires a government to

1) identify certain needs, present and forseen, in their environment,

2) Establish objectives related to those needs and

3) consider alternative ways of achieving those objectives and to choose among them.[2]

Since public policy making requires the making of decisions the following discussion focuses both on policy making and, where appropriate, on the specific activity of decision making.

## Public Policy Analysis

Basically there are two kinds of theories used in the analysis of policy making. Normative theories focus on the final outcome and the rational decision making steps leading to it.

> In this view . . . policy-making is essentially a technical question, a matter of developing more systematic means to canvass alternatives, assess costs and benefits, and implement choices.[3]

The concern in normative analysis is on the soundness of the final decision. The basic assumption is that all options have been evaluated in a

rational manner. Such an approach would be appropriate for reviewing, for example, the various analysis and decision stages leading to the formulation of a policy endorsing the development of nuclear power in B.C. What initial studies were conducted, and by whom? When did the public have a chance to particpate? What choices were considered before the ultimate decision was made? Who made the final decision?

Behavioural models, on the other hand, focus on the processes of policy making. They attempt to explain the policies made. Decision makers are not presumed to have approached the problem with complete rationality. Here the objects of study are the factors which influence the choice of alternatives considered. What were the professional and scientific backgrounds of the decision makers? What sources of political power were brought to bear on the process? How did the current economic conditions affect the decisions made?

While the normative approach to policy analysis is useful in evaluating the validity (i.e. rationality) of the decision process, behavioural theories are valuable for understanding why different decision making groups, following the same rational processes, make contrasting decisions. Therefore, the latter approach is more appropriate for the purposes of this particular study.

Within this dichotomy of normative and behavioural theories, there are many specific theories of public policy making:

> To date . . . there has not yet emerged a general theory that has been accepted as the framework for the analysis of public policy. There still remains . . . a marked disjunction of theories and models among students of this phenomenon.[5]

A brief look at four important, but very dissimilar, theories used to explain public policy making will give a perspective to concepts to be discussed later. Their contrasting foci illustrate alternate ways of

approaching the analysis of particular policy situations.[6]

## Four Theories of Public Policy Making

Incrementalist Theory. The incrementalist theory of policy making proposed by Lindblom focuses on the "logical and behavioural tendencies of policy makers."[7] This approach explores the various obstacles to rational decision making. To explain what he has called the Science of Muddling Through, Lindblom has written:

> Inventive as man has been in extending his analytical capacities, he cannot follow through to a conclusive analysis of the merits of alternative policies. Policy problems simply run beyond his analytical competence. In particular, the merits of many of the goals or values that men contemplate pursuing through public policy cannot be empirically verified as can beliefs about facts, but are instead subject to endless dispute.[8]

Policy makers are thought to be discretional (both intentionally and unintentionally) towards the choices they consider when making decisions. Rather than examining all possible alternatives, only a limited few are examined. In this way, choices are made which provide satisfactory, rather than ideal, solutions to problems--a process called "satisficing" by Simon.[9] Progress towards the ideal situation tends to be piecemeal and incremental instead of being comprehensive and farsighted. An example of this approach to policy analysis is Wildovsky's analysis of the American government's budgetary process.[10]

Public Choice Theory. Public choice theory, like the incrementalist theory, focuses on the decision making process of the individuals who participate in collective decision making. Allan Maslove has written:

> The basic motivating premise of this methodology is the individual as a rational, self-interest maximizing actor. This individual when placed in an environment defined by its institutions, rules of behaviour and a set of prices (incentives) will maximize his perceived self-interest, and will respond to changes in this environment in a predictable fashion.[11]

It is easy to understand the attraction of this approach for economists. Standard economic theories can be applied to situations where prices are defined as a "set of explicit and implicit incentives"[12] and trade-offs related to alternative courses of action. Profits are defined more broadly than in dollars and cents. This view of policy making has been applied to a study of the budgetary process in Canada by Hartle.[13] It is possible, as well, to extend this approach outside the study of the decision making body to studies of voting behaviour and interest group activity.[14]

The incrementalist and public choice theories are two which concentrate on how the decision makers deal with the complex activity of policy making and on the methods they use to narrow their range of choices to a manageable number. The next two theories focus less on the decision makers and more on the external forces affecting the policy outcomes.

Marxist Theory of the State. Here public policy is thought to be the result of conflict between the interests of different economic classes. In this case it is the group rather than the individual which is the unit of analysis. Government in democratic societies is seen as simultaneously attempting to achieve the conflicting conditions of fostering capital accumulation, promoting social harmony and maintaining social order. Thus it must provide support for both capital improvements (to satisfy the capitalist interests) and social services (to satisfy the labour interests). The government attempts to maintain the balance by undergoing continuous change and adjustments necessary in light of a constantly changing environment. Studies using Marxist and other approaches based on assumptions of ideological or cultural constraints have particular value in international comparisons of federal policies.[15]

Environmental Theory of Policy Determinants. "Another way to conceive of public policy is to think of it as a response of a political system to forces brought to bear upon it from the environment."[16] The 'environments' in which different governments have produced different policies are examined in order to determine underlying relationships. This approach has had frequent application in American policy studies.[17]

The organizational environment can be defined as the "totality of physical and social factors that are taken directly into consideration in the decision making behaviour of individuals in the organization."[18] Generally a systems framework is devised to illustrate the effects of the environment.

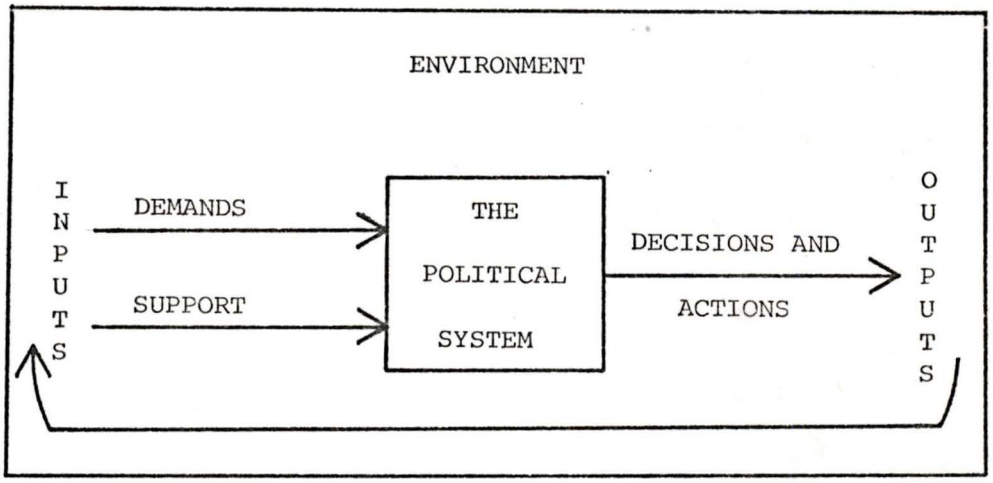
> Environmental variables which presumably measure cleavages comprise 'inputs' (demands and supports) which are 'processed' by the political system (that is, formal governmental institutions), which produce 'outputs' in the form of policies and decisions. By constructing measures of input, system and output variables, and subjecting these measures to quantitative analysis, much of the variation in the incidence of governmental forms and policy outcomes is presumably accounted for.[19]

A graphic representation of the system is shown in Figure 4.

This brief review of four theories used to describe policy making illustrates the complex nature of policy analysis. One cannot fully explain what governments or organizations do by the incrementalist approach or by stressing only the "impersonal forces of the environment. . . . Policy emerges from the play of economic, social and political forces, as manifested in and through institutions and processes."[20] Generally it appears that policy development involves influence from ideals and culture, institutions, environment, power sources and the decision processes of the policy makers.[21]

Although such a conclusion may appear to make policy making too

FIGURE 4 - Systems Framework of the Environmental Theory of Policy Determinants




Source: Thomas R. Dye, Understanding Public Policy, 2nd ed. (Englewood Cliffs, NJ: Prentice-Hall, 1975), p. 37.

complex for analysis:

> the utility of each approach varies depending on the aspect of policy one wants to explain: aspects of the process are more powerful in explaining small, detailed variations in policy; ideology and the environment explain broader variations.[22]

In the case of this study of the actions towards energy conservation taken by municipal councils of the single political region of B.C., the broad environmental approach appears to be appropriate. As will be seen later, the environmental theory provides a simple framework for the review of the variables important for this level of analysis.

## Dimensions of Policy Making

Obviously 'policy making' cannot be properly examined without an understanding of what specifically a policy is. Policy can be broadly defined as

> a deliberate course of action or inaction taken by those in office under the influence of values and pressures on the way resources are to be used in pursuit of objectives or in support of other policies.[23]

There are several important aspects of policy making suggested by this definition. Inaction, and the nondecisions and nonissues resulting from it, are as much a reflection of policy as is action. This will be discussed in greater detail later in this chapter. First, influence and pressure and the related concepts of power and rationality will be examined.

Power. Power is often considered to be the 'political' aspect of policy making. It is a dimension of politics which has attracted exhaustive research in the disciplines of political science and sociology. Although it is not the intention here to explore in depth the various arguments which have been developed using 'power' to explain policy output by governments, the concept provides a useful way in which to understand

the types of influences which have an impact on decision makers.

Power implies "an ability to bring about some change in the behaviour of other people."[24] Lying at the root of discussions of power are the concepts of pluralistic and elitist decision making structures. Pluralism implies that the power to influence decisions made lies in the hands ot all governed while elitist theories suggest that only a small group of individuals are able to influence decisions. Both of these theories have their proponants and in many cases the exercise of power over local councils suggests a mixture of the two with power shifting from one group to another as various issues are explored.[25]

Power can have various sources. Smith suggests that it can arise from:

1) office - in which an individual has been given the authority to exercise power

2) expertise - where an individual's experience and training lend respectability to the opinions he expresses

3) coercion - which implies the capacity to inflict penalities

4) influence - where inducements and persuasion lead to a change in the behaviour of the decision makers.[26]

Politics provides the mechanism through which contentious issues can be settled. The possession of power or the exercise of it upon political decision makers provides them with with means for making value judgements. As Lindblom suggests:

> In actual fact, of course, 'power' is always held by a number of persons rather than by one; hence policy is made through the complex processes by which these persons exert power or influence over each other.[27]

Each individual in the 'environment' of these decision makers possesses a different strength and type of power with respect to each issue under consideration. It is the effect of these diverse power sources which creates varying degrees of influence upon the decision makers and leads

to the range of policy decisions made.

Rationality. Although power provides decision makers with values on which to decide questions of controversial matters, the rational evaluation of alternatives is also a part of decision making. Planning provides this rational evaluation.

Planning is generally considered distinct from politics. The object of planning "is not to set or establish arbitrary values but to provide politicians with information on the alternative directions, means, costs and benefits of governmental action."[28] Ideally, provided with decisions on the objectives to pursue, planners can examine, design and weigh alternative means of achieving those objectives within the bounds of the policies approved by the decision makers. For example, in urban areas, physical planners attempt to coordinate the spatial distribution of various land uses, control the temporal and spatial processes of change, and provide guidance for development in both the public and private sectors.[29] Various techniques for objectively evaluating alternatives have been developed.[30] Using these methods alternatives can be assessed so that the relative advantages of each can, in theory, be easily determined.

Although there are many different models of rational decision making, their value must be realized in light of the obstacles which prevent absolute rationality.[31] This is where the incrementalist theory of policy making obtains its greatest support. Technical obstacles are the most obvious. Expensive and scarce resources in terms of manpower, money and time prevent the evaluation of all possible alternatives. Administrative obstacles exist in the form of hierarchical structures impeding the ability to coordinate planning activities across disciplines. Each individual in the planning process also presents an obstacle to rationality.

Professional training and experience necessarily limit the range of choices considered in 'rational' planning exercises.[32]

Politics creates a fourth type of obstacle. This is the point at which power and rationality merge. Political demands put firm limits upon the range of alternatives which can be considered and the processes of evaluation which are utilized.

## Issues and Policies in Local Government

In terms of public policy making, an issue can be defined as "any unresolved matter, controversial or non-controversial, which awaits an authoritative decision."[33] Issues arise in a community in response to changes in the environment or to new information. Technological change can exacerbate or magnify an existing unsatisfactory situation. New, or additional information, expecially through the mass media, can make the public aware of differentials between themselves and others. The outcome of previous policies within the community can also create new issues.[34] All of these create a 'performance gap', a discrepancy "between what the organization is doing and what its decision makers [and citizens] believe it ought to be doing."[35]

Whether or not an issue comes to the attention of a decison making body is strongly related to the concept of power. The importance of an issue depends on who perceives and defines the situations, the force with which the issue is presented and the distribution of power between the groups in support or opposition.

Policy and Issue Types. One approach to organizing studies of contrasting outcomes of various policy making bodies has been to attempt to classify the issues and policies considered according to various

typological schemes:

> the range of issues will be very different for a metropolitan center as compared to an open-country community; for a southern, as compared with a northern or western community; and for a college town as compared to an industrial center. . . . it appears, then, that there is a pressing need for research leading to the development of a typology of issues.[36]

The intent in such attempts is to remove some of the variation of influences on decisions by holding constant a particular variable--the issue studied. The difficulty with this approach, as with innovation typologies, is that a single issue does not remain constant across the communities. Different decision makers will view an issue differently in terms of urgency, salience, tractability and a myriad of other ways. The discussion in the previous chapter regarding primary and secondary attributes of innovations applies equally well here. Thus, an issue, policy and even a specific measure, as well as the way in which these are perceived by the decision makers, must be considered separate characteristics inherent to each specific community.

Inaction and Non-issues. Inaction is an enigma in policy studies. Non-issues created by inaction tend to be of three types; latent, concealed, and visible.[37] Though non-decisions resulting from inaction may often reflect a policy covertly approved by a council, the fact that no specific demands have been articulated makes it very difficult to determine their existence. These become 'concealed' non-issues.

In some cases a negative decision leading to inaction may be made by a small group not visible to the community at large[38] and thus a 'latent' non-issue develops. It is also possible that an issue will be suppressed in order that it will not become a controversial issue in the community. If this resulting non-issue is recognized by both the decision makers and the community at large it would be designated a

'visible' non-issues.

Thus, the type of non-issues vary according to whether they are salient to decision makers and/or non-decision makers in the community. Table 4 illustrates this relationship. The problem of uncovering inaction (and related non-decisions) in specific areas is further compounded by the many other less important issues which also lead to inaction-- issues that are trivial, suppressed, short-lived, foreclosed, simple, unresolvable, routine.[39]

Clark suggests that the only way to discover non-decisions and non-issues is to determine the extent to which decision makers represent the values and interests of the local subgroups. If decision makers' values differ significantly from various local groups, then many important non-decisions may exist. Similarily, Jenkins suggests that non-issues can be examined "within a context of observable conflict."[40] These are difficult tasks to operationalize, requiring indepth surveys of interest groups and local newspapers in each community.

This concept of inaction and non-issues is an important one for the study of the implementation of innovative policies and techniques in municipal energy conservation. Of major importance to this study is the group of non-decisions and non-issues which result from temporal competition from more 'important' issues--issues which demand the full attention of the municipal council, leaving no time to consider less immediate ones such as energy conservation. It may be possible to study this aspect of inaction by examining what may be described as 'competing issues on the agenda'.

It can be seen that certain issue areas may be either incompatible or complementary to other issue areas. For example, severe budget cutbacks

TABLE 4 - Saliency of Various Non-issues

| | SALIENT TO DECISION MAKERS | SALIENT TO NON-DECISION MAKERS |
|---|---|---|
| LATENT | | X |
| CONCEALED | X | X |
| VISIBLE | X | |

Source: Roy Forward, "Issue Analysis in Community Power Studies", Australian Journal of Politics and History 15 (1969):26-44.

are unlikely to appear along with proposals for new civic sports complexes but could be quite compatible with internal energy conservation programs. It is doubtful that incompatible issues will appear on an agenda at the same time, thus when attention is focused on one issue, others tend to be ignored.[41] Matthew Crenson in his study of air pollution legislation in the U.S. suggests that the absence of specific issue areas on an agenda may reflect latent policy orientations of the council.[42] He operationalized this aspect by cataloguing the items on the agendas of municipal councils in order that trends in incompatibility and complementarity could be determined.

Public policy analysis cannot be comprehensively examined in only a few pages. However, the major factors which are thought to have a direct impact upon local government innovativeness have been presented in this chapter. The interrelationship of innovation decision making and local government policy making can now be explored.

FOOTNOTES

[1]Charles E. Lindblom, The Policy Making Process (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968), p. 1.

[2]T.J. Plunkett and G.M. Betts, The Management of Canadian Urban Government: A Basic Text for a Course in Urban Management (Kingston, Ontario: Institute of Local Government, Queens University, 1978), p. 236.

[3]Richard Simeon, "Studying Public Policy," Canadian Journal of Political Science 9 (1976):549-550.

[4]Ibid., p. 554.

[5]Peter Aucoin, "Public Policy Theory and Analysis," in G. Bruce Doen and Peter Aucoin, eds., Public Policy in Canada: Organization, Process and Management (Toronto: Macmillan Co. of Canada Ltd., 1979), p. 5.

[6]This discussion relies heavily on a review of this topic by Auccin in "Public Policy Theory and Analysis," p. 4-12.

[7]Aucoin, "Public Policy Theory and Analysis,", p. 5.

[8]Lindblom, Policy Making Process, p. 116.

[9]H.A. Simon, "Theories of decision-making in economics and behavioural science," in F.G. Castles et al., eds., Decisions, Organizations and Society (Middlesex: Penguin Books, 1971), p. 44.

[10]A. Wildavsky, The Politics of the Budgetary Process (Boston: Little, Brown and Co., 1964).

[11]Allan M. Maslove, "Review Article: A theory of the expenditure budgetary process," Canadian Public Administration 21:125.

[12]Ibid., p. 126.

[13]D.G. Hartle, A Theory of the Expenditure Budgetary Process (Toronto: University of Toronto Press, 1976)

[14]See Robert Cameron, "National Environmental Lobbies and the Apparent Illogic of Collective Action," and Denton E. Morrison, "Uphill and Downhill Battles and Contributions to Collective Action," in Clifford S. Russell, Collective Decision Making: Applications from Public Choice Theory (Baltimore: Johns Hopkins University Press, 1979).

FOOTNOTES

[15]Simeon, "Studying Public Policy." According to Aucoin, "Public Policy Theory and Analysis," some major works outlining this theory are Ralph Miliband, The State in Capitalist Society (New York: Basic Books, 1969) and James O'Connor, The Fiscal Crisis of the State (New York: St. Martins Press, 1973).

[16]Thomas R. Dye, Understanding Public Policy, 2nd ed. (Englewood Cliffs, New Jersey: Prentice-Hall, 1975), p. 36.

[17]For a review of some of these see Dye, Understanding Public Policy.

[18]Gerald Zaltman, Robert Duncan and Johnny Holbeck, Innovations and Organizations (New York: John Wiley and Sons, 1973), p. 114.

[19]Philip B. Coulter, "Comparative Community Politics and Public Policy: Problems in Theory and Research," Polity 3 (1970):25.

[20]Simeon, "Studying Public Policy," p.550.

[21]Ibid.

[22]Ibid., p. 566.

[23]Brian Smith, Policy Making in British Government: An Analysis of Power and Rationality (London: Martin Robertson and Co., 1976), p. 15.

[24]Ibid., p. 16.

[25]Matthew A. Crenson, The Un-politics of Air Pollution: A Study of Non-Decisionmaking in the Cities (Baltimore: Johns Hopkins University Press, 1971), p. 25.

[26]Smith, Policy Making in British Government, p. 16.

[27]Lindblom, Policy Making Process, p. 29.

[28]Malcolm Rowan, "A Conceptual Framework for Government Policy-Making," Canadian Public Administration 13:290.

[29]J. Brian McLoughlin, Control and Urban Planning (London: Faber and Faber Ltd., 1973), p. 120.

FOOTNOTES

[30]Recently several 'rational' systems for program evaluation and resource allocation have been developed. These include Management by Objectives (MBO), Planning Programming and Budgeting System (PPBS) and Operational Performance Measurement System (OPMS). These are reviewed in Kenneth Kernaghan, ed., Public Administration in Canada: Selected Readings, 3rd ed. (Toronto: Methuen Publications, 1977), Chapter 4.

[31]Smith, Policy Making in British Government, p. 131.

[32]This view is well illustrated in R.J. Audley, "What Makes Up a Mind?" in Castles et al., Decisions, Organizations and Society, pp. 56-65.

[33]Crenson, Un-politics of Air Pollution, p. 29.

[34]McLoughlin, Control and Urban Planning, p. 26.

[35]Zaltman, Duncan and Holbeck, Innovations and Organizations, p. 55.

[36]Ernest A.T. Barth and Stuart D. Johnson, "Community Power and Typology of Social Issues," Social Forces 38:30.

[37]Roy Forward, "Issue Analysis in Community Power Studies," Australian Journal of Politics and History 15:37.

[38]Terry N. Clark, "The Concept of Power: Some Overemphasized and Underrecognized Dimensions - An Examination with Special Reference to the Local Community," in Charles M. Bonjean, Terry N. Clark and Robert L. Lineberry, Community Politics: A Behavioural Approach (New York: Free Press, 1971), p. 27.

[39]Forward, "Issue Analysis," p. 38.

[40]W.I. Jenkins, Policy Analysis: A Political and Organizational Perspective (London: Martin Robertson and Co Ltd., 1978), p. 110.

[41]Crenson, Un-politics of Air Pollution.

[42]Ibid.

# CHAPTER FOUR

## A Conceptual Framework

### An Environmental Model of Local Government Innovation

Previous chapters have shown that theories of innovative decision making and those of public policy making in local governments can both be analysed using an 'environmental' approach. It should be pointed out that 'environmental' factors here mean the political and institutional circumstances within which decisions are made, in addition to the conditions of the physical environment which may affect the decision outcome.

Recall that the characteristics of the environment, both internal and external to the decision making body, and the characteristics of the innovation (or issue) can be seen to combine to lead decision makers toward a final outcome. It is worthwhile, therefore, to take a further look at the systems framework of the environmental model of policy making (see Figure 4). Here 'inputs' from the environment are 'processed' by the decision makers and 'outputs' are produced in the form of policy decisions.

In order to simplify a complex task, environmental studies of local policy making generally begin by classifying the numerous variables which appear to have an impact on decision making. It is convenient here to consider these factors either as external to the decision making body (inputs) or internal to the decision making body (processes). A further breakdown might classify environmental factors according to whether they provide rationality or power to the decision making process. Table 5 lists

examples of factors in each of these categories. Although the relationships between specific factors are very complex, Figure 5 illustrates the basic interrelatedness of these types of factors and indicates that each of these is an important determinant in the eventual policy.

Since the innovation-decision process is a subset of the policy making process, it is possible to incorporate the innovation decision model into the environmental model of local policy making. Environmental influences on innovative behaviour can be easily grouped into the categories developed for the policy making model above. In addition, by expanding the decision process into the environmental model one is not forced to deal only with positive outputs. Negative or non-decisions at any point in the process may be entered into the analysis and their causes noted.

Since it is impossible to graph the complex links between the two models discussed, a simplified framework of an environmental model of the innovation-decision process in local government is illustrated in Figure 6. Although many of the paths shown in the diagram also flow opposite to the direction indicated, this figure is designed to suggest the influences on one specific decision making outcome only. It is important to keep in mind that each of the categories of influencing factors may have varying impacts at differect stages of the innovation-decision process. For example, total municipal revenue may not have a major effect at the awareness stage; however, it may be a major determinant at the evaluation stage when alternatives of varying cost are considered.

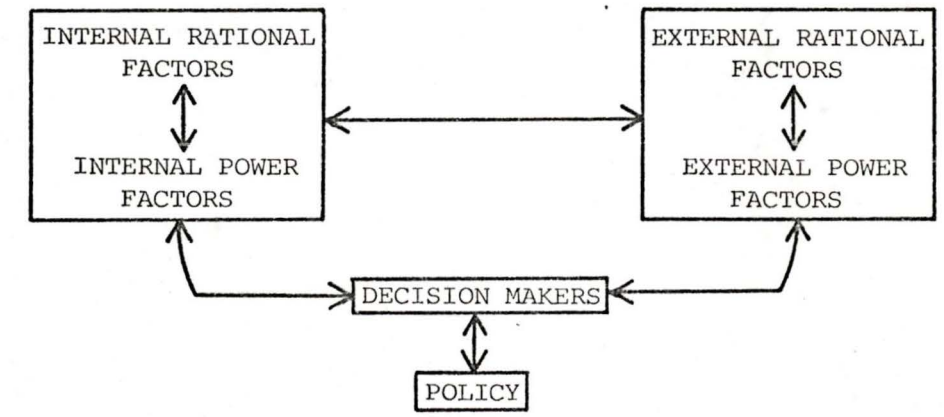
## Energy Conservation Programs in B.C. Municipalities

Returning finally to the topic of municipal energy conservation programs, it can be shown that the environmental model of the

TABLE 5 - Examples of Input Factors

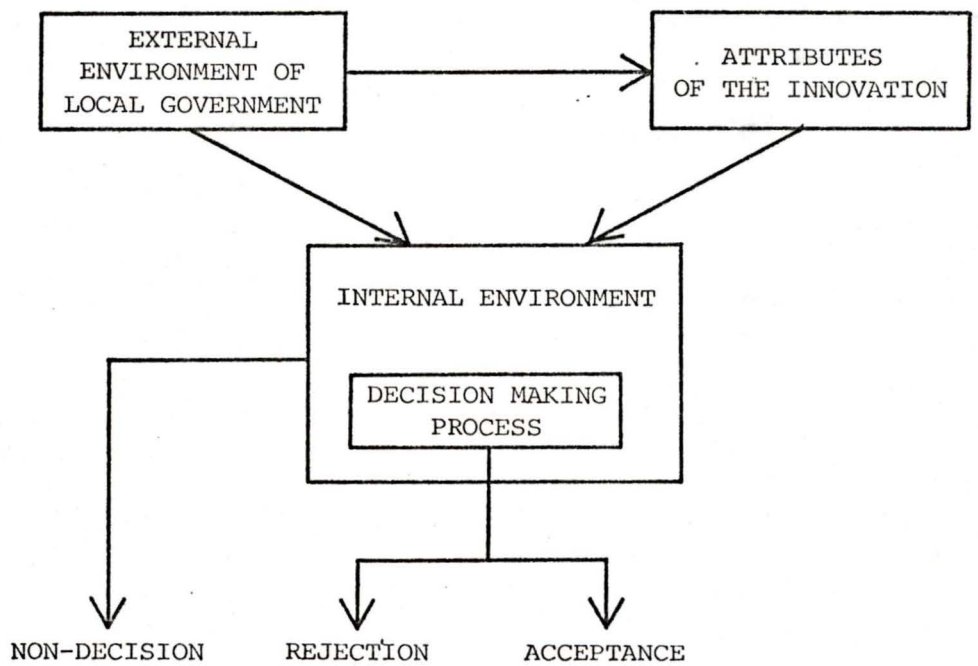
| | RATIONAL FACTORS | POWER FACTORS |
|---|---|---|
| INTERNAL | municipal revenue<br>number of staff<br>surplus borrowing power | strength of mayor<br>experience and knowledge of council members<br>structure of municipal organization |
| EXTERNAL | distance from capital city<br>climatic conditions<br>population | incentives from senior government<br>interest groups<br>information sources |

FIGURE 5 - Basic Relationship Between Input Factors




← flows important for decision making

FIGURE 6 - An Environmental Model of the Innovation-Decision Process in Local Government



innovation-decision process provides a very suitable framework around which to design this study. The model consists of three major components; characteristics of the innovation, external characteristics and internal chatacteristics (the decision making process being a subset of the internal characteristics). The parameters to be considered for analysis in this particular study can then be divided into three categories of data:

1) the innovation itself
2) the characteristics of the community, and
3) the characteristics of the local government.

Energy Conservation - The Innovation

It is important, first, to define explicitly the 'innovation' being studied. Energy conservation was defined in Chapter One as "a program or activity intended to reduce energy consumption, increase efficiency of energy use, or increase the use of renewable resources."[1] This definition applies equally well to the concepts of energy conservation as an 'issue', as an 'innovation' or as a 'series of innovations'.

Energy Conservation as an Issue. In his study of issues and non-issues in American local politics, Crenson defined an issue as an "unresolved matter which awaits an authoritative decision" and thus becomes "an agenda item."[2] This approach may be a useful one since agendas and meeting minutes are readily available for examination. However, such an approach is time consuming and, thus, costly. Alternatively, municipal representatives can be asked directly if energy conservation has ever been discussed during local council meetings. Where it has been discussed, a council can be assumed to have reached the stage of awareness of the innovation.

Energy Conservation as an Innovation. Having determined which councils

have included energy conservation as an issue in their sphere of concern, it is easy to determine if they have adopted it as an innovation. Councils which have passed resolutions or bylaws or have directed their staff to implement specific energy conservation activities are considered innovators.

Energy Conservation as Several Innovations. In the earlier chapter on innovation diffusion it was suggested that each innovation-decision should be studied separately. Therefore, it is further necessary to determine which energy conservation measures have been instituted in each community. Since many energy conservation measures have obvious cost-reduction effects, many of these may have been adopted without the direction of the council. It is necessary therefore, to ask also for a description of measures instituted by the staff on their own initiative.

## General Hypotheses

Several points discussed in previous chapters can now be seen to merge into the set of general hypotheses to which this study is directed. These points are:

1) the role of energy conservation - as an issue, an innovation or several innovations

2) the operational definition of the term innovation - adoption/ nonadoption, timing of adoption and the extent of implementation

3) three important stages of the innovation decision process - Awareness, Adoption and Implementation.

General Hypothesis 1. The 'environments' of communities whose councils have considered energy conservation to be an issue will differ considerably from the 'environments' of communities whose councils have not.

General Hypothesis 2. The 'environments' of communities which have adopted energy conservation programs will differ considerably from the

'environments' of communities who have not adopted these programs. This hypothesis, though similar to Hypothesis 1, is concerned with the actual decisions made concerning energy conservation rather than purely with awareness of the issue. Communities considered under this hypothesis are only those whose councils regard energy conservation to be an issue under the first hypothesis.

General Hypothesis 3. Communities with similar 'environments' will tend to implement similar energy conservation strategies.

## Characteristics of the Environment and the Local Government

After consideration of the copious literature on individual and organizational innovation, it initially appears that the choice of a few meaningful parameters to describe the environment and the characteristics of energy conservation innovators would be a very difficult task. Fortunately, due to the present concern over the cost and security of energy supplies, municipal energy conservation has become a popular area of study. The results of two recent, well-documented reports provide a sound basis from which to choose manageable research parameters.

The study of California municipalities by Lang and Armour discussed briefly in Chapter One identified 15 factors which appear to "pattern municipal energy situations" and lead to the "formulation of effective programs."[3] Concurrently with Lang and Armour's study, the U.S. Department of Energy conducted a very detailed review of the energy activities of 12 local governments in the U.S. Their research, too, suggested 15 factors affecting "the scope, implementation and effectiveness of local government energy activities."[4]

Each study classified the factors in different ways. However, the categories clearly correspond with those developed in the conceptual model

of innovative decision making in local governments. The factors identified in each of these previous studies are compared with the conceptual framework of this study in Table 6. The first column shows the categories devised in the conceptual model. In the second and third columns the important factors of these previous two studies are listed. Underlined headings in each of the lists indicate the categories used in these studies. For example, the first seven factors in the U.S. Department of Energy list were categorized as 'External', the last eight as 'Internal'. In the Lang and Armour list factors 10 to 14 were characteristics of the 'Municipal Organization' found to be important. Reading across the table, corresponding factors are listed on the same line. Thus, 'Available resources' in Lang and Armour's study corresponds with 'Budget/resource constraints' in the U.S. Department of Energy study. Where no corresponding factor was identified the factor is listed on its own line.

## Research Hypotheses

Given the discussion in this and previous chapters and the existing research on municipal energy conservation, it is now possible to present the research hypotheses on which this study is based.

B.C. Municipalities which are innovative in the area of energy conservation will tend to:

### External Rational Factors

1. have local industrial expansion restricted by a limited energy supply.
2. not be connected to the integrated hydro grid and thus be dependent upon diesel generators.
3. have cool climatic ocnditions.
4. have a large population or be small, young and rapidly growing.
5. be in or adjacent to the Lower Mainland (Greater Vancouver area).

TABLE 6 - Previous Research Findings Placed in Conceptual Framework

| CONCEPTUAL FRAMEWORK | LANG AND ARMOUR | U.S. DEPARTMENT OF ENERGY |
|---|---|---|
| EXTERNAL RATIONAL FACTORS | Local Energy Problems<br>1. Local energy supply<br>2. Local energy demand<br>3. Vulnerability<br>4. Natural environment<br><br>Development Characteristics<br>5. Population size<br>6. Stage of development<br>7. Housing market | External<br>1. Cost of energy<br>2. Sources of energy<br>3. Availability of supply<br><br>4. Consumption data available externally |
| EXTERNAL POWER FACTORS | Public Demand and Support<br>8. Local attitudes<br>9. Tradition of community involvement | 5. Level of citizen involvment<br>6. Government opportunities<br>7. Government requirements |
| INTERNAL RATIONAL FACTORS | Municipal Organization<br>10. Available resources<br>11. Control of energy utility | Internal<br>8. Budget/resource constraints<br>9. Existence of municipal energy utility<br>10. Municipal powers and authority<br>11. Consumption data available internally |
| INTERNAL POWER FACTORS | 12. Organizational structure<br>13. Internal support<br>14. Growth management<br><br>Political Demand and Support<br>15. Political will and leadership | 12. Interested individual<br><br>13. Support from elected officials<br>14. Perception of constituents' priorities<br>15. Perceived link between energy and other responsibilities |

Continued ...

TABLE 6 - Continued

Source: U.S., Department of Energy, Office of Assistant Secretary Policy and Evaluation, Division of Environmental and Institutional Impacts Evaluation, Local Government Energy Activities, vol. 1, Summary Analysis of Twelve Cities and Counties, Report DOE/PE-0015/2 (Springfield, VA: National Technical Information Service, 1979), pp. II-46 and II-47,

and, Reg Lang and Audrey Armour, Sourcebook: Energy Conservation in Twenty Canadian Cities, City of Toronto, Planning and Development Department (Toronto: Information Services, City of Toronto, 1980), p. 117.

External Power Factors

6. have an active recycling program in the community.

7. have citizens who are concerned about the local energy supply situation.

8. encourage citizens to take an active role in local government affairs.

9. have obtained funding for energy conservation activities from the Federal or Provincial governments.

10. have different important local issues than municipalities which are not innovative in energy conservation.

Internal Rational Factors

11. have high transportation and solid waste disposal costs.

12. have a large surplus borrowing power.

13. have a large municipal revenue.

14. have a large number of municipal employees.

Internal Power Factors

15. provide tangible support for local recycling.

16. be actively planning for future growth.

17. have a manager or administrator in addition to a clerk.

18. have internal staff support for energy conservation.

19. have strong political support for energy conservation.

These hypotheses, though by no means covering the entire range of possible influencing factors, serve to provide a structure for data collection and analysis. The use of these hypotheses does not prevent the recognition of unanticipated situations arising as data is collected.

FOOTNOTES

[1]Reg Lang and Audrey Armour, Sourcebook: Energy Conservation in Twenty Canadian Cities (Toronto: Information Services, Planning and Development Department, City of Toronto, 1980), p. 14.

[2]Matthew A. Crenson, The Un-politics of Air Pollution: A Study of Non-Decisionmaking in the Cities (Baltimore: Johns Hopkins University Press, 1971), p. 29.

[3]Reg Lang and Audrey Armour, New Directions in Municipal Energy Conservation: The California Experience (Toronto: Ontario Ministry of Energy, 1980), p. 116.

[4]U.S., Department of Energy, Office of Assistant Secretary Policy and Evaluation, Division of Environmental and Institutional Impacts Evaluation, Local Government Energy Activities,vol. 1, Summary Analysis of Twelve Cities and Counties, Report DOE/PE-0015/2 (Springfield, VA: National Technical Information Service, 1979), p. II-46.

# CHAPTER FIVE

## Data Collection

Unlike previous studies on municipal energy conservation programs which have sought information from various known innovators spread across several states or provinces, this study was aimed at all potential innovators within a single political unit--the province of British Columbia. Although this narrowed the geographic range of the municipalities to be studied and held constant certain variables such as electricity costs and senior government incentives, the region under study was very large nonetheless.

Initially, assuming a significant amount of energy conservation activity in B.C.'s municipalities, the study was focused entirely upon the activity in the 29 municipalities on Vancouver Island.[1] This region provided an ideal study site since many factors associated with energy use remain relatively constant across the entire area. These factors include the physical separation from mainland B.C., limited electrical energy supplies until new transmission cables are laid across the Strait of Georgia, relatively consistent climatic conditions and the lack of a natural gas supply to the Island.

A mail questionnaire was sent to the principal appointed officer in each of Vancouver Island's 29 municipalities requesting information on their local energy conservation activities. The intent of this initial questionnaire was to provide base line data from which to design an interview format for more indepth data collection. However, the lack of

activity uncovered by this initial survey showed very clearly that the innovation of municipal energy conservation in B.C. is only in the early stages of the diffusion period. Thus, it was felt that at this time a more appropriate approach to the study of the adoption of municipal energy conservation in B.C. would be to examine the activities of municipalities throughout the province.

The small number of municipal councils on the Island who have considered energy conservation suggested that even the use of a random sample of the 141 B.C. municipalities might possibly not provide sufficient useful data for analysis. Therefore, it was necessary to survey the entire population of 141 municipalities in B.C. The logistics of data collection over the entire province rendered the use of an interview format unmanageable and necessitated dependence upon a carefully constructed questionnaire.

Questionnaire Design - The 'Total Design Method'

In order that the analysis of results would truly reflect the B.C. situation, it was necessary that information be obtained from virtually every potential respondent in the province. Mail questionnaires typically receive low rates of response. So that a reliably high response rate could be achieved, it was necessary to use a meticulously designed questionnaire. Fortunately, a very rigorous method for producing successful questionnaries--the 'Total Design Method' (TDM)--has been recently developed by Don A. Dillman at Washington State University.[2]

In his book describing the method, Dillman reports that the 48 mail questionnaire surveys which had been conducted up to 1978 using this design approach achieved average response rates of 73% for surveys of the general public and 81% for surveys or specialized groups.[3] The method,

based on a systematic analysis of responses to various questionnaire designs, requires extremely careful attention to every detail. The logic on which every design decision is based is carefully described. Not only are there guidelines for question construction, for ordering of questions and for designing the front and back pages of the questionnaire, but also the physical dimensions of questionnaire, cover letter and addressed return envelope are prescribed.

Overall, the TDM seeks to provide a finished product that is well organized and attractive and appears to be short and easy to complete. An equally painstakingly designed cover letter assures the respondent that the study is useful and that the respondent is important to the success of the study. No rewards for completing the questionnaire are offered beyond the implied utility of the study and the opportunity to obtain a summary of results.

There is also a strict implementation schedule to be followed. The first mailing, consisting of the questionnaire, a personally addressed and signed cover letter and a stamped return envelope, is dated and mailed on Tuesday. This, given acceptable mail service, provides for delivery late in the week. Exactly one week after the first mailing, a postcard is sent thanking respondents for completing the survey, if they have done so, or reminding them to do so, if not. Three weeks after the first mailing a second complete package, with a more strongly worded cover letter and another questionnaire and return envelope, is mailed to each respondent whose completed questionnaire has not yet been returned. Lastly, seven weeks after the initial mailing, a final package is sent by certified mail to the remaining nonrespondents.

Questionnaire Design - B.C. Survey

Given the hypotheses posited earlier and the experiences of previous studies on municipal energy conservation,[4] the task of choosing appropriate questions was relatively straightforward. A copy of the questionnaire used for mainland B.C. and copies of the series of cover letters and postcards used in both the Vancouver Island and mainland B.C. surveys are included in the Appendix.

For the sake of a high response rate certain difficult to answer or compromising questions which would have been useful in the final analysis were omitted. The benefits gained by responses to these questions would be outweighed, it was decided, by a possible lower response rate.

In addition, in order to broaden the base for analysis of these results, one question from a questionnaire used in a previous study on municipal energy conservation was adapted to this study. This important question (Question 15) investigates the barriers to adoption of municipal energy conservation programs. It had been used previously in the study by Sewell and Foster on energy conservation strategies in land use planning in the U.S.[5]

Since the entire population of municipalities was eventually surveyed, it was impossible to conduct a standard pilot study. Therefore, the proposed questionnaire was screened by individuals employed by local municipal governments, the Ministry of Municipal Affairs, the Conservation and Technology Division of the Ministry of Energy, Mines and Petroleum Resources, and by several university faculty members. In addition, although the initial Vancouver Island survey provided little data on existing municipal energy conservation programs, it did serve as a useful pilot study for the subsequent survey of the remaining 112 B.C. municipalities. As a result of the careful design initially, very few changes

to the second questionnaire were necessary. One very subjective question which received a high rate of nonresponse was dropped. Also, the order of possible responses on another question (Question 17) was changed in order that the frequency of responses to certain items could be validated. This is discussed in greater detail in the next Chapter.

Questionnaire packages were sent to the principal appointed officers of all B.C. municipalities. It was reasoned that these municipal employees, because of their high management level positions, should be conversant with council matters while at the same time be in touch with the daily operation of the municipal corporation. The Vancouver Island survey was conducted during February to May 1981 and the B.C. mainland survey during April to June 1981.

Although more time consuming and costly than 'standard' questionnaire designs, the results in terms of the response rates for both the questionnaire and for individual questions rewarded the extra effort. The Vancouver Island survey attained a surprising response rate of 100% while the B.C. mainland survey, which ended abruptly at the start of a national postal strike (lasting from June 29 to August 10, 1981), received a 90% response rate (101 out of 112). An overall response rate of 92% for the entire province was obtained. This compares favourably with response rates of 60 to 65% common for questionnaires of this sort.[6]

FOOTNOTES

[1]In B.C. a municipality is defined by the Municipal Act as "the corporation into which residents of an area have been incorporated as a municipality," Municipal Act, RS Chapter 290, Section 1 (1979).

[2]Described in his book Mail and Telephone Surveys: The Total Design Method by Don A. Dillman (New York: John Wiley and Sons, 1978).

[3]Ibid., p. 27.

[4]See U.S., Department of Energy, Office of Assistant Secretary Policy and Evaluation, Division of Environmental and Institutional Impacts Evaluation, Local Government Energy Activities, 3 vols., Report DOE/PE-0015/2 (Springfield, VA: National Technical Information Service, 1979); W.R.D. Sewell and H.D. Foster, Analysis of the United States Experience in Modifying Land Use to Conserve Energy, Environment Canada, Lands Directorate, Working Paper No. 2 (Ottawa: Supply and Services, 1980); and, Reg Lang and Audrey Armour, Sourcebook: Energy Conservation in Twenty Canadian Cities (Toronto: Information Services, Planning and Development Department, City of Toronto, 1980).

[5]Sewell and Foster, United States Experience.

[6]Dillman, Mail and Telephone Surveys, p. 3.

# CHAPTER SIX

## Overview of Survey Responses

Before attempting to validate the specific research hypotheses to which this study is addressed, it is useful, first, to examine the survey responses in a general manner. This chapter, then, undertakes a broad look at the reported municipal energy conservation activities, while the next chapter turns to a detailed analysis of the collected data.

### Primary Review

Before reviewing the information obtained from the mail questionnaire, it is necessary to establish the fundamental validity of the responses and the potential effect of the nonresponses.

Nonresponse. Fortunately, nonresponse was not a major porblem in light of the high response rate obtained. Eleven municipalities from the total population of 141 municipalities (8%) had not returned completed questionnaires prior to the beginning of the postal strike ending this data collection stage.

Figure 7 shows the location of the eleven municipalities which did not reply. Selected characteristics of these municipalities are shown in Table 7. Population (1979) of these municipalities ranges from 625 to 64,250. In the group of eleven, there are four villages, no towns, four districts and three cities. They are distributed throughout the province geographically. Due to this variation in primary characteristics, it is felt that additional questionnaire responses from these eleven

FIGURE 7 - Location of Nonrespondents

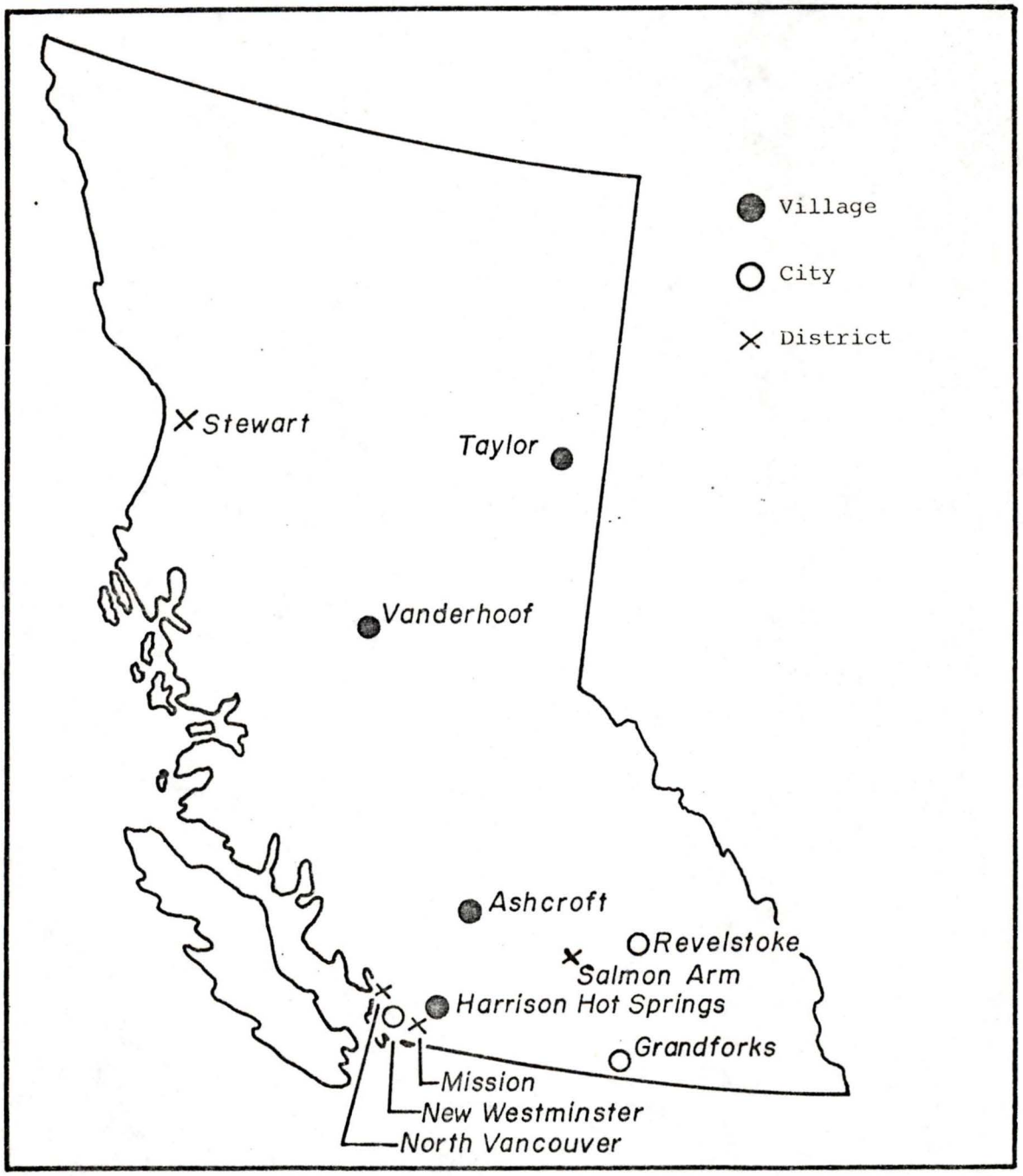


TABLE 7 - Selected Characteristics of Nonrespondants

| NONRESPONDANT | STATUS | POPULATION | REGIONAL DISTRICT |
|---|---|---|---|
| Ashcroft | village | 2300 | Thompson-Nicola |
| Grandforks | city | 3500 | Kootenay-Boundary |
| Harrison Hot Springs | village | 650 | Fraser-Cheam |
| Mission | district | 16,500 | Dewdney-Alouette |
| New Westminster | city | 40,000 | Greater Vancouver |
| North Vancouver | district | 64,250 | Greater Vancouver |
| Revelstoke | city | 5000 | Columbia-Shuswap |
| Salmon Arm | district | 10,700 | Columbia-Shuswap |
| Stewart | district | 1200 | Kitimat-Stikine |
| Taylor | village | 900 | Peace River-Liard |
| Vanderhoof | village | 2500 | Bulkley-Nechako |

Source: B.C., Ministry of Municipal Affairs, Municpal Statistics for the Year Ended December 31, 1979, Victoria.

municipalities would not significantly alter the final analysis of the innovativeness in municipal energy conservation in B.C.

Within the completed questionnaires, there is also a very low non-response rate for individual questions. Only one questionnaire received was begun but not completed.

Response. Due to several events, it appears that a much lower response rate could have developed. Dillman's rigid implementation schedule, in which successive correspondence is sent on the first, third and seventh Tuesdays following the initial mailing, appears to have been designed for the postal service of another country or at least an earlier decade. There are strong indications that mail did not arrive when anticipated. This suggests that given our present postal service, future mail surveys using Dillman's method should use a lengthened implementation schedule to account for this uncertainty.

Also, a national postal strike occurred near the originally scheduled conclusion of the data collection stage. It is not felt that this strike affected the final response rate in a fundamental way.

In addition to the unreliable mail service, the questionnaire was conducted at the time of several strikes being held by municipal employee union locals in B.C. Fortunately, this does not appear to have affected the response rate. However, many respondents may have answered more briefly then they would have otherwise as a result of the additional pressures on them at the time.

In spite of these peripheral difficulties many respondents appear to have completed the questionnaires enthusiastically. In some instances the questionnaire became a joint effort of individuals from several departments.

Although the questionnaire was sent to the principal appointed officer (PAO) in each municipality, it was in many cases, as expected, passed on to other individuals for completion. Since the questions did not request information known only to the PAO, responses from these other individuals are assumed to be accurate. In many cases, it appears that these individuals were more directly involved in local energy conservation activities than would be the PAO.

Reliability of Responses. Several opportunities to check the reliability of the results developed during the survey:

1. After completing the preliminary Vancouver Island survey, the responses to two questions in particular appeared to be somewhat suspect. One question, asking respondents to rate the support given to the concept of energy conservation by local interest groups, was subsequently dropped in the B.C. mainland survey. The other question asked respondents to choose from seven possible policy approaches a council can take, the three their council appeared to favour most (Question 17). In the Vancouver Island survey 25 out of the 26 who answered this question chose the first item in the list as one of their councils' preferred approaches. This item read as follows:

> Seeing to it that the municipality becomes a very attractive place to live - with good residential areas and pleasant, convenient facilities.

Assuming that this approach was being chosen more for its initial position in the list than for its actual frequency of occurrence, in the mainland survey this item was switched with the second item in the list.

Given this switch, the number of times these two items were chosen over the other options are as follows:

| ITEM | VANCOUVER ISLAND | | | B.C. MAINLAND | | |
|---|---|---|---|---|---|---|
| | Item # | Frequency | Rank out of 7 | Item # | Frequency | Rank out of 7 |
| attractive place | 1 | 25/26 | 1 | 2 | 80/98 | 1 |
| good climate for growth | 2 | 16/26 | 3 | 1 | 60/98 | 3 |

Note that in both cases these items ranked 1 and 3 in order of decreasing frequency of response.

In spite of this reassuring consistency, there were many indications that the responses to this question should not be used to determine the important factors in the local decision making process. The respondent in one municipality was kind enough to fill in the questionnaire a second time in response to later letters which indicated the originally completed questionnaire had not been received (the letters crossed in the mail). In both of these questionnaires he chose four (instead of the requested three) items. The first time items one, two, three and five were chosen, the second time items one, two, three and six. In another city, where several individuals cooperated in completing the questionnaire, they commented that the question was:

> highly subjective! Four people gave 4 different sets of answers. These are mine [2,6,7] but the most common of the 4 replies are circled [2,5,6,7]

As a result, responses to this question are considered useful in the analysis but are used only as supporting evidence rather than as primary data.

2. The duplicate responses received served to highlight the subjecivity of other questions as well. These were:

> Question 1 - investigating the extent to which the local energy supply situation is seen as a problem in the community.

Question 15 - rating the possible barriers to the establishment of a local energy conservation program.

Since these are important questions for the analysis it was necessary to utilize these responses. Again they are used only as supporting evidence, indicating tendencies in the communities rather than absolute situations. Since most of these respondents are management level personnel and as such are relatively important in the local decision making process, their opinions are useful indicators of important inputs to that process.

3. Complete responses to two questions required a knowledge of municipal operations and a familiarity with the interests of other municipal personnel. Question 13 asked for the names and titles of personnel interested in energy conservation while Question 14 asked for information on minor energy conservation activities being carried out internally.

This familiarity would obviously vary from individual to individual. However, it is felt that where conditions favourable for innovation in energy conservation exist, responses from any municipal official would reflect this situation.

4. Other than a few individuals who checked responses rather than circling them as directed, there appears to be no misunderstanding of the intent of any of the questions. Thus, all completed questionnaires could be utilized.

## Secondary Review of Results

Having discussed the basic constraints inherent in the questionnaire results, it is now possible to review the results generally and in terms of four commonly recognized geographic regions in B.C. These regions are based on Regional District boundaries and as a result should reflect the regional decision making networks. The regions are defined

as follows:

| REGION | REGIONAL DISTRICTS INCLUDED |
|---|---|
| Vancouver Island | 1. Alberni-Clayoquot |
| | 2. Capital |
| | 3. Comox-Strathcona |
| | 4. Cowichan Valley |
| | 5. Mount Waddington |
| | 6. Nanaimo |
| Lower Mainland | 7. Central Fraser Valley |
| | 8. Dewdney-Alouette |
| | 9. Fraser-Cheam |
| | 10. Greater Vancouver |
| North | 11. Bulkley-Nechako |
| | 12. Cariboo |
| | 13. Central Coast |
| | 14. Fraser-Fort George |
| | 15. Kitimat-Stikine |
| | 16. Peace River-Liard |
| | 17. Skeena-Queen Charlotte |
| South | 18. Central Kootenay |
| | 19. Central Okanagan |
| | 20. Columbia-Shuswap |
| | 21. East Kootenay |
| | 22. Kootenay-Boundary |
| | 23. North Okanagan |
| | 24. Okanagan-Similkameen |
| | 25. Powell River |
| | 26. Squamish-Lillooet |
| | 27. Sunshine Coast |
| | 28. Thompson-Nicola |

Numbers in this list correspond to those shown on the map in Figure 8.

Energy Supply Problems. There appears to be a large variation in the perceived severity of the local energy supply situation. Figure 9 summarizes the responses to the first question:

> To what extent do you feel the local energy supply situation is seen as a problem in your community by the municipal council and by the population at large?

The figure illustrates how observed frequencies of response compare with 'predicted' frequencies. Predicted frequencies are calculated using the distribution of responses from all responses received. Where the bar

FIGURE 8 - Boundaries of Geographic Regions

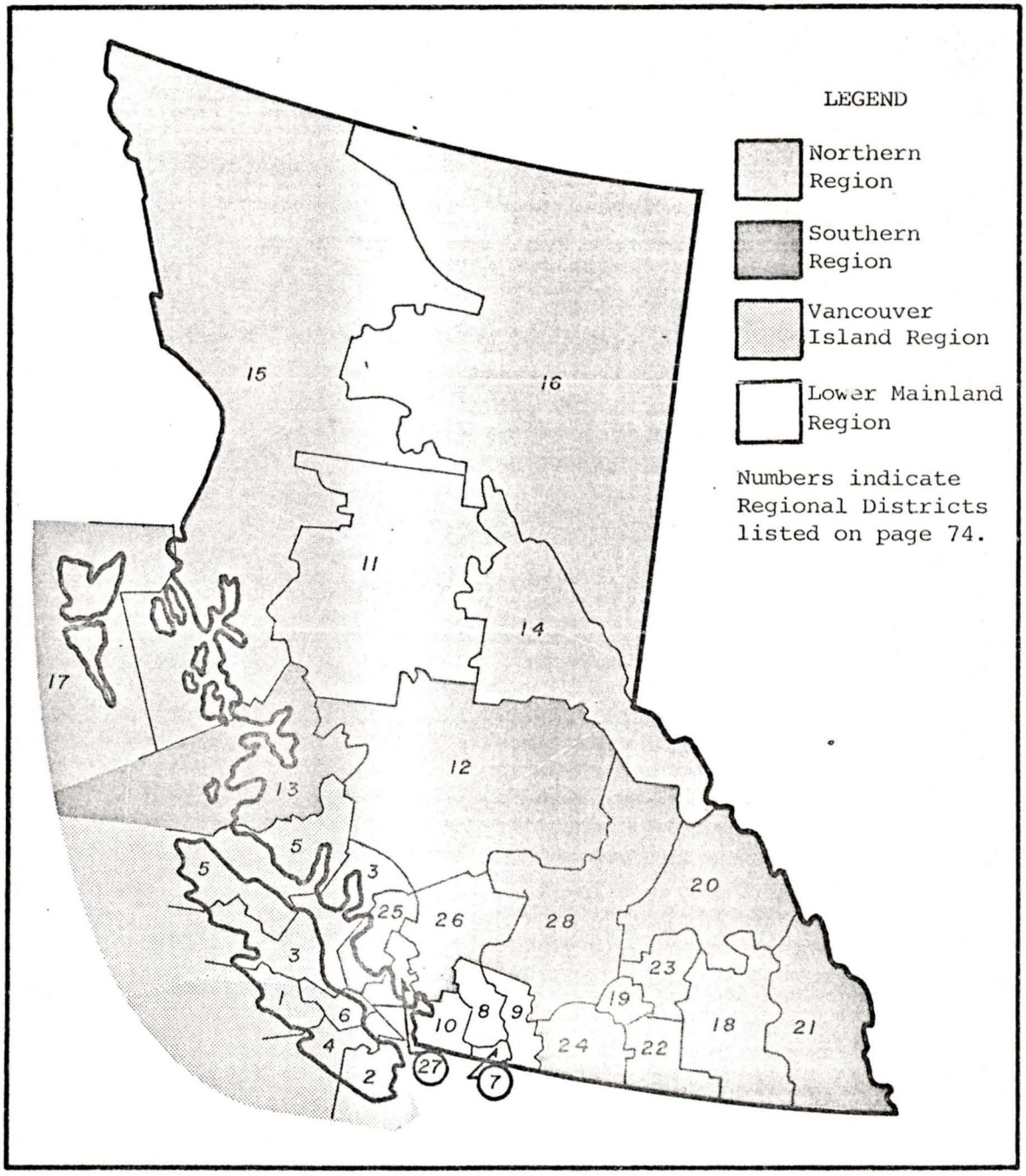
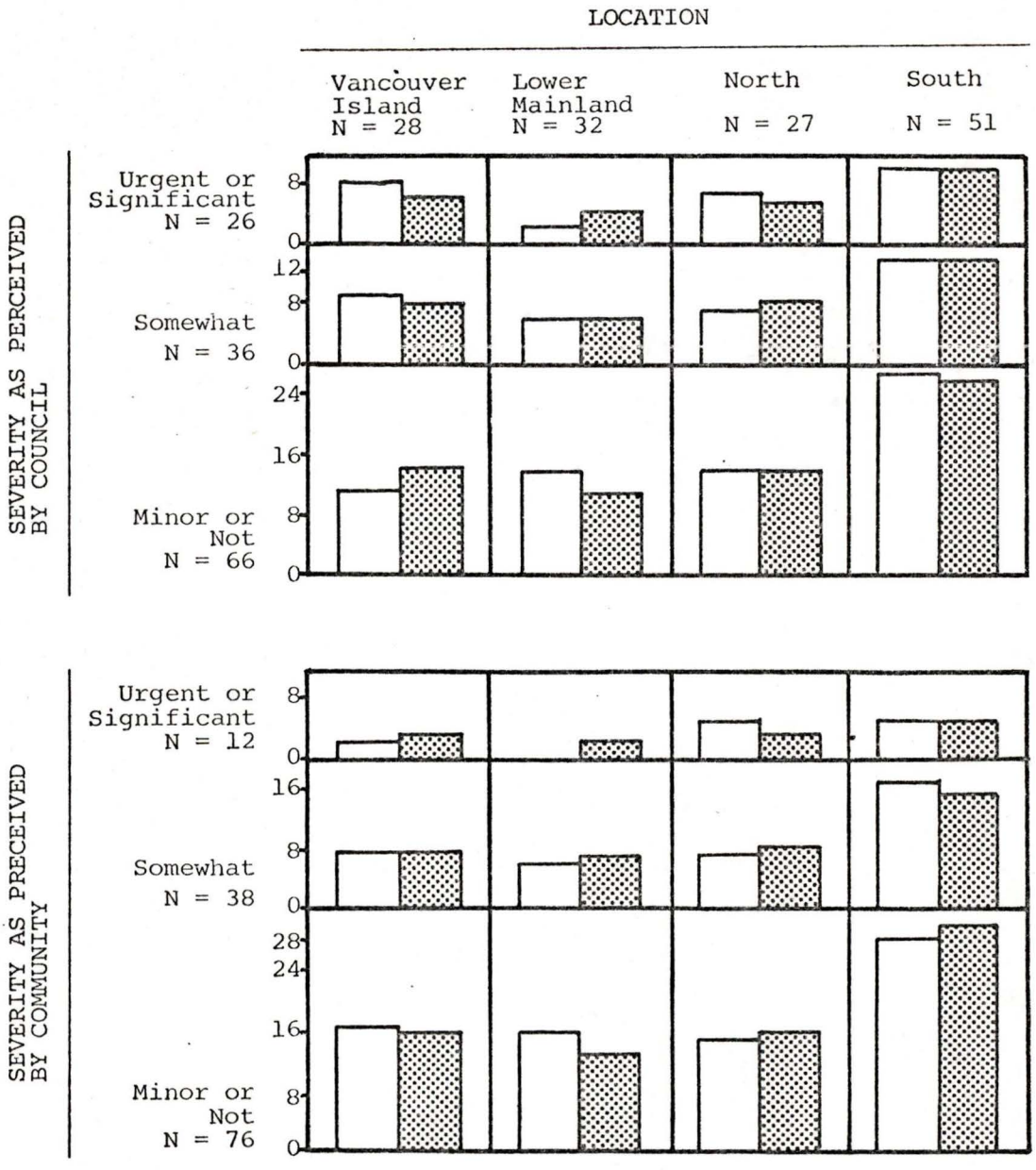


FIGURE 9 - Perceived Severity of Energy Supply Situation




Source: Question 1 - To what extent do you feel the local energy supply situation is seen as a problem in your community by the municipal counsil and by the population at large?

Bar heights represent observed (blank) and predicted (shaded) frequencies. Predicted frequencies are calculated using the provincial distribution of responses.

representing observed frequencies is taller than the corresponding bar representing predicted frequencies, a relationship between the two elements stronger than that indicated by the provincial average is suggested.

On the average it appears that respondents felt energy supply is thought to be a minor problem or only somewhat of a problem to both councils and citizens. Regionally, Vancouver Island councils appear to be slightly more concerned and the Lower Mainland councils slightly less concerned than those in other regions where no strong tendency appears. This corresponds with the present limited electrical and natural gas supply situation on Vancouver Island and indicates that aldermen are aware of its implications for municipal affairs. The lower level of concern in the Lower Mainland region may be a result of that area being less dependent economically upon energy intensive industries.

Very few communities indicated that the local energy supply situation has restricted industrial expansion and/or reduced local employment opportunities. Responses to a question on this topic are summarized in Table 8.

Energy Issues. Energy does not appear to be a major issue in most communities. In response to the question:

> Have there been any citizen groups in your community who have publicly expressed concern over any energy issues?

only a few respondents replied affirmatively. The breakdown of the areas of concern of these citizen groups is shown in Table 9. These concerned groups range from Chambers of Commerce to local environmental groups (especially SPEC) to Rod and Gun Clubs. No significant tendencies are apparent here.

Barriers to Adoption. A question investigating the perceived

TABLE 8 - Energy Restrictions on Economic Growth

| | | Vancouver Island | Lower Mainland | North | South | TOTAL |
|---|---|---|---|---|---|---|
| Past restrictions | Severe | 2 | 0 | 1 | 2 | 5 |
| | Moderate | 1 | 0 | 3 | 1 | 5 |
| | Minor | 1 | 1 | 3 | 2 | 7 |
| Future restrictions | | 3 | 1 | 3 | 4 | 11 |

Source: Question 2 - To your knowledge, has the local energy supply situation in any way restricted the expansion of local industries and/or reduced local employment opportunities over the last 5 years?,

and Question 3 - Over the next 3 years, is it anticipated that the local energy supply situation will in any way restrict the expansion of local inductries and/or reduce local employment opportunities?

Numbers indicate the number of respondants who felt their communities' economic growth had been restricted by limited energy supplies.

TABLE 9 - Energy Issue Areas

| | Vancouver Island | Lower Mainland | North | South | TOTAL |
|---|---|---|---|---|---|
| Interested in energy conservation | 3 | 3 | 1 | 5 | 12 |
| Concerned about limited local supply | 6 | 1 | 4 | 3 | 14 |
| Opposed to local energy supply developments | 0 | 0 | 3 | 2 | 5 |

Source: Question 4 - Have there been any citizen groups in your community who have publically expressed concern over any energy issues?

Numbers indicate the number of respondants who listed a local group interested in one of these energy issue areas.

barriers to the adoption of energy conservation measures was included in the questionnaire not only to provide useful information for the detailed analysis but also because it might provide information of particular interest to provincial government officials involved in municipal energy conservation programs. As mentioned previously, this question was based on a similar one used in a survey of the diffusion of energy efficient land use strategies in the U.S. by Sewell and Foster.[1] Since energy conservation appears to be a rational area of interest for municipal councils, this selection of possible barriers reflects the four common types of 'barriers to rationality' discussed in Chapter 3. These are technical, administrative, political and personal barriers.

By assigning integer values to signify the increasing strength of the potential responses (from 0 for 'not a problem' to 3 for 'a major problem') Sewell and Foster were able to list the barriers in the probable order of decreasing significance. Using the same approach with the data from the B.C. survey, the order of significance shown in Table 10 is determined.

It is interesting to note how little similarity there is between Sewell and Foster's rankings and the rankings from this survey. While most barriers to energy conserving land use measures appear to be political, potential adopters of municipal energy conservation activities appear to be most reluctant to invest time and money.

Although this numerical approach to a nonnumerical question (Table 10) cannot be literally interpreted, it is interesting to note that the 'top' two barriers identified in this study relate to the scarity of funds and staff and the next two to the lack of interest in energy conservation. In terms of municipal management these do appear to be valid reasons for

TABLE 10 - Barriers to Adoption Listed in Decreasing Order of Frequency

| Rank in B.C. survey | Rank in Sewell and Foster survey | Item |
|---|---|---|
| 1. | not included | Limited funding and staff available for such programs |
| 2. | 4. | Lack of federal and provincial incentives |
| 3. | 3. | Energy conservation not seen as an urgent problem |
| 4. | 2. | Lack of interest in the community |
| 5. | 9. | Staff unfamiliar with techniques |
| 6. | 8. | Lack of jurisdiction over this issue |
| 7. | 1. | Rigidity of the existing municipal infrastructure |
| 8. | 6. | Conflict with other municipal objectives |
| 9. | 5. | Opposition from groups and organizations within the community |

Source: W. R. D. Sewell and H. D. Foster, Analysis of the United States Experience in Modifying Land Use to Conserve Energy, Environment Canada, Lands Directorate, Working Paper No. 2 (Ottawa: Supply and Services, 1980),

and Question 15 - Below is a list of possible obstacles facing any municipality wishing to establish local energy conservation programs. Rate each one according to how serious a problem you believe it to be at present in your community.

not implementing these innovative activities. This, then, identifies clearly two important areas for concentration if senior government officials wish to promote municipal energy conservation activities.

For the purposes of this particular study it is useful to examine the distribution of responses to each of these barriers in terms of the four geographical regions in B.C. Figure 10 depicts this information graphically. Municipalities in all regions agree that limited funding and staff and lack of incentives are significant problems while conflict with other municipal objectives and opposition within the community are not important barriers.

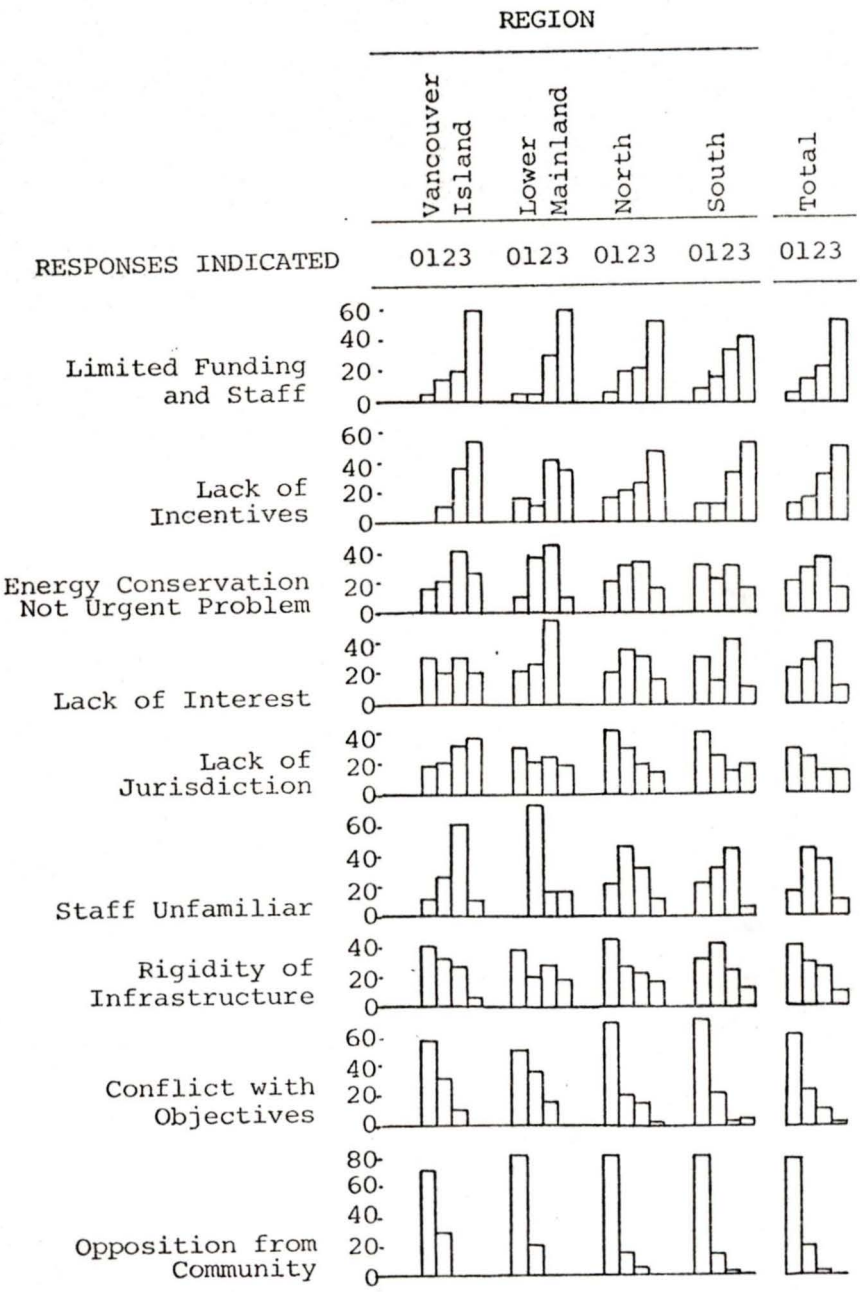
For the remaining barriers some regional variation does appear to exist:

1. 'Energy conservation not seen as a problem' appears to be a moderate barrier everywhere but in the northern region where no strong preference occurred.

2. 'Lack of interest in the community' was perceived more strongly to be a moderate problem in the Lower Mainland and southern regions than in the other two regions where opinions were not particularily one sided.

3. The Lower Mainland and southern region respondents felt staff unfamiliarity with energy ocnservation was only a minor problem while Vancouver Island and northern respondents tended more strongly toward a moderate response. This lends some support to the proximity theory--Lower Mainland and southern municipalities are closer to the U.S. innovators and other information sources. However, unless one views the Strait of Georgia as a major communication barrier, as it may be, this does not explain why the Vancouver Island region responses were more

FIGURE 10 - Barriers to Adoption: Regional Analysis




Source: Question 15 - Below is a list of possible obstacles facing any municipality wishing to establish local energy conservation programs. Rate each one according to how serious a problem you believe it to be at present in your community.

Height of bars represents percentage of region choosing specific responses as follows:

0 - Not a problem
1 - Minor problem
2 - Moderate problem
3 - Minor problem

strongly in agreement with this obstacle.

4. The graph illustrating the item 'lack of juridsiction' shows an interesting difference between the Vancouver Island region and the southern region. Vancouver Island municipalities tended to indicate that jurisdiction is a significant problem while the southern respondents indicated it is a very minor issue.

Whether these observations are significant is questionnable. However, they do point to possibly fruitful areas for futher study. A similar analysis was performed by grouping the municipalities according to population size. Variations by size did not appear to have any significant trends.

Energy Conservation Activities in B.C.'s Municipalities

Throughout B.C. municipalities there appears to be very little attention being paid to coordinated municipal energy conservation programs. This does not suggest that municipalities are not concerned about saving energy. Most conservation results directly in reduced expenses. Table 11 lists all energy conservation activities listed in the completed questionnaires received. These measures are grouped in a manner similar to that used by Lang and Armour in Table 1. The first 22 measures provide for reduced energy consumption within municipal operations while the following 17 measures are directed toward reducing the consumption of 'conventional' energy in the community generally.

Amongst the 39 measures listed are 13 which for adoption would require more than a rational analysis in the decision making process. These measures would also need some exercise of power. These require the commitment of scarce resources which certain of the decision makers may feel could be more usefully employed in other ways. Thus, it would be

TABLE 11 - Energy Conservation Measures Adopted or Considered

Inwardly Directed

A. Committing Resources
1. Establish internal energy management committee.
2. Assign staff to additional duties in energy conservation.
* 3. Hire energy conservation officer.
* 4. Budget for unspecified energy conservation activities.
5. Purchase policy on energy efficiency and life cycle costing.

B. Improving Operations
6. Review specific municipal buildings and/or operations for conservation opportunities.
7. Conduct comprehensive energy audit of municipal operations.
8. Reduce consumption by cutting back on equipment use.
9. Manual daily adjustment of heating and lighting levels.
10. Increased maintenance and proper adjustment of equipment.
11. Municipal vehicles used more efficiently.
12. Coordinated internal energy management programs.

C. Physical Modifications
13. Convert heating system from oil to other conventional energy sources.
14. Interior illumination improved.
15. Various efficiency improving devices added to existing equipment and facilities.
16. Conversion to energy efficient street lights.
17. Improved insulation in municipal buildings.
18. Retrofit of municipal buildings.
19. Purchase of smaller, fuel efficient vehicles.
20. Purchase of diesel and/or propane vehicles and engines.
21. Energy efficiency planned into new municipal buildings.
22. Solar heating added to swimming pool.

Community Directed

D. Plans and Policies
* 23. Community energy audit.
* 24. Official statements of concern by council.
* 25. Clauses promoting energy efficiency included in community plan.
* 26. Adoption of official municipal energy conservation plan.

* indicated measures requiring strong political commitment

continued ...

TABLE 11 - Continued

E. Development Controls and Regulations
   27. Encourage energy efficient developments.
 * 28. Solar access protection.
 * 29. Support amendments to building code requiring increased efficiency in new buildings.

F. Local Energy Resources
   30. Municipal support for recycling activities.
   31. Encourage use of renenwable energy in new developments.
   32. Promote use of local industrial wastes for energy sources.
   33. Energy recovery units on solid waste disposal units.
   34. Exploit new local primary energy sources.

G. Outreach
 * 35. Establish energy conservation steering committee to encourage public participation in program.
 * 36. Sponsor local energy information centre.
 * 37. Sponsor educational/cultural programs on energy conservation.
 * 38. Conduct seminars and conferences on energy conservation.
 * 39. Sponsor demonstration projects.

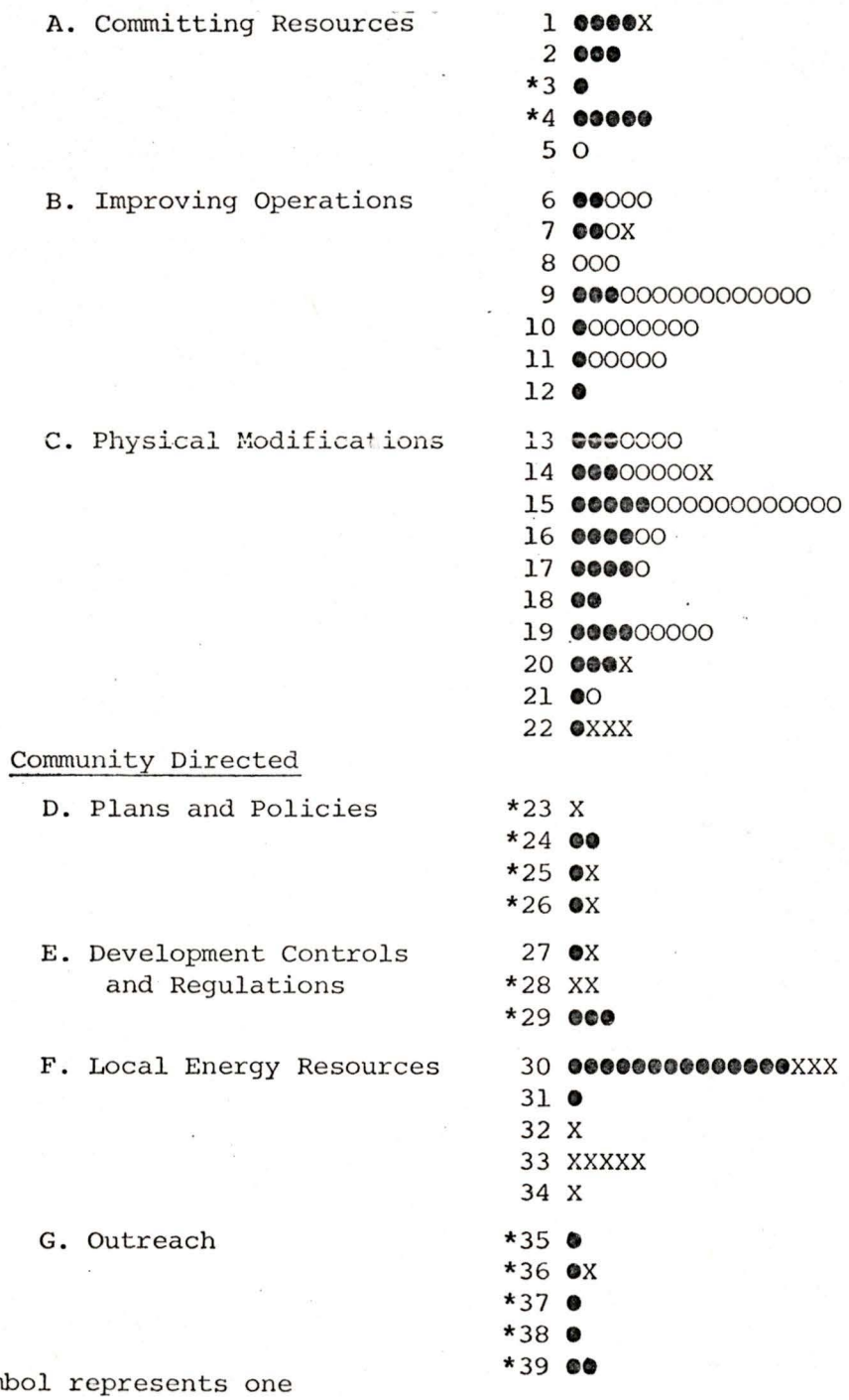
necessary for council members to commit themselves politically to the concept of energy conservation and to bargain and make trade-offs in order to achieve the adoption of these 13 measures. For this reason these measures have been marked with an asterisk in Table 11 and will be dealt with separately in the following discussion.

Most of the measures included in this list were not specified as council actions but rather as actions implemented on the initiative of municipal staff alone. The reported frequency of adoption by staff and by councils of these measures is illustrated in Figure 11. This figure shows quite clearly how much more popular are the inwardly directed measures. Measures which realize an immediate reduction in the energy consumption by agencies of the municipal corporation, and thus the cost of operations, were reported to be far more frequently adopted than those which are directed outwardly to the community and/or require a political commitment. In order of decreasing frequency of adoption the top 6 measures are:

1. Efficiency improving devices
2. Everyday conservation practices
3. Recycling
4. Energy efficient vehicles
5. Improved interior illumination
6. More frequent maintenance

Of the community directed measures, only one was reported to have been implemented in more than three municipalities. Fourteen municipalities reported having a council which actively supports recycling by operating a recycling program or by providing financial assistance, a building and/or a collection site. Support for recycling activities,

FIGURE 11 - Reported Frequency of Adoption or Consideration of Energy Conservation Measures




Each symbol represents one municipality:
- ● adopted by council
- O adopted by staff
- X under consideration
- * measure requires strong political commitment

Energy conservation measures are identified by numbers corresponding to those used in TABLE 11.

however, appears to have a limited relationship to energy conservation programs. Of the 14 municipalities reported to be supporting local recycling activities, five of these (42%) have not discussed energy conservation in council meetings. Therefore, it appears that recycling support is not necessarily the result of an interest in energy conservation.

In spite of this wide range of energy conservation activities identified, the amount of activity in the province as a whole is minor. While 51 municipalities (39% of respondents) reported that their councils had discussed energy conservation in council meetings, only 34 (26%) reported their councils had taken any action to encourage energy conservation. Of these, only eight (6%) appear to have made a political commitment to energy conservation.

Committed B.C. Municipalities

There are eight communities in the province which appear to be making substantial headway toward developing a comprehensive approach to municipal energy conservation. Three municipalities have made especially significant progress.

1. Port Coquitlam. Council has placed $3000 in the 1981 budget for unspecified energy conservation programs. While many communities have budgeted for energy conservation activities, specific activities have been identified at budget time. Power must have been involved to override other rational claims on this money. This municipality conducted an energy audit of some of their municipal operations in 1979.

2. West Vancouver. Council has also budgeted for unspecified energy conservation projects. They have, however, set up an internal energy conservation committee to administer this budget. Although they have

done very little to date for energy conservation, they are very heavily involved with a municipal recycling program which, it appears, is seen by municipal staff as a major energy conservation activity. When asked what resolutions council have passed with respect to energy conservation, the response was "Budget of funds for 'E.C.' projects, recycling depots and curbside pickup."[2]

3. Kelowna. Council received, discussed, and passed on for future deliberation a letter from a citizen regarding solar access protection. In 1979, council passed a resolution to be sent to the Union of B.C. Municipalities that amendments be made to the National Building Code to include new energy conservation standards. A further resolution, providing guidelines for thermostat settings in municipal buildings, was passed in July 1979. At the present time this municipality is collecting and reviewing information on municipal energy conservation programs in order to "produce a cohesive energy conservation policy."[3]

4. Elkford. Though the respondent from Elkford did not indicate that the council had ever discussed energy conservation it appears that there is interest locally. The community plan officially adopted in October 1980 includes the following conservation clauses:

> 4.1.8 Council shall encourage energy efficient site planning and innovative residential developments that make efficient use of land and the natural physical assets of that land.
>
> 4.1.9 Environmental design considerations shall be given to cold air drainage in developments of the upper terrace by the creation of tree buffer zones within new residential developments as well as along the major arterial and collector roads.[4]

5. Hazelton. Hazelton has taken a very unique and innovative approach to municipal energy conservation. This municipality plans to develop its "own hydro electric generating facility on a local creek

using surplus 3MW Hydro generator available locally."[5] At the time of the questionnaire they were awaiting a reply from B.C. Hydro on this proposal. In addition, the municipality has installed a small wind generator on the roof of their municipal hall to serve as a demonstration of that source's potential. Also, in 1979, under 'Katimavik', the Federal government's work/experience program for young people, a student was employed to develop a demonstration exhibit of alternate energy ideas to be displayed to children in the local schools.

6. Victoria. This city has finally begun to make progress on their energy conservation program. In 1978, the city was chosen as a site for a federally funded municipal energy audit. In 1979, energy conservation was added to the responsibilites of the council's Public Works and Emergency Measures Standing Committee. In 1981 an Energy Advisory Committee was set up and energy conservation given a budget of $25,000. Up to the research period only internal measures had been implemented. Council has, however, since been asked to approve some funding for a local energy information centre to be jointly sponsored by the federal, provincial and municipal governments.[6]

7. Vernon. Vernon has a unique role in the diffusion of municipal energy conservation programs in B.C. In 1979, Vernon was selected as one of three Canadian communities to become demonstration sites for an experiment in developing community energy conservation initiatives. The other communities chosen were Fredricton, B.C., and Richmond Hill, Ont. These communities were selected on the basis of their demonstrated interest in community energy activities.[7] A trained consultant was 'parachuted' into the community to act as a 'stimulator'[8] for local energy activities. In addition, an 'initiator' from within the community was also engaged.

These two individuals worked together to involve citizens, community groups and municipal government officials in energy conservation. The program was originally funded for two years jointly by the federal, provincial and municipal governments and by the local community college.[9] Many local activities have been initiated as a result of this program. These include a review of solar access protection legislation, an internal energy conservation program, energy efficiency clauses considered for inclusion in the community plan, land use planning for energy efficiency and life cycle costing procedures.[10] In spite of this progressive approach, local funding for the project was withheld after the initial funding commitment of two years ended.[11]

8. Vancouver. Vancouver is the major innovator in municipal energy conservation programs in B.C. As the result of strong initiative from a former Alderman who is now the city's mayor, energy conservation is considered to be an important part of Vancouver's municipal responsibilities.[12] Vancouver hired an Energy Conservation Officer in 1978 and has approved energy conservation budgets annually since that time. They have a large internal energy management program and have realized dramatic savings as a result of it. They have also actively encouraged the planning of energy efficient housing developments and are considering 'neighbourhood energy conservation programs'. In cooperation with SPEC they have set up an Energy Information Centre which is now the pilot centre for a series being developed throughout B.C.[13]

## Energy Conservation's Introduction to Council

Two other areas of interest in this overview of questionnaire results are the circumstances which prompted a discussion of energy conservation in council chambers and the sources of information and funding that have

been tapped by the municipalities to enable them to develop their energy conservation measures. First, the manner in which energy conservation has been introduced at council meetings will be explored.

Although most respondents did not know or could not recall why energy conservation was first discussed by their councils there were a number of useful responses. The most frequently reported reasons for discussing energy conservation were the cost of municipal operations (11 municipalities) and concern over an insecure and/or expensive energy supply (8 municipalities). In these cases, the innovative decision making processes began with an initial awareness of the problem (cost and supply), leading to the search for a solution (energy conservation). All other reasons for introduction to council mentioned indicate an initial awareness of the innovation leading to a search for its local application:

1) interests or concerns about specific aspects of energy conservation introduced by informed individuals both inside and outside of council (5 municipalities)

2) the opportunity to reduce energy consumption by considering energy efficiency options in the purchase of new equipment or facilities (4 municipalities)

3) a new energy conserving idea seen by a municipal officer or employee in a media report or at a seminar (4 municipalities)

4) the existence of a 'new' useful energy source, such as solar or waste heat, brought to council's attention (4 municipalities).

The manner in which energy conservation is introduced to councils--as a solution to a problem or as an interesting innovation--does not appear to have a major impact on the overall success of the innovation. Far more important are the specific problems and solutions themselves and the conditions in each community which affect the decision processes.

Funding and Information Sources

Only six municipalites reported having obtained outside funding

which enabled them to develop energy conservation activities. Four of these municipalities reported assistance with specific projects; an oil to natural gas conversion, municipal energy audits and a recycling program. Only two municipalities, Vancouver and Vernon, reported any assistance with projects taking more comprehensive approaches.

In these few cases in which funding was received it is evident that the federal and provincial governments have been the most generous sources. The only other sources reported were North Okanagan Regional District and Okanagan College, both contributing to Vernon's program, and SPEC who had aided in a portion of Vancouver's.

Information sources have been more freely exploited. Table 12 shows the information and technical assistance sources provided in the questionnaire in order of decreasing frequency of designation. This list is a useful indication of the success of the energy conservation campaigns by B.C. Hydro and both senior levels of government. Other information sources mentioned were "information newsletter", a library, volunteer agencies and schools.

Comments and Observations

Though it would be most interesting to review many of the respondent's personal responses in detail, confidentiality prevents this; however, a few general observations can be made.

It appears from the questionnaire responses that energy conservation is an area of interest in many communities, no doubt as a result of its direct dollar savings. Likely because of this, responses were usually complete and very informative. Many individuals indicated their desire to do something constructive about energy conservation but justified their inactivity by listing time and financial constraints.

TABLE 12 - Sources of Information and Technical Assistance

| SOURCE | NUMBER OF RESPONDANTS INDICATING SOURCE |
|---|---|
| 1. Energy supply companies | 14 |
| 2. Provincial government ministries | 7 |
| 3. Federal government departments | 6 |
| 4. Individual citizens | 5 |
| 5. Other municipalities | 5 |
| 6. Local businesses and industries | 5 |
| 7. Consultants on contract with municipality | 5 |
| 8. Public interest groups | 4 |
| 9. Regional government | 3 |
| 10. Universities or colleges | 1 |

Source: Question 12 - The following agencies could supply an interested community with technical assistance or general information on municipal energy conservation. Which, if any, of these have given your municipality nonmonetary assistance in the development of these energy conservation initiatives?

These sources were listed in the questionnaire and have been shown here in order of decreasing frequency of response.

On the other hand, in spite of the considerable amount of advertising devoted to energy conservation today, many individuals still appear to be confused about its intent. This relates to the concepts of primary and secondary characteristics mentioned above. Although the methods themselves may be clearly understood by all, perceptions of their usefulness in each community vary greatly. Questionnaire responses showed that many people perceive energy conservation to have a negative effect on growth or to be an expensive means to an unnecessary end. Many appear to equate energy conservation with only the use of 'new' sources of energy such as solar and wind. One respondent indicated that his council's only discussion on energy conservation focused on the potential for solar heating of the community pool. Once it was found to be too expensive, no further actions were initiated. In some communities the lack of interest in energy conservation was justified by the apparent need for new sources of industrial energy. The logic in such a statement is questionable. This appears to equate energy conservation with a reduction in energy supply. In areas adjacent to major energy supply projects it was reported that many residents fail to appreciate the need for energy conservation.

FOOTNOTES

[1]W.R.D. Sewell and H.D. Foster, Analysis of the United States Experience in Modifying Land Use to Conserve Energy, Lands Directorate, Environment Canada, Working Paper No. 2 (Ottawa: Supply and Services, 1980).

[2]Questionnaire response.

[3]Questionnaire attachments.

[4]Village of Elkford, Official Community Plan, adopted October 14, 1980.

[5]Questionnaire response.

[6]Personal communication from Robin Blencoe, Alderman, City of Victoria, November 17, 1980 and March 20, 1981.

[7]Louis J. D'Amore, "Energy Conservation - the Canadian Experiment'" Business Quarterly (Winter 1980):19.

[8]For a discussion of the roles of stimulator and initiator refer to the section entiled Key Individuals, pp. 23-24 above.

[9]Canada, Department of Energy, Mines and Resources, Community Energy Conservation Initiatives: A Guidebook (Ottawa: Supply and Services, 1981).

[10]Questionnaire attachments and N. Garth Maguire, "Energy and Plan Vernon," brief submitted to the Plan Vernon Review Committee by Vernon's "NRG" Action Council, March 26, 1980.

[11]Personal communication from Dale M. Rintoul, Planning Assistant, City of Vernon, May 12, 1981.

[12]Art Langley, Director, Civic Buildings Department, City of Vancouver, presentation at U.B.C. Seminar on Municipal Energy Management, March 19 and 20, 1981, Vancouver; and, Greater Vancouver Regional District, Planning Department, "Discussion Paper on Energy Preparedness," February 1, 1980.

[13]Art Langley, March 20, 1981.

# CHAPTER SEVEN

## Detailed Analysis of Results

Having reviewed the scope of activity in municipal energy conservation in B.C., the original research hypotheses stated in Chapter Five will now be examined in detail. Before looking at each individual hypothesis, a few basic premises must be established.

Since virtually the entire population of B.C. municipalities was surveyed, it is inappropriate to rely totally on probability models during the statistical analysis of the information collected. This data reflects the actual provincial situation at a given point in time rather than the characteristics of a random sample with a statistical probability of occurrence. In spite of the comprehensiveness of the survey coverage it is, however, useful to employ some probability models in this analysis. Although the application of these techniques to data obtained from entire populations is illogical, they can be used to indicate the strength of a relationship. For example,

> If a full count of towns A and B had revealed a difference in the proportion of pensioners, one may still have wanted to know the likelihood of such a difference occurring by chance. This can be done by treating the two town populations as if they were samples of a single imaginary statistical population. . . . It is not suggested that a difference between the two real populations is the result of chance, but the probability of a difference of this magnitude occurring by chance can be a useful yardstick for measuring its remarkability.[1]

$Chi^2$ and the t-test for difference of means are the only inferential statistical tests employed in this analysis. All relationships are tested

at the p = 0.05 level. Although this level of significance may be very stringent for this type of analysis, it provides useful reinforcement for the stronger relationships observed. Use of the p = 0.10 level in this loose application of inferential statistics may render the statistical implications ineffectual.

The general hypotheses listed in Chapter Three permit municipal energy conservation to be regarded as an issue area, as one innovation or as many innovations. In order that these different interpretations can be investigated, the responding municipalities were divided into four groups according to their energy conservation activities. These groups are:

1) Municipalities whose councils have NOT DISCUSSED energy conservations. (N = 79)

2) Municipalities whose councils have discussed energy conservation but have taken NO ACTION with respect to it. (N = 15)

3) Municipalities whose councils have discussed energy conservation and have taken action, but only in a piecemeal NOT COMPREHENSIVE manner. (N = 28)

4) Municipalities who have initiated or appear to be beginning to initiate COMPREHENSIVE programs incorporating inhouse as well as community directed activities. (N = 8)

In order that the conditions leading to awareness of the issue of energy conservation can be compared with the conditions preventing awareness (recall the earlier discussion on inaction and non-issues) the characteristics of the NOT DISCUSSED (ND) groups are compared with the characteristics of all other groups combined. This is the first level of analysis and for ease of communication is called Issue Awareness.

Analysis of the differences between non-adopters and adopters of the innovation of energy conservation activities is carried out by comparing the combined characteristics of the NOT DISCUSSED (ND) group plus

the NO ACTION (NA) group with the characteristics of the NOT COMPREHENSIVE (NC) group plus the COMPREHENSIVE (C) group. This is the second level of analysis--Adoption.

Finally, the third level of analysis, in which the types of energy conservation activities adopted are examined, compares the characteristics of the NOT COMPREHENSIVE group with the characteristics of the COMPREHENSIVE group. This final level of analysis explores Innovativeness. The limited number of comprehensive adopters makes analysis at this level fairly inconclusive. However, many interesting relationships are evident.

In the following discussion and in the corresponding diagrams, these groups may be referred to by their one or two letter abbreviations and are grouped according to the levels of analysis. Where diagrams are used to illustrate the relationship, only the observed and predicted frequencies of the more innovative grouping in each analysis level are shown. The less innovative groupings will always have the opposite relationship. Thus, the illustrated groups are:

1) NA + NC + C at the issue awareness level

2) NC + C at the adoption level, and

3) C only at the innovativeness level.

At the first and second levels of analysis 'predicted' frequencies are calculated from the actual provincial distributions. For the third level of analysis, predicted frequencies are calculated from the distribution observed among the 36 municipalities who have adopted some energy conservation activities.

Since most of the ensuing diagrams follow the same format, a word of explanation on their interpretation may be useful. Each pair of bars illustrates the relationship between the predicted and observed

frequencies for a particular element of the diagram. For example, in the first box of Figure 12, it can be seen that at the issue awareness level, more positive responses were observed than were predicted from the provincial distribution. The magnitude of this difference between predicted and observed frequencies suggests the importance of each factor in determining how the 'innovation' is regarded in B.C.'s municipalities.

Analysis of Research Hypotheses

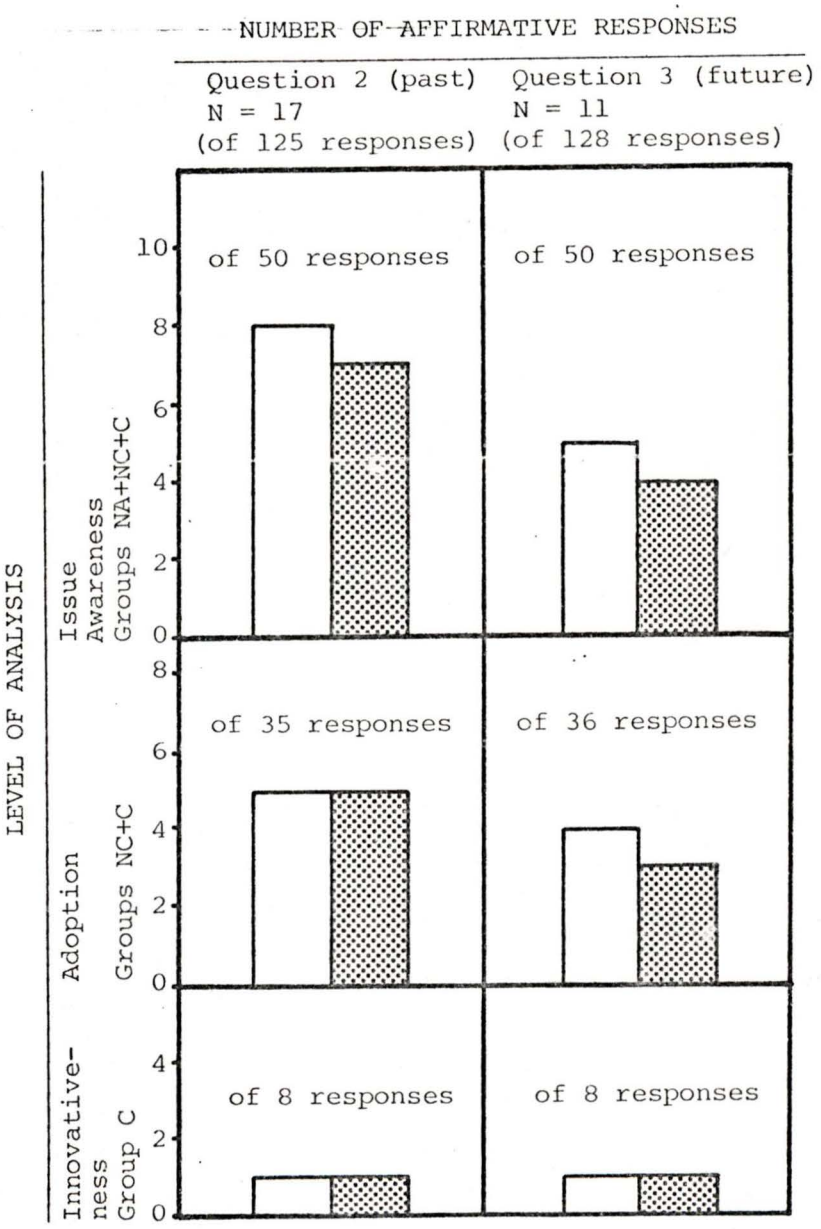
Research hypotheses were presented in Chapter Five but will now be restated in order that they can be examined in detail.

Municipalities which are innovative in the area of energy conservation will tend to:

1. Have local industrial expansion restricted by a limited energy supply. Early in the questionnaire were included two questions investigating the degree to which the respondents felt local industrial expansion has been, and possibly will be, limited by restricted energy supplies (Questions 2 and 3). Results of these questions are summarized in Figure 12. The variation between groupings at every level of analysis is so small that it appears the possibility of restricted industrial expansion has little effect on the awareness or adoption of energy conservation.

2. Not be connected to the integrated hydro grid and thus dependent upon expensive and less reliable diesel generators. The data for this analysis was obtained from B.C. Hyrdo. Only 5 of B.C.'s municipalities are not connected to the integrated grid. These are Fort Nelson (NC), Massett (ND), McBride (ND), Port Clements (NC) and Zeballos (ND). Three of these municipalities have not discussed energy conservation while two

FIGURE 12 - Energy Restrictions on Industrial Expansion




Source: Question 2 - Has the local energy supply situation in any way restricted the expansion of local industries and/or reduced local employment opportunities over the last 5 years?
and, Question 3 - Over the next 3 years, is it anticipated that the local energy supply situation will in any way restrict the expansion of local industries and/or reduce local employment opportunities?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level. Predicted frequencies are calculated from provincial distributions of responses.

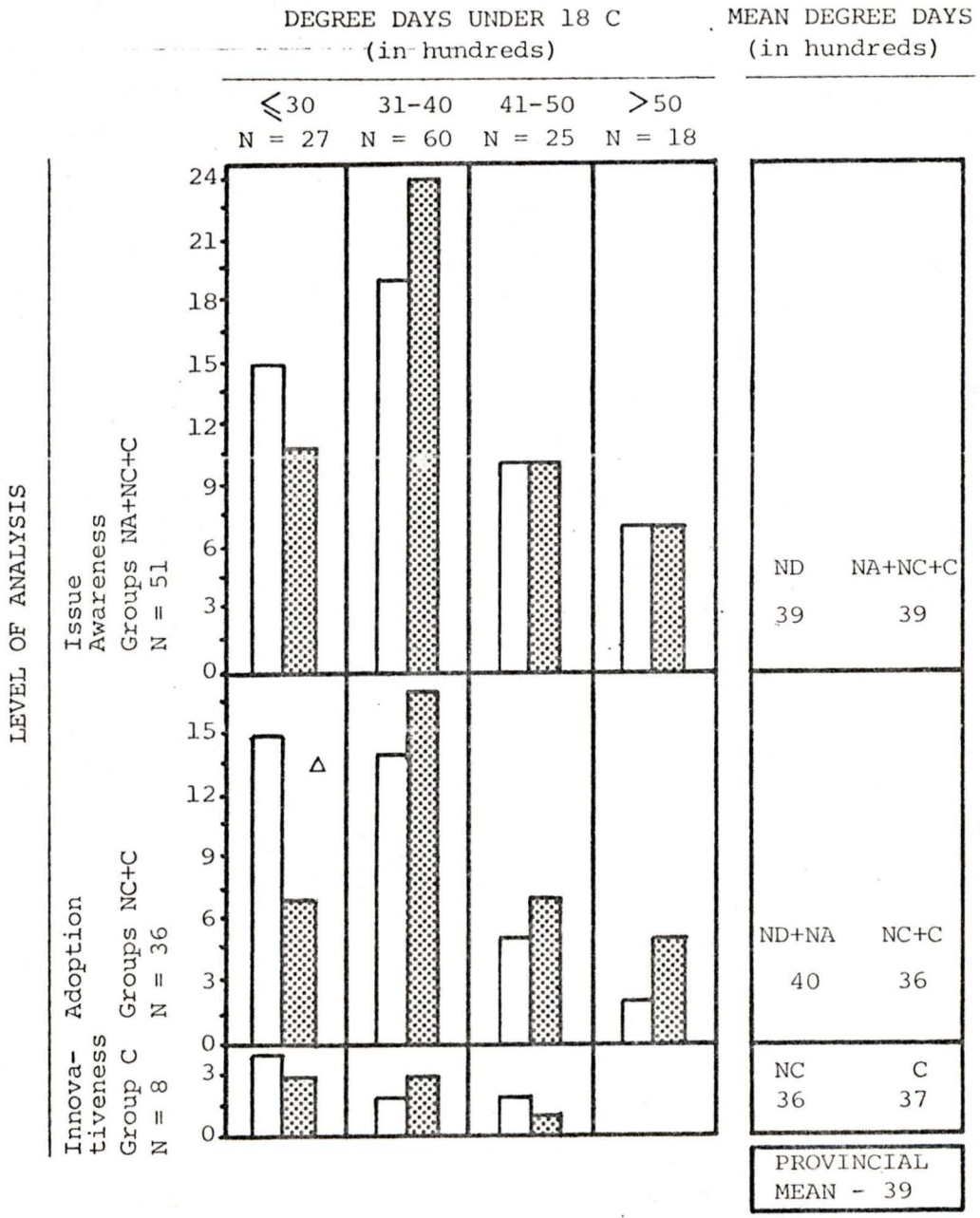
have initiated minor energy saving/cost cutting activities. This small data set makes conclusions unreliable, however, it appears the dependence upon diesel generators has no effect on energy conservation.

3. Have cool climatic conditions. The number of degree days below a threshold value, usually 18°C for heating calculations, is a useful and generally accepted measure of the severity of an area's climate. This information is readily available from B.C. Hydro. Since the absolute number of degree days in any one area varies from year to year and with microclimate, it was felt that values rounded to hundreds of degree days were more appropriate in this analysis. The data for B.C.'s municipalities is summarized in Figure 13.

Contrary to a priori indications, it appears initially that the climatic conditions have a possible inverse relationship to energy conservation activities. The more innovative groupings have a higher than expected number of municipalities with less than 3000 degree days below 18°C. This indicates that municipalities with warmer climates are more innovative. However, the same relationship is not so evident in the classes with high numbers of degree days nor in the group means. Since, as it will be shown later, a large number of innovators are in the warmer, Lower Mainland area, this relationship likely reflects the location of most innovators rather than the direct effect of mild climate.

4. Have a large population or be small, young and rapidly growing. Information was available from several sources to test this hypothesis. Questions 18 and 19 sought the respondent's interpretation of the local economic growth situation and Question 23 provided a recent population estimate. Also available was the annual publication, Municipal Statistics, published by the B.C. Ministry of Municipal Affairs. The most recent

FIGURE 13 - Summary of Climatic Influence Factor




Source: B.C. Hydro, Energy Services Division, "Heating Systems and Insulation," pp. 29-30.

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping in each analysis level. Predicted frequencies calculated from provincial distribution or responses.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

edition available at the time of analysis was for the year ended December 31, 1979, already well out of date. However, in many ways the information available in this edition reflects the environment affecting the decision makers, in terms of the material covered by the questionnaire, more accurately perhaps than would more recent statistics. This publication supplied a great deal of information for testing this and many other hypotheses.

Municipalities are separated into five size classes based on classifications used in the Municipal Act. These are:

Village - not greater than a population of 2500 (N = 62)

Town - 2501 to 5000 (N = 21)

Small city - 5001 to 10,000 (N = 16)

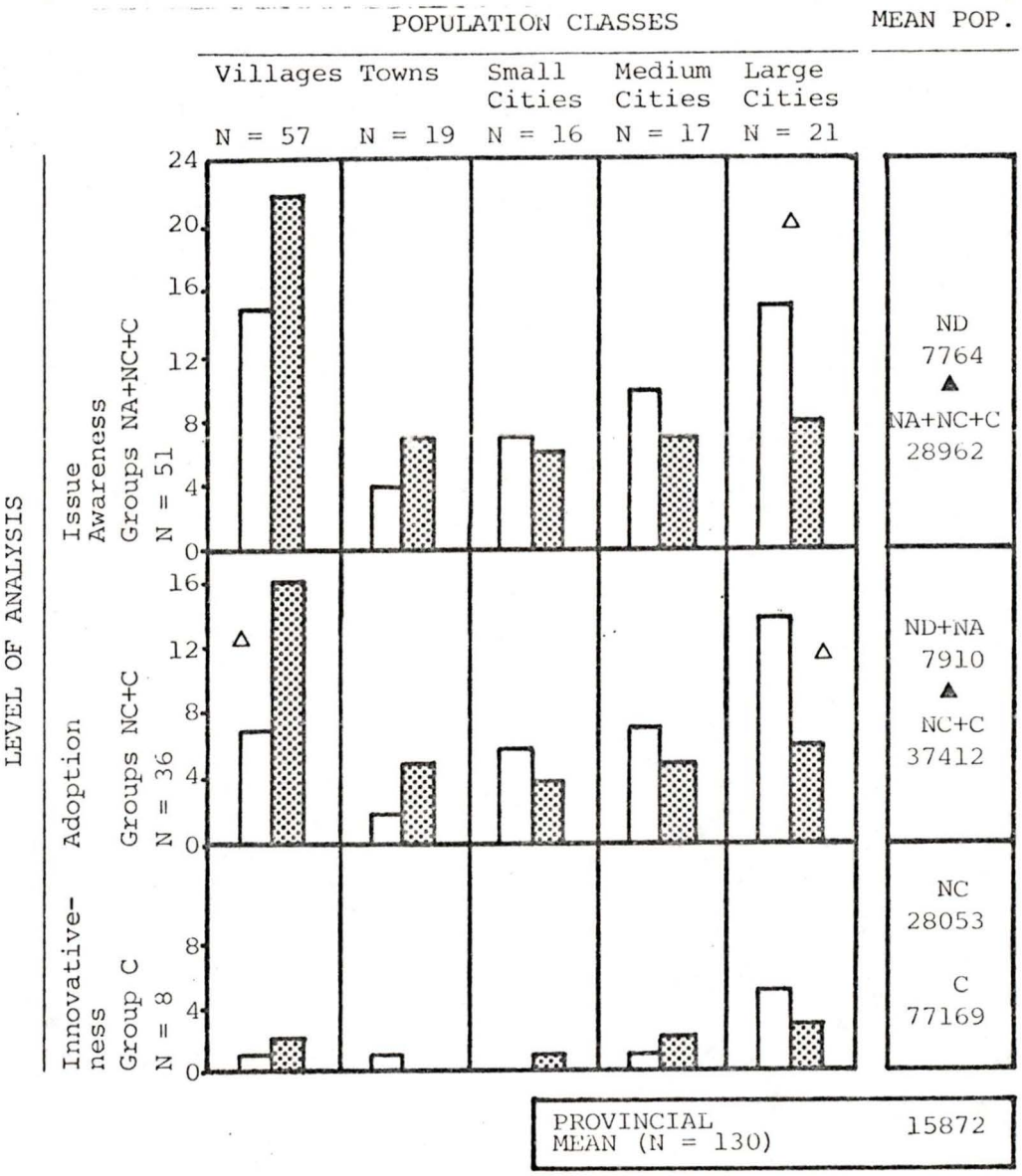
Medium city - 10,001 to 20,000 (N = 19)

Large city - greater than 20,000 (N = 23)

Classifcation by population rather than by municipal type is more reliable since there are several municipalities which, according to their present populations, are not classified appropriately. For example, the City of Greenwood had a 1979 population of 1000; the City of Enderby, 1500; and the Village of Fort Nelson, 3645. While the use of five classes retains a degree of similarity between municipalities in each class, it does create some small classes. Therefore, the distributions shown in Figure 14 must be used recognizing that a single additional response in some columns could add as much as 6% to the total.

A quick review of this figure appears to indicate a positive relationship between innovativeness and municipality size. Whereas less innovative groups have more villages than expected and fewer of the city size municipalities, the more innovative groupings have opposite frequencies.

FIGURE 14 - Summary of Population Factor




Source: B.C., Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1979, Victoria, and, Question 25 - What is the present estimated population of your municipality?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

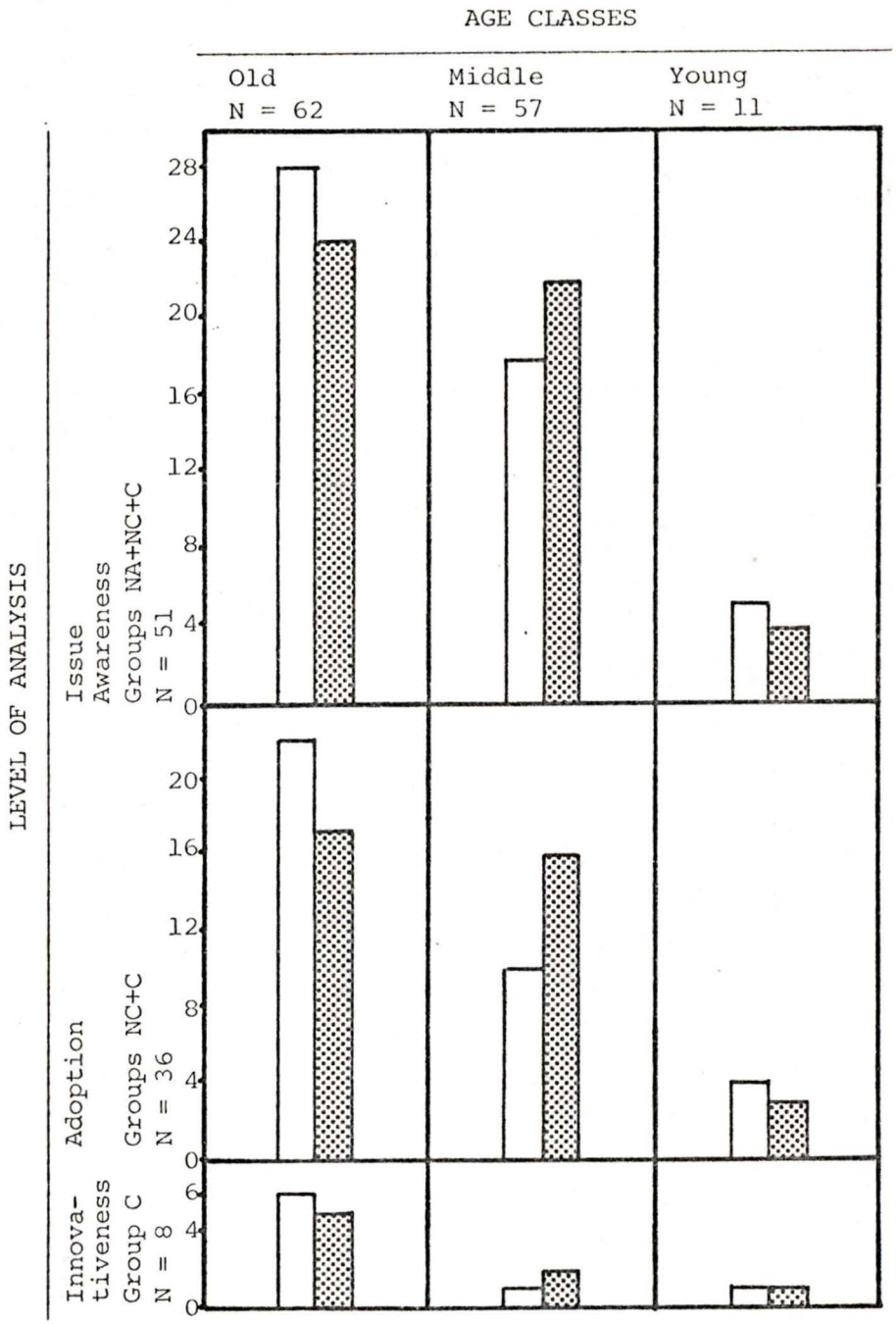
▲ indicates significant difference in the t-test for difference of means.

This same situation is highlighted by the means of the population magnitudes in each group. Thus, it would appear that large municipalities tend to be more innovative in their approach to energy conservation. The $Chi^2$ test supports the conclusion corresponding with existing diffusion research.

Municipality age classes are based on B.C.'s development eras. Municipalities incorporated prior to 1940 are classed as 'old' and municipalities incorporated from 1970 onwards as 'young'. All others fall into a 'middle' age class. The analysis of the survey results using these classes is illustrated in Figure 15. Here again, a relationship is evident. Innovative groupings appear to have sightly higher numbers of old municipalities than expected. However, how much of the correlation can be attributed to the size of municipalities? Evidently, large municipalities would tend to be older than small ones. This relationship between the population and age of all B.C. municipalities is shown in Table 13. Because of this correlation it is impossible to tell from the available information which of these factors, age or population, contributes to energy conservation and which only reflects the contribution. However, previous research based on gravity and environmental models suggests that population is the key factor here.[2] Large size is thought to provide the large pool of innovative knowledge, initiative and resources necessary.[3]

The age factor relationship shown here actually is contrary to Lang and Armour's conclusions. Their study suggested that older cities would tend to be concerned more with the problems of decay and thus not have as much time as younger municipalities to consider energy conservation.[4] That this relationship may actually hold with the B.C. data could be tested only by holding the size factor constant. However, with a data set this

FIGURE 15 - Summary of Age Factor




Source: B.C., Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1979, Victoria.

Observed (blank) and predicted (shaded) frequencies of the most innovative grouping at each analysis level.

'Old' - pre-1940 date of incorporation
'Middle' - 1940-1969
'Young' - 1970 onwards

TABLE 13 - Age versus Population

| | | POPULATION | |
|---|---|---|---|
| | | $\leq$ 5000 | $>$5000 |
| AGE CLASSES | OLD | 27 | 43 |
| | MIDDLE | 46 | 14 |
| | YOUNG | 10 | 1 |

Source: B.C., Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1979, Victoria,

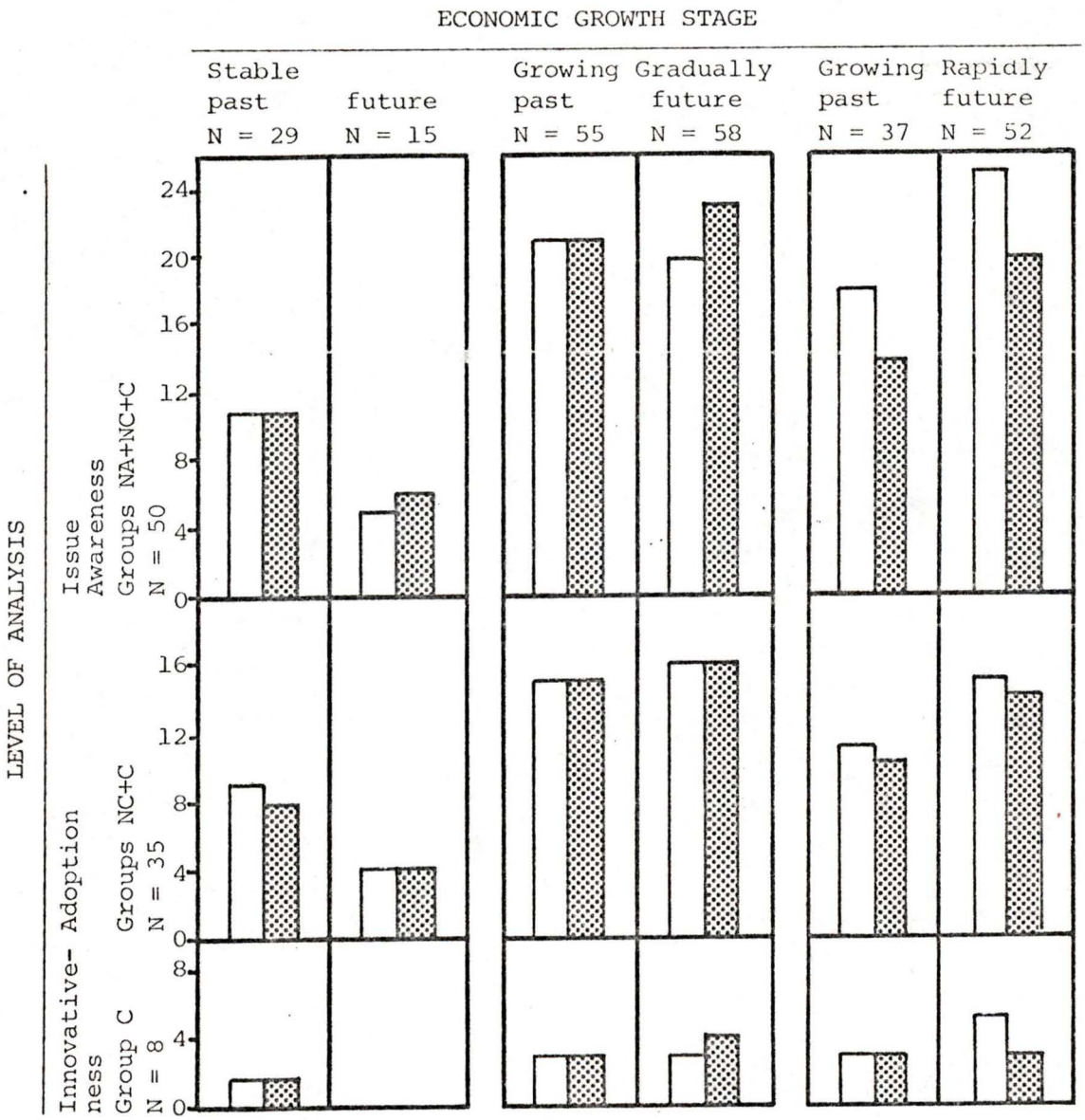
and Question 25 - What is the present estimated population of your municipality?

small, the portion of the relationship between age and innovativeness not correlated with size is difficult to isolate and study. It is likely that the decay recognized in the American cities has not yet affected the much younger 'old' B.C. cities.

With respect to the stage of development (early stage of rapid growth versus a much later stage of decline), an analysis of municipalities indicating decline and rapid growth (Questions 18 and 19) shows that all municipalities reporting to be experiencing or expecting a decline in the local economy were in the NOT DISCUSSED group. However, since this only represents a total of six reported past declines and three reported possible future declines, the numbers are not large enough to draw strong conclusions. It appears that the relationship between declining economies and non-innovativeness can only be properly analyzed in other regions where the number of declining economies is better balanced with the number of economies which are growing.

Rapid growth, on the other hand, is very evident in B.C.'s municipalities. Figure 16 illustrates the reported and 'expected' stages of economic growth. Although a more reliable indicator of economic growth can be found in the percentage increase in taxable assessment over a period of a few years, changes made in 1978 in the manner in which taxable assessments have been calculated made this indicator impossible to determine for periods greater than one year. For this reason, personal responses to the questions was the readily available factor for measuring economic growth. Analyzing Figure 16, only rapid growth, past or future, appears to have some relationship with innovativeness. It appears that rapid growth, especially anticipated rapid growth, encourages awareness of energy conservation. This may be due to the openness to change of

FIGURE 16 - Summary of Past and Future Growth Trends




Source: Question 18 - In your opinion, on the average over the last five years has the local economy been growing rapidly, growing gradually, remained stable or been declining?,
and, Question 19 - In the next five years is the local economy expected to grow rapidly, grow gradually, be stable or decline?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping in each analysis level.

municipal councils in rapidly growing areas and their ability to take advantage of new opportunities during growth.

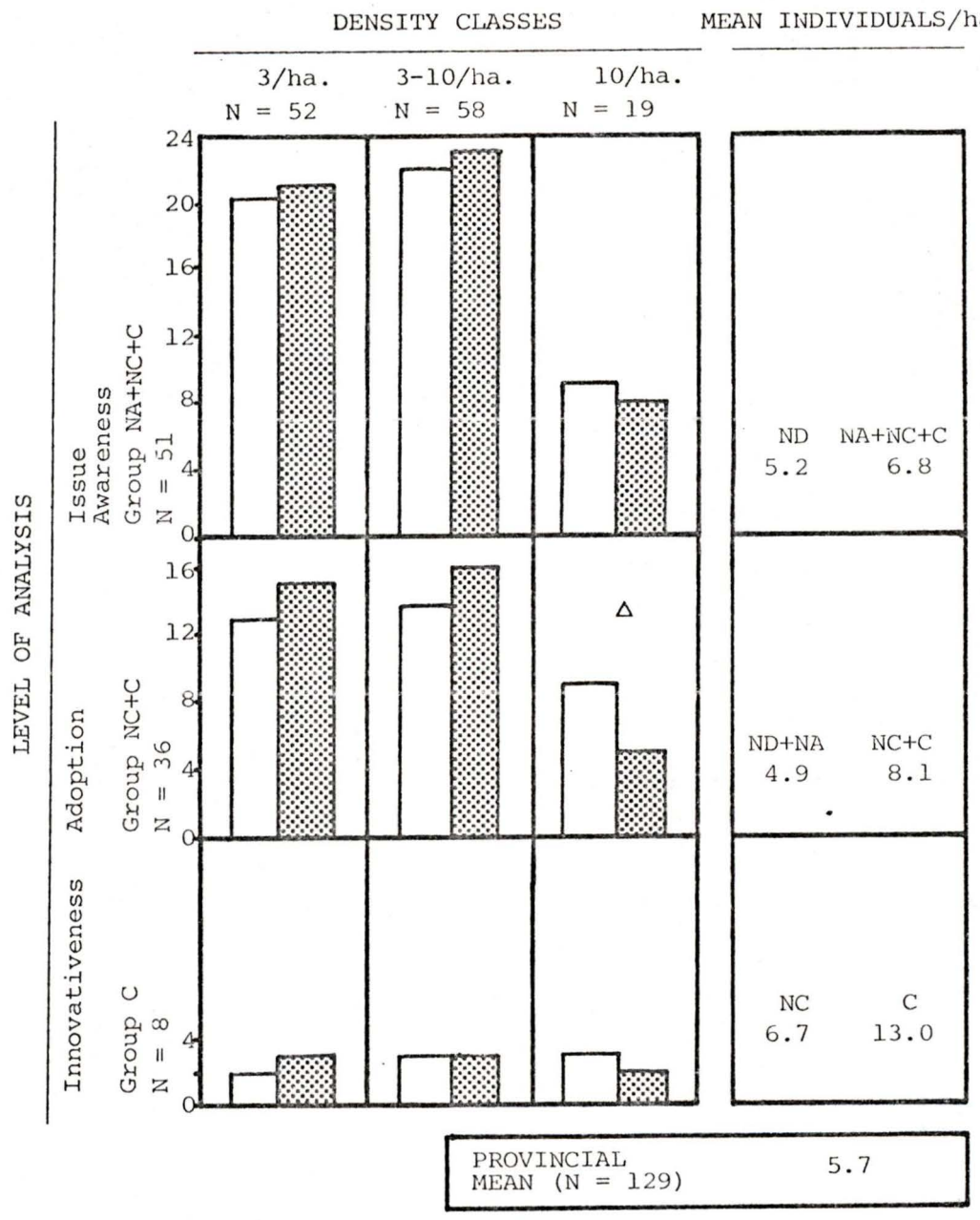
Two other factors related to this hypothesis are total land area and density (people/hectare) in each municipality. A comparison of these factors is shown in Figures 17 and 18. Here it is apparent that innovative communities tend to be densely populated and large in area. Again it is quite likely that much of this relationship is a result of the correlation with population. The only variation from this is the indication (shown by the mean of total land area) that municipalities adopting comprehensive programs have slightly smaller land areas than municipalities adopting not comprehensive programs. Although this may have some interesting implications related to the effect of wide-spread populations, the number of municipalities in these two groups makes any conclusion unsustainable.

5. Be in or adjacent to the Lower Mainland. This hypothesis called for an analysis of innovators and noninnovators on a regional basis. The four regions used in this study have been identified in Chapter Six (see Figure 8). Results are summarized in Figure 19.

Regional differences are not statistically significant. However, the Lower Mainland does have more innovative municipalities than expected, especially at the adoption level of analysis, and the southern region has fewer innovative municipalities than expected. The Lower Mainland is anticipated to be more innovative due to its city character. The southern region, which has neither limited energy supplies nor huge heating requirements, may well tend to be less informed or concerned about energy conservation.

6. Have an active recycling program. Question 5 in the questionnaire

FIGURE 17 - Summary of Density Factor

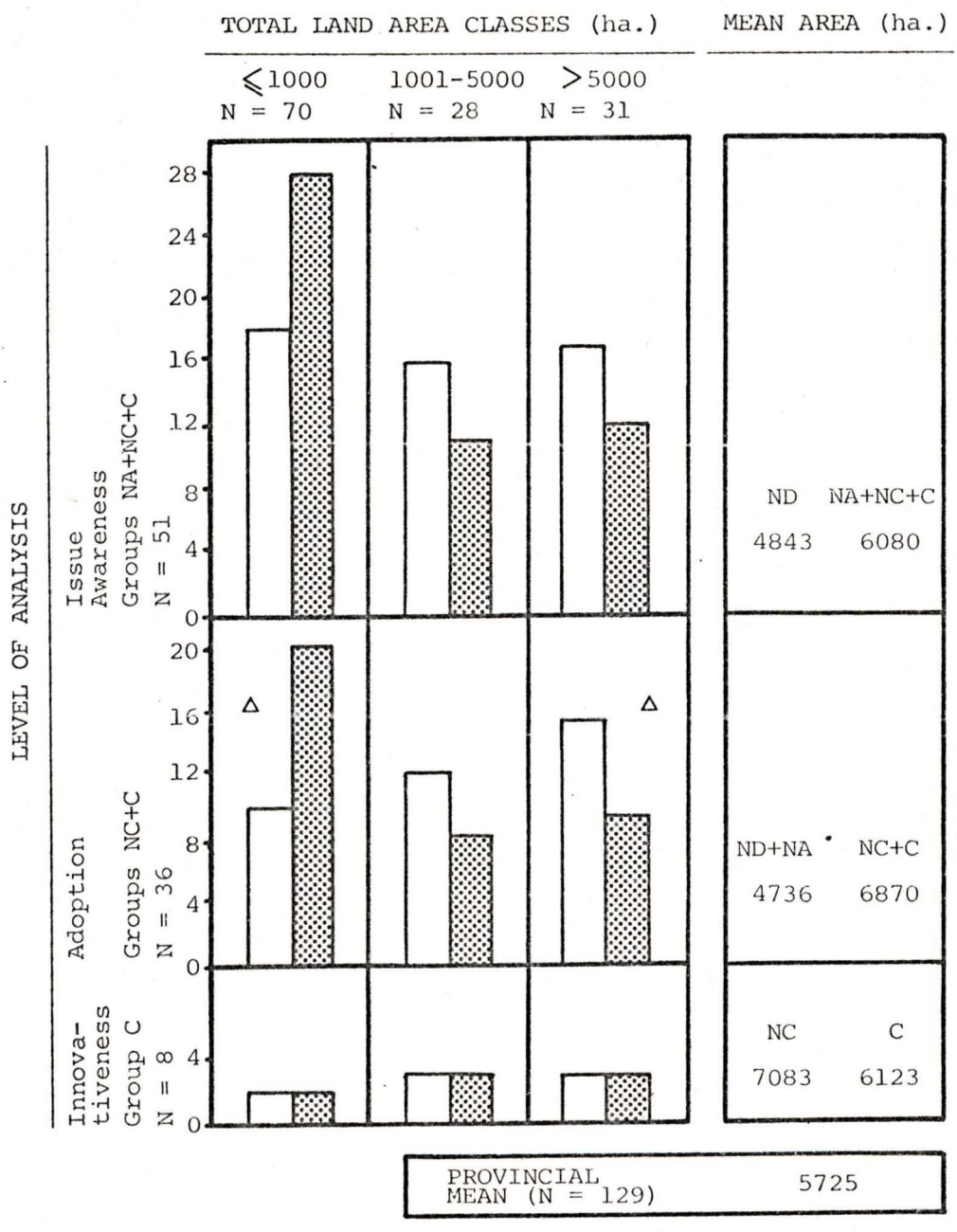



Source: B.C., Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1979, Victoria.

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the Chi$^2$ test.

FIGURE 18 - Summary of Total Land Area Factor

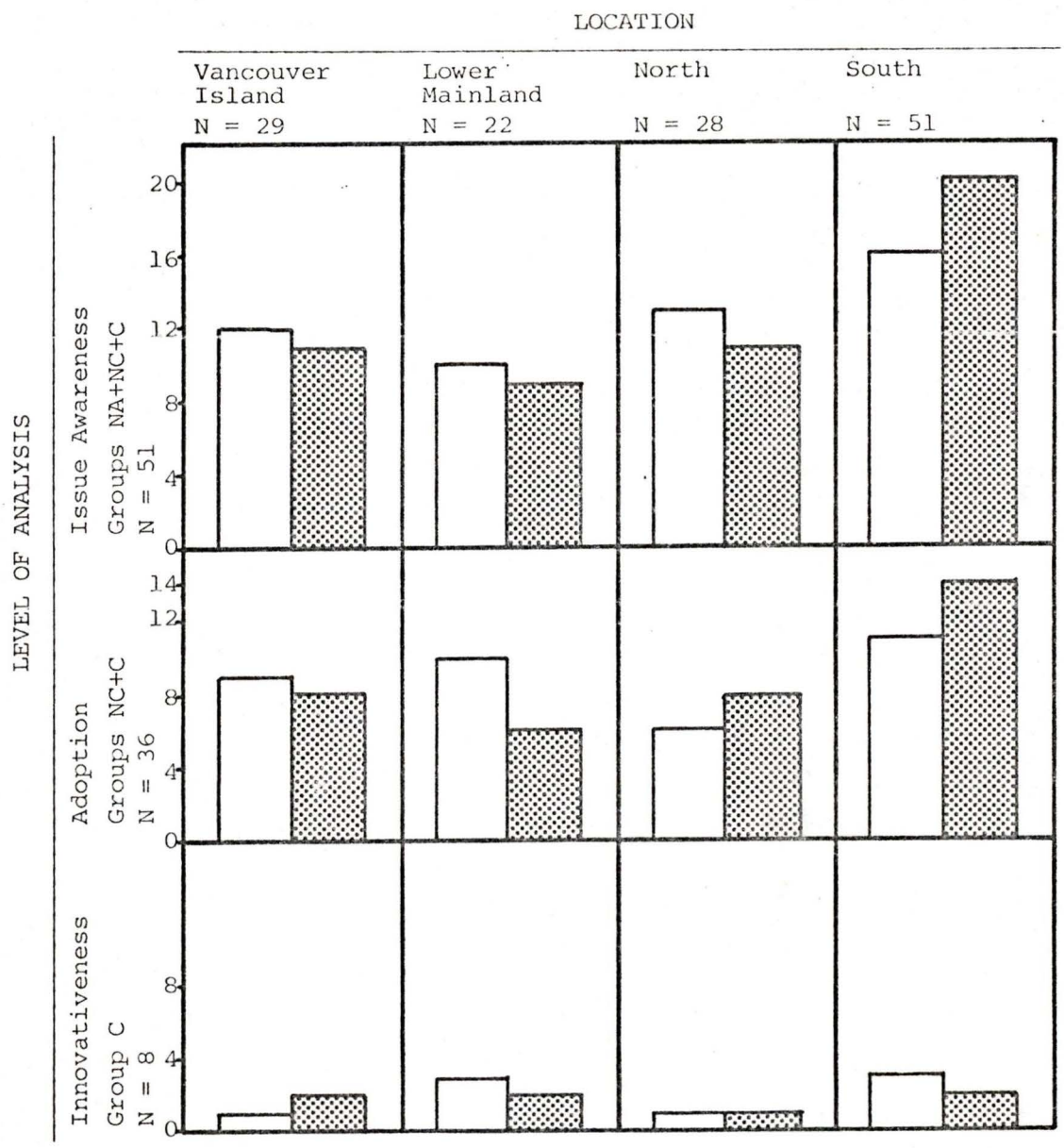



Source: B.C., Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1979, Victoria.

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

FIGURE 19 - Summary of Location Factor



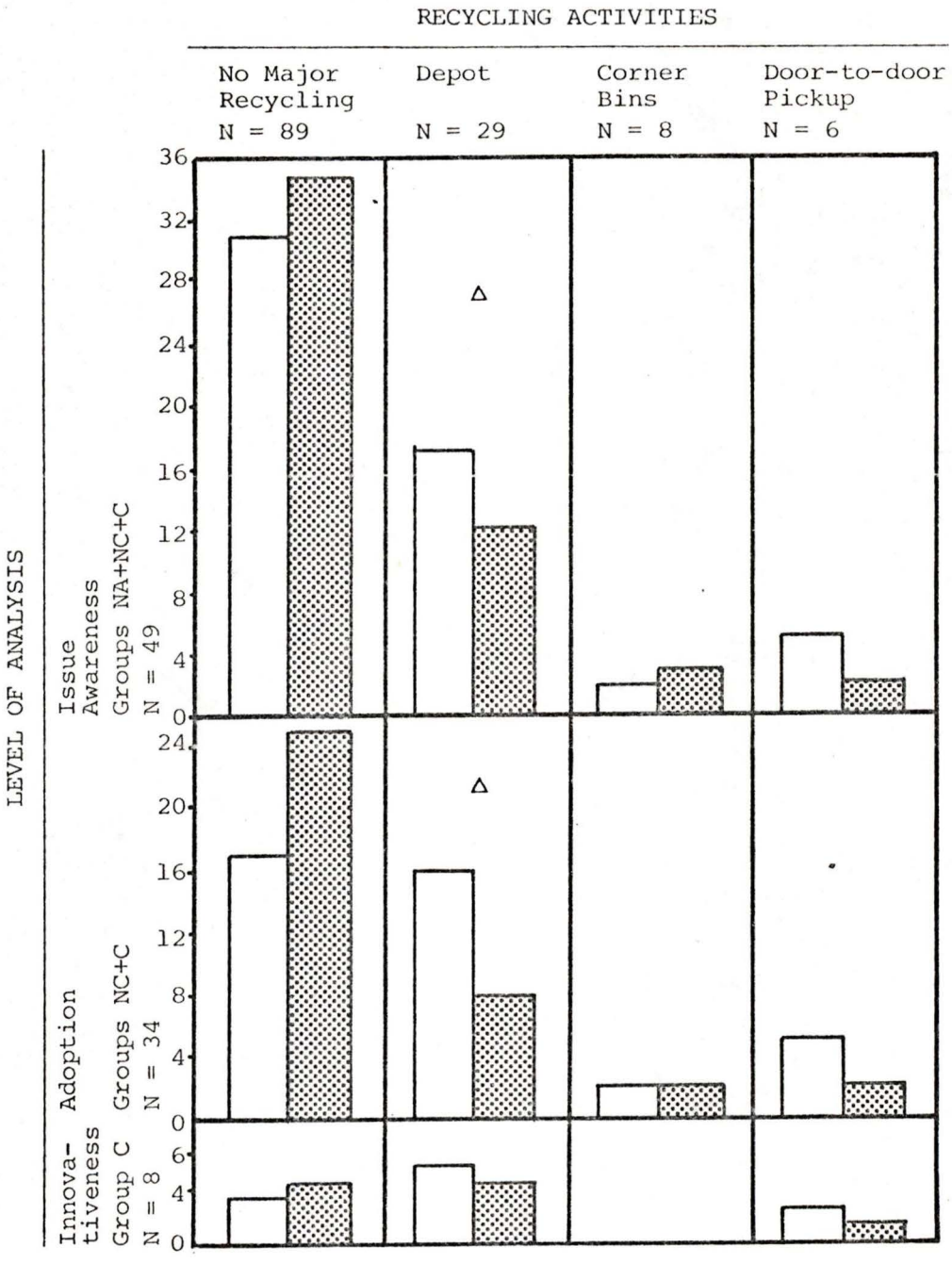

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level. Predicted frequencies are calculated from the provincial distribution of occurrence.

collected information on the availability of recycling activites in communities. Since it appears that recycling is occasionally considered an energy conservation activity, this hypothesis sought to investigate the relationship between recycling and other energy conservation activities. In this analysis, only communities with major recycling activities are considered. Newspaper pickup drives by community groups is not regarded a major recycling activity since it has, until, recently, been carried out primarily as a fund raising activity rather than as an energy conservation measure. The results are illustrated in Figure 20.

There is a strong indication that recycling activity is related to energy conservation activity. At all three levels there are fewer innovative municipalities that indicated no major recycling activities were available than is 'expected' (at the innovativeness level, however, the sample size is actually too small for meaningful comparison). Depots, especially, appear to be more common in innovative municipalities. This relationship is one directional, however. Energy conservation may make a municipality more likely to cooperate in recycling activities but, as pointed out above in Chapter Six, recycling activities do not necessarily mean the municipality will be energy conservation innovative.

7. Have citizens who are concerned about the local energy supply situation. Two questions provide information which helps in verifying or rejecting this hypothesis. Question 1 asked respondents to rate the extent to which she/he felt that the citizens saw the local energy supply situation to be a problem. It is obvious that such a question is highly subjective and answers are likely to vary with the individual who responds. Results for this question must be used carefully. The other question highlighting citizen's energy attitudes requested information about local

FIGURE 20 - Summary of Recycling Availability Factor




Source: Question 5 - Which, if any, of the following recycling activities are available in your community?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

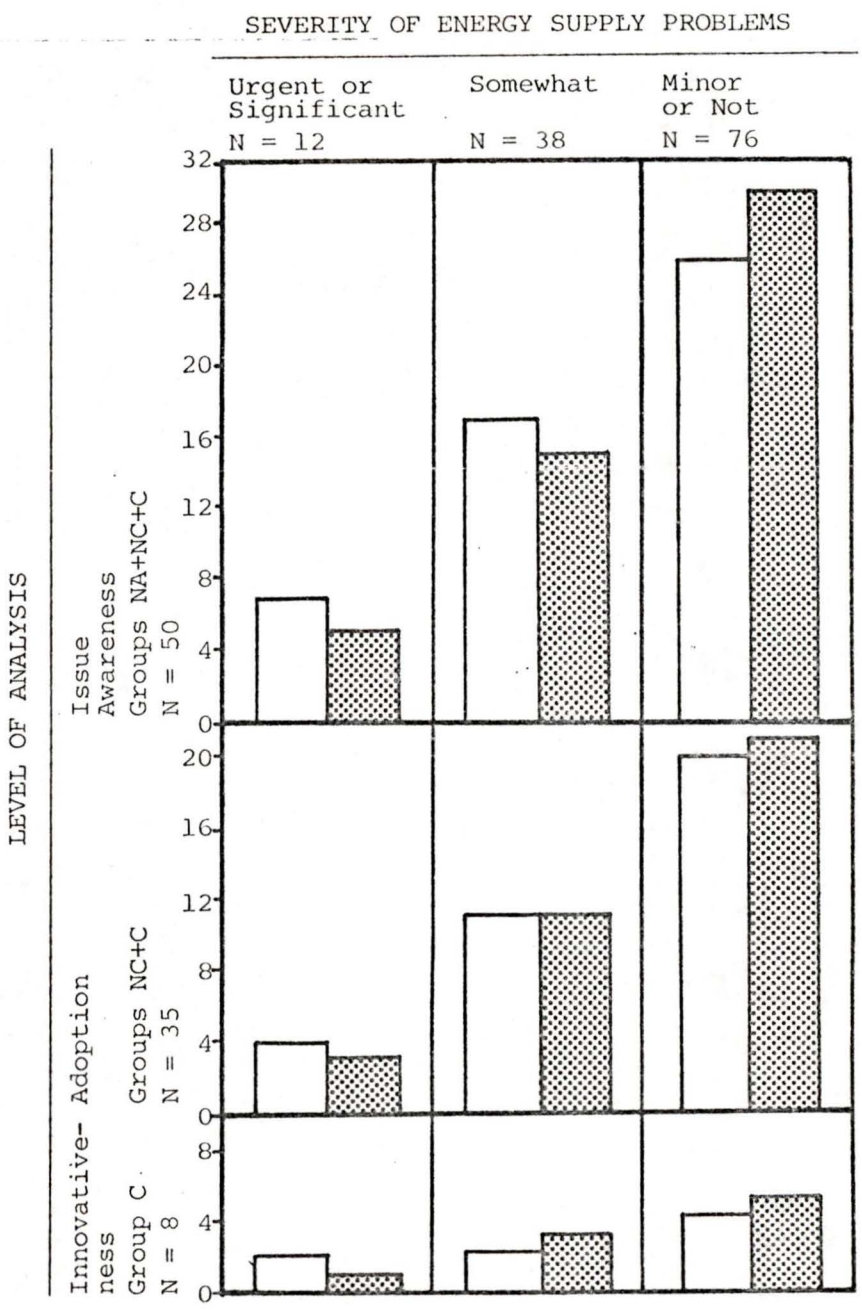
citizen groups who have expressed concern over energy issues (Question 4). This question brought a variety of responses including comments on hippies' conservation attitudes and businessmen's concerns about energy supply. The usefulness of these two questions has been discussed earlier. The results are illustrated in Figures 21 and 22.

It is interesting to see that, in spite of the subjectivity of the questions, responses indicate a strong tendency to verify the obvious--more than 'expected' respondents from the innovative municipalities indicated that they felt their communities' citizens considered the local energy supply situation to be at least somewhat of a problem. It is also apparent that citizen interest in energy cosnervation does lead to council concern about the issue--more than predicted innovative communities reported citizen interest in energy conservation. It is comforting to see that councils tend to respond to citizen concerns.

8. Encourage citizens to take an active role in local government affairs. This hypothesis is difficult to check without a detailed knowledge of each community studied. Since this was impossible to achieve, an attempt was made to obtain an indication of the extent of citizen involvement in the local government by including it as a possible council objective (Question 17). The summary in Figure 23 shows the reported and 'expected' number of respondents in each group who indicated this objective as one of those most favoured by their councils. In spite of the subjective nature of this question the anticipated relationship is again apparent. Innovative municipalities reported the encouragement of citizen involvement in government affairs more frequently than predicted from the provincial distribution.

9. Have obtained funding for energy conservation activities from the

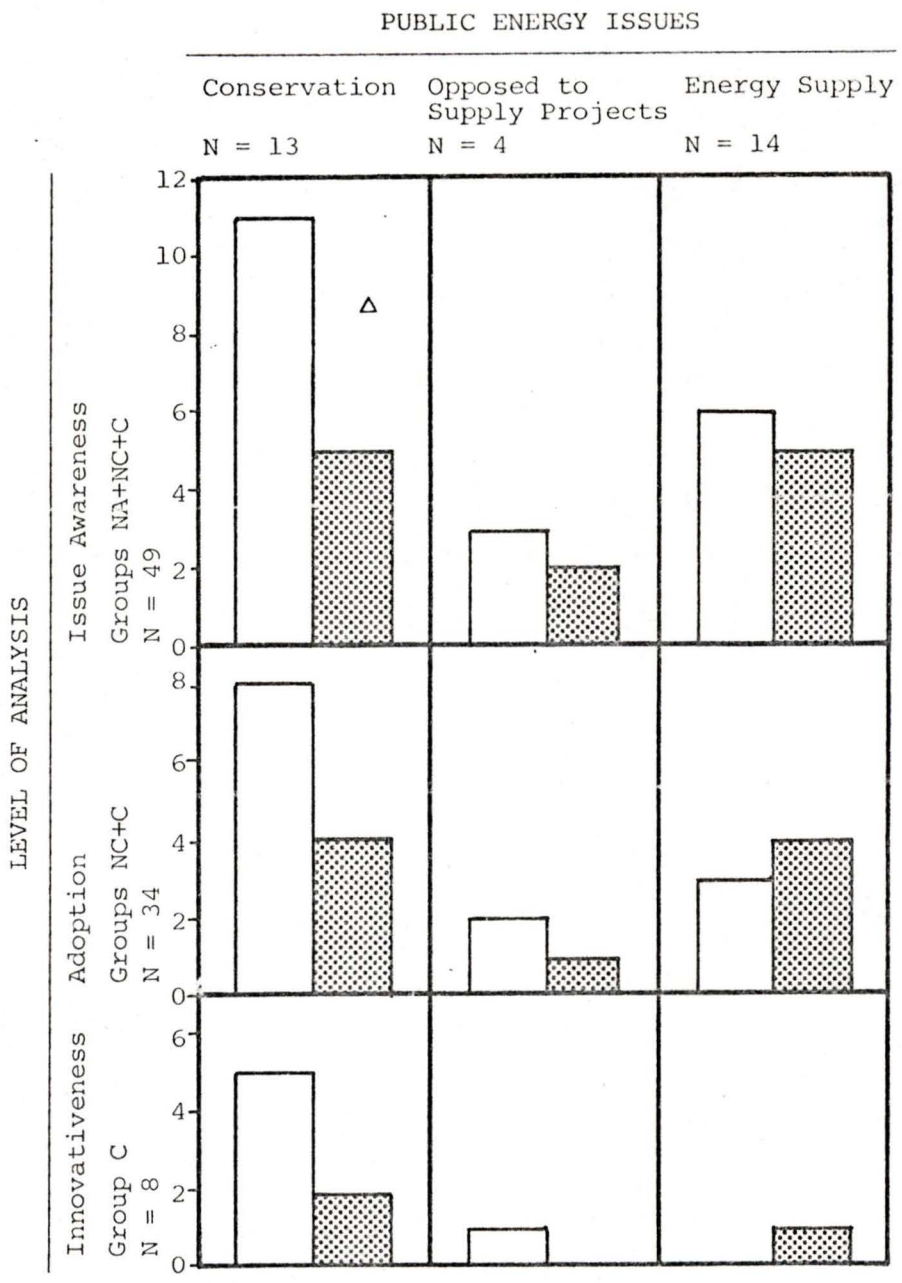
FIGURE 21 - Citizen's Perceptions of Severity of Energy Supply Problems Summary




Source: Question 1 - To what extent do you feel the local energy supply situation is seen as a problem in your community by the municipal council and by the population at large?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

FIGURE 22 - Public Energy Issues Summary

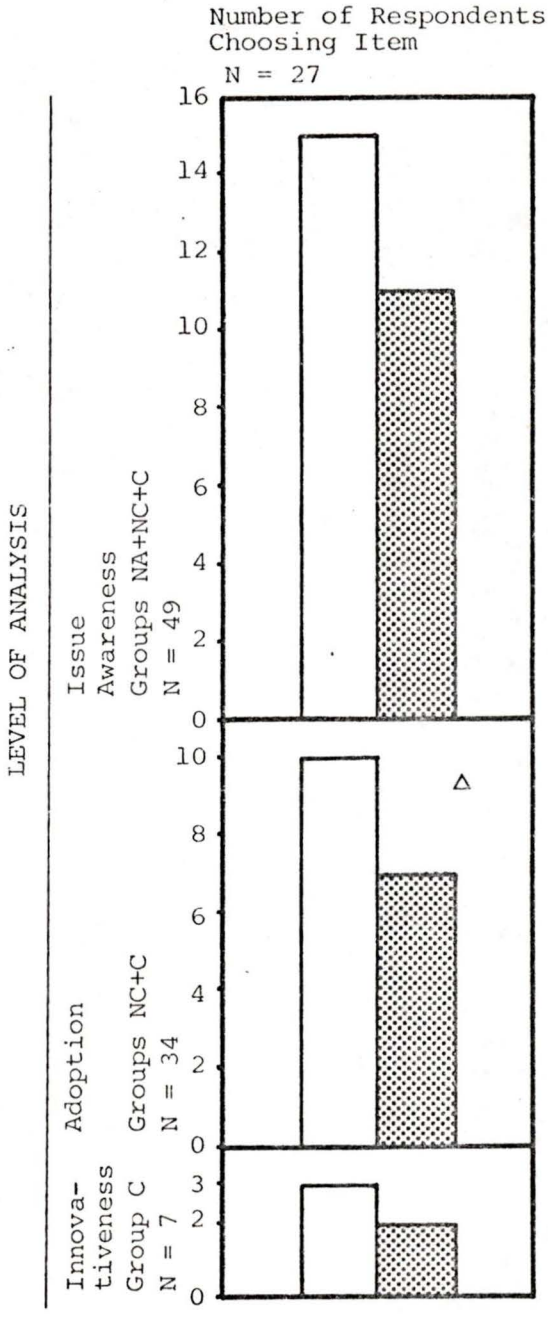



Source: Question 4 - Have there been any citizen groups in your community who have publicly expressen concern over any energy issues? What are the major energy related concerns of these citizens?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

FIGURE 23 - Summary of Citizen Involvement in Local Government Factor




Source: Question 17 - Listed below are seven different things which most councils would like to do. Please indicate which one of these your council appears to have considered most important, second important and third important over the last 5 years. . . . Item 7 - Seeing to it that the municipality is a place where citizens play an active role in government.

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

federal or provincial governments. Question 11 provides direct information for this hypothesis. Other sources of information for this hypothesis are very difficult to trace. No municipalities have received direct funding for municipal energy conservation programs,[5] though many may have applied funding received from various sources to specific conservation projects (i.e., hiring students under summer employment programs to work on municipal energy audits).

Very few municipalities reported receiving any funding at all. Oak Bay and Victoria obtained senior government funds used to conduct building audits. Surrey received a federal grant for their heating conversion (a situation which is likely much more common though unreported). West Vancouver's recycling program is supported by provincial funding. Finally, Vancouver's and Vernon's programs have significant government support. Vernon's program was begun under the initiative of a federal government study while small portions of Vancouver's programs have received support from a federal/provincial demonstration project agreement.

It is evident that government funding is being used to develop energy conservation programs. However, several of the comprehensive programs have not received outside funding. Kelowna and Elkford appear to be working on their own. It seem likely, therefore, that at this time funding is not a prerequisite to energy conservation programs. This does not mean to say that the availability of more funding would not speed the adoption of such programs; it suggests only that existing funding sources are not a prerequisite for their initiation or adoption.

10. Have different important local issues than municipalities which are not innovative. In an effort to uncover possible competing and complementary issues to energy conservation, respondents were asked to

indicate what they felt had been the three most important problems faced by their councils over the last five years (Question 20). Obviously, a myriad of answers was received. However, it was possible, and useful, to summarize the reported problems under several comprehensive issue areas. These are listed in Table 14.

The need to interpret and classify each individual response does lend some uncertainty to this classification scheme. Every attempt was made to place problems in the appropriate issue area. Note that there are two items for growth--one for reported rapid growth, the other just for growth. It was felt this distinction was necessary since the response 'growth' could indicate both undesirable or planned growth, future or present. However, rapid growth appears to indicate present growth problems.

The most frequently reported problems were obtaining sufficient revenue, planning and providing basic services (see Figure 24). These are common to municipalities throughout the province, no matter what their approach to energy conservation. Although not statistically significant, municipalities in the more innovative groupings reported issues in the basic services area less frequently than would be predicted based on the provincial distribution. Other than this, competing issues appear to have little relationship with conservation innovativeness.

11. Have high transportation and solid waste disposal costs. In the general expenditure chart of the Municipal Statistics municipal expenses are grouped under several headings. Two categories which appear to be most related to the cost of energy, and thus if high, should provide good reasons for conservation, are Transportation and Solid Waste Disposal expenses. By converting these values to expenditures per capita, previously noted correlation with population can be removed. The mean values

TABLE 14 - Council Issue Areas

Revenue Issues (57)
1. Obtaining sufficient revenue
2. Improving tax base

Planning and Development (21)
3. Recreation facilities
4. Downtown development/revitalization
5. Planning - bylaws, zoning, community plan

General Growth Problems (53)
6. Rapid growth
7. Growth
8. Slow or negative growth

Basic Services (90)
9. Providing basic services - water, sewer
10. Roads and transportation
11. Housing

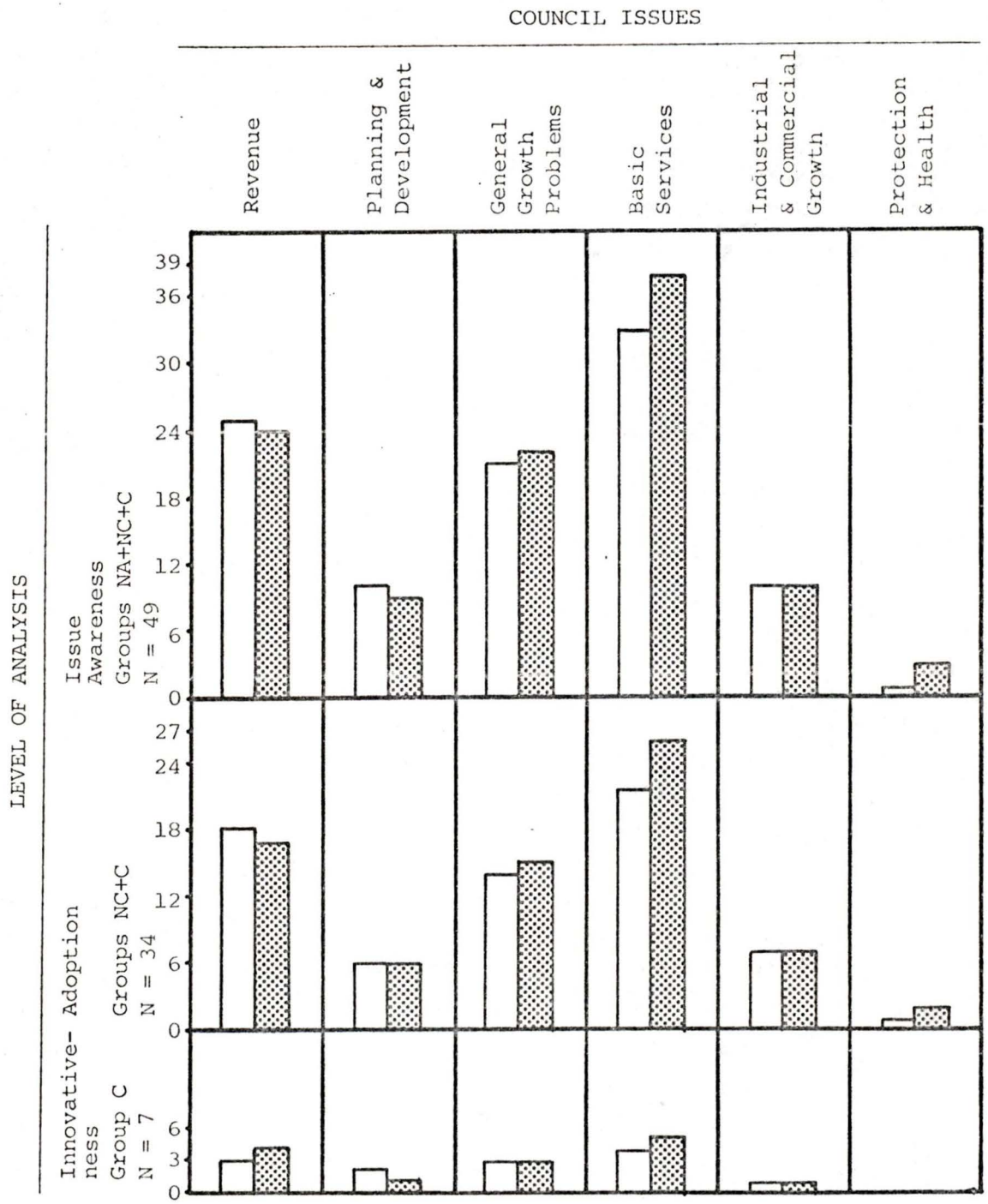
Industrial and Commercial Growth (24)
12. Providing employment
13. Attracting industrial growth
14. Attracting commercial growth

Protection and Health (7)
15. Police and fire departments
16. Health care

Source: Question 20 - What do you think have been the three most important problems faced by your municipal council over the last 5 years?

Numbers in brackets indicate the number of respondants who listed an issue in this area as one of the three most important problems faced by their councils in the last five years.

FIGURE 24 - Council Issues Summary




Source: Question 20 - What do you think have been the three most important problems faced by your municipal council over the last 5 years?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping in each analysis level.

of these statistics for each innovation grouping are shown in Table 15. Although the mean is often a poor indicator of central tendency, espeially for nonnormal distributions such as these (skewed to the right), it does serve to reflect the frequency of higher values.

Solid waste disposal costs per capita are very constant throughout the province. Thus it seems that disposal costs are either not related to energy conservation activity or are poor indicators of municipal energy costs. There is a tendency for transportation costs per capita to be higher in less innovative municipalities. This is contrary to a priori indications and does not support the theory that higher energy costs lead to energy conservation. The reasons for this opposite relationship are not readily apparent. Perhaps this, too, is a reflection of the Lower Mainland location of many innovators.

12. Have large surplus borrowing power. Many municipalities, as well as individuals, appear to assume that energy conservation costs money. If this is the case, many municipalities may be held back by their lack of financial resources. Though the 1979 statistics on borrowing power may not be an accurage reflection of the present situation, they do serve to give an indication of the recent limitations each municipality faced when planning major capital expenditures. These statistics are shown in Figure 25.

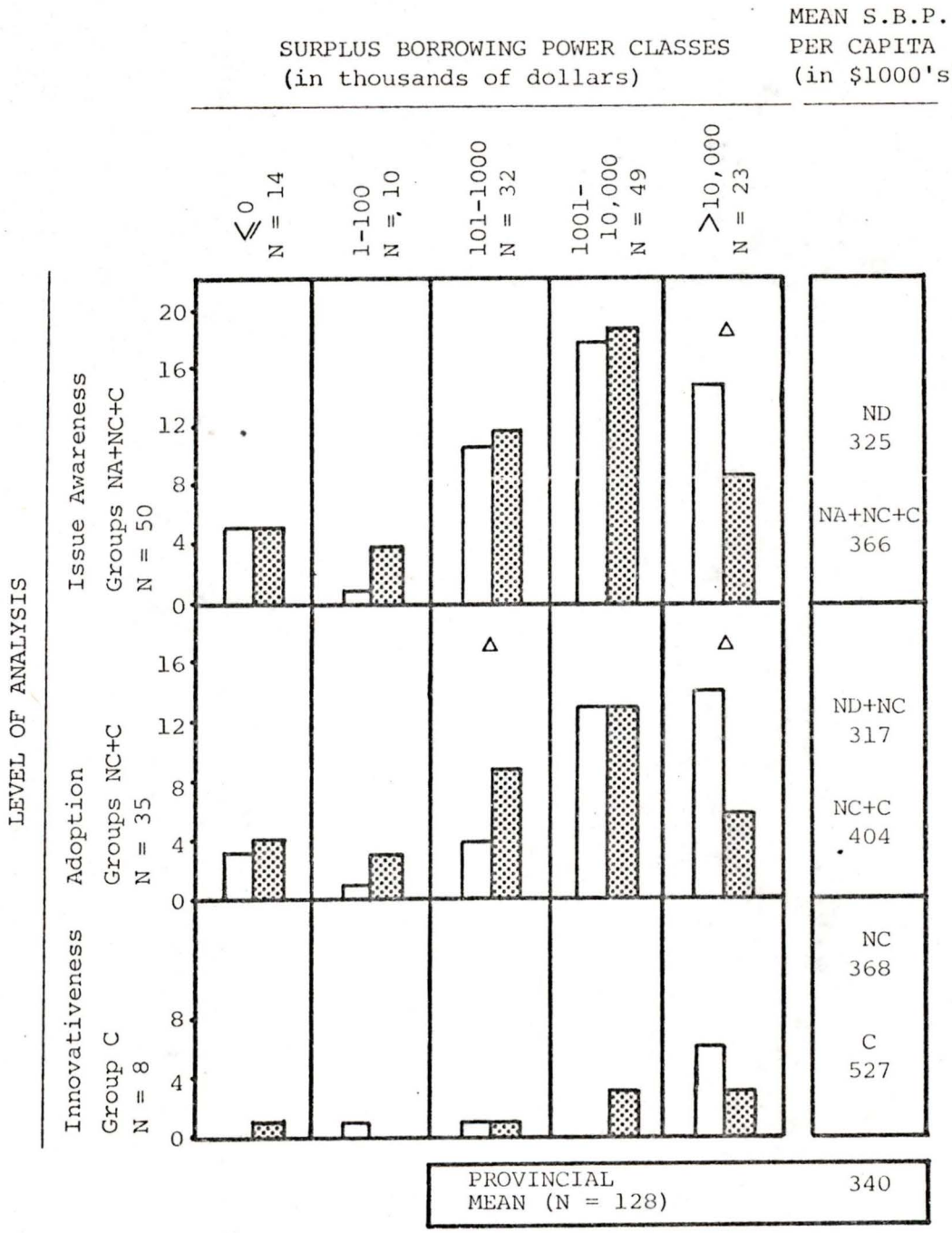
A positive relationship between recycling support and energy conservation is indicated (and statistically significant). Recycling and energy conservation may then be concurrent activities for many municipalities. However, recall that there were recycling activities in communities where conservation had not been discussed in council. Again, while energy conservation may lead to active recycling programs, recycling programs in the community do not necessarily lead to energy conservation.

TABLE 15 - Transportation and Solid Waste Disposal Costs

| LEVEL OF ANALYSIS | MEAN TRANSPORTATION COSTS PER CAPITA ($'s) | MEAN SOLID WASTE DISPOSAL COSTS PER CAPITA ($'s) |
|---|---|---|
| Awareness | | |
| ND | 59 | 1.3 |
| NA+NC+C | 57 | 1.3 |
| Adoption | | |
| ND+NA | 61 | 1.3 |
| NC+C | 51 | 1.3 |
| Innovativeness | | |
| NC | 53 | 1.2 |
| C | 47 | 1.5 |
| Provincial Mean | 60 | 1.3 |

Source: B.C., Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1979, Victoria.

FIGURE 25 - Summary of Surplus Borrowing Power Factor




Source: B.C., Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1979, Victoria.

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

13. Have a large municipal revenue per capita. A second measure of available resources is the total municipal revenue. Per capita figures are used to remove some of the correlation between population and revenue. Table 16 summarizes the data. Increasing revenue per capita appears to be associated with innovativeness in the area of energy conservation. These differences are not, however, statistically significant.

14. Have a large number of municipal employees. A further measure of available resources is the number of municipal employees. According to previous research, a large municipal staff should offer a large diversity of interests, knowledge and contacts. Such a situation will create a high probability that the innovation will be recognized as well as provide unallotted staff time for its consideration.[6] Information for this hypothesis was obtained from Question 22. Results are illustrated in Figure 26.

Municipalities with large numbers of employees appear to be more innovative than those with few. This agrees with previous research. The mean values support the relationship--mean number of employees rises and number of citizens per employee falls as innovativeness increases. Again, much of this relationship is possibly related to municipal size.

15. Provide tangible support for local recycling activites. To test the relationship between recycling and other energy conservation activities, it is useful to look at the support given by councils for local recycling activities (Question 6). While many respondents reported that their councils had given verbal support for recycling, Figure 27 shows only those municipalities whose councils have actually committed municipal resources (money, buildings, land, vehicles) to the activity.

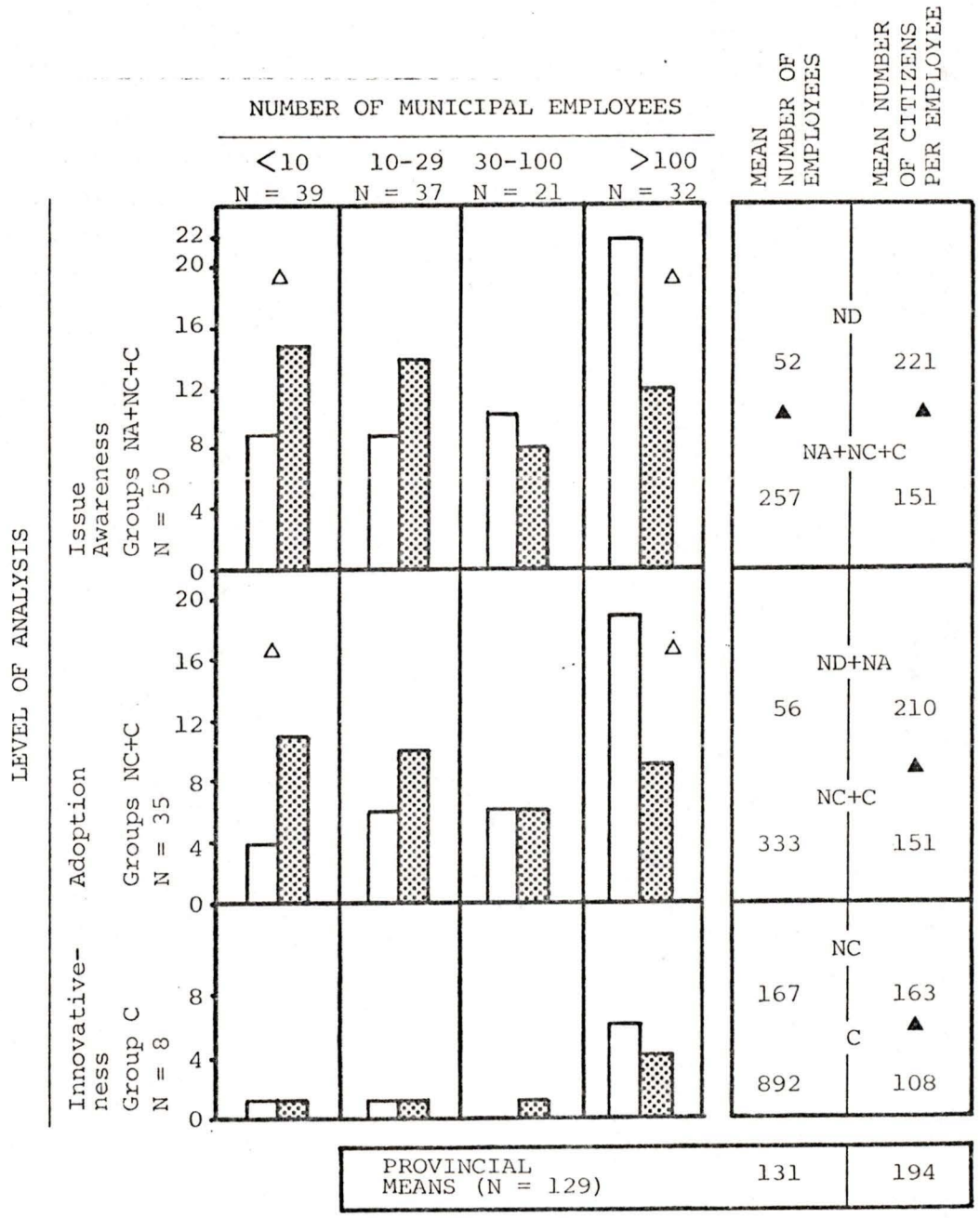
A positive relationship between recycling support and energy conservation is indicated (and statistically significant). Recycling and energy

TABLE 16 - Municipal Revenue per Capita

| LEVEL OF ANALYSIS | MEAN MUNICIPAL REVENUE PER CAPITA ($'s) |
|---|---|
| Awareness | |
| ND | 325 |
| NA+NC+C | 357 |
| Adoption | |
| ND+NA | 330 |
| NC+C | 359 |
| Innovativeness | |
| NC | 351 |
| C | 386 |
| Provincial Mean | 343 |

Source: B.C., Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1979, Victoria.

FIGURE 26 - Summary of Number of Municipal Employees Factor



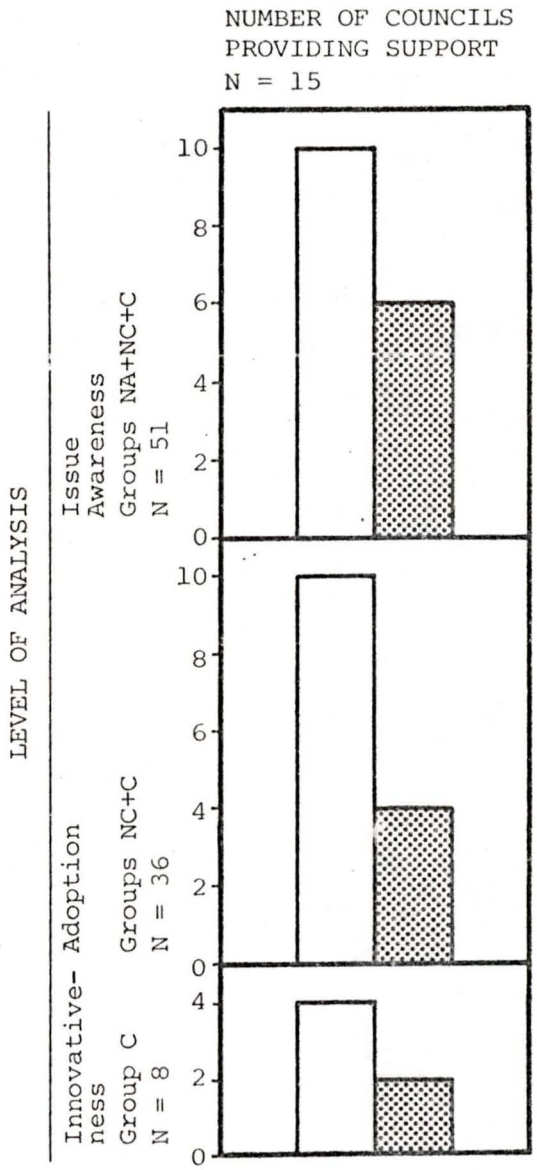

Source: Question 22 - How many people are employeed full time by your municipal corporation?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping in each analysis level.

△ indicates significant difference between observed and predicted frequencies in the Chi$^2$ test.

▲ indicates significant difference in the t-test for difference of means.

FIGURE 27 - Summary of Support for Recycling Factor




Source: Question 6 - Has the municipal council been active in supporting any household waste recycling activities? If yes, in what ways has the council supported these activities?

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

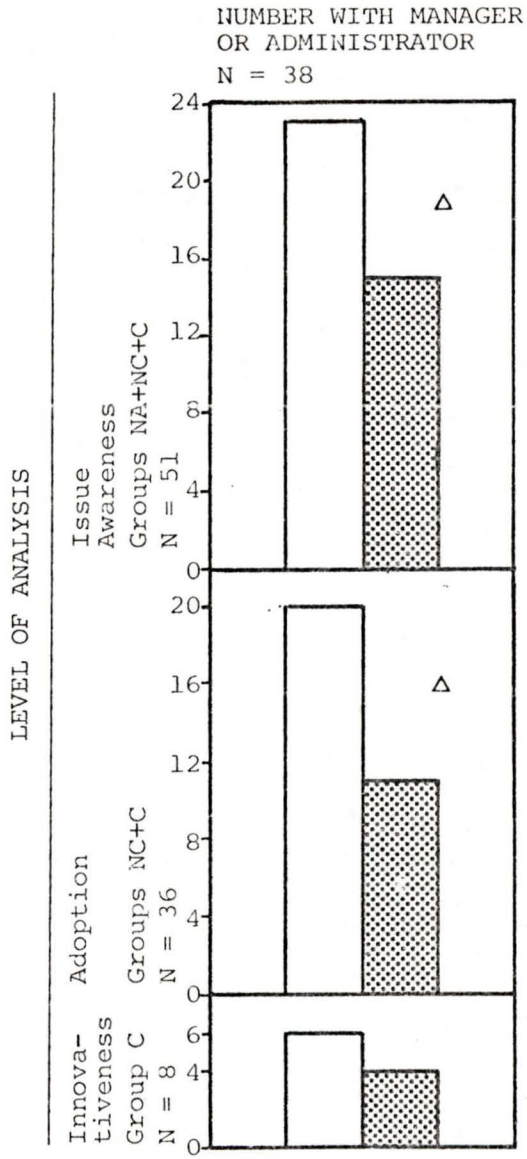
conservation are concurrent activities for many municipalities. However, recall that there were recycling activities in communities where energy conservation had not been discussed in council. Again, while energy conservation may lead to active recycling programs; recycling programs in the community do not necessarily lead to energy conservation.

16. Be actively planning for future growth. It had been anticipated that the extent to which each municipality plans for and anticipates future growth would be reflected in their recent major problems and their responses to the question on council objectives (Question 17 and 20). However, the large variation in responses on recent problems faced by council and the subjectivity of the question on council objectives make the data inappropriate for analysis of this hypothesis. Like hypothesis eight, validation of this factor requires a local knowledge of each municipality. Therefore, it is impossible at this time to analyze the effect of this factor on energy conservation innovativenss.

17. Have a manager or administrator. Like surplus borrowing power, municipal revenue and staff size, this factor reflects the potential relationship between available resources and energy conservation. An administrator or manager should have the resources and time to look at the municipal operation comprehensively and consider the advantages of undertaking energy conservation activities. Only some districts and cities have managers or administrators senior to their clerks. The expected and actual numbers of cities and districts having municipal managers/adminisrators are illustrated in Figure 28. Again, a positive relationship (statistically significant) is evident.

18. Have internal staff support for energy conservation. For this and the following hypothesis, support was observed through both a

FIGURE 28 - Presence of Manager or Administrator in Local Administration Factor




Source: B.C., Ministry of Municipal Affairs

Observed (blank) and predicted (shaded) frequencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

question asking directly for names and positions of energy conservation supporters in the local government (Question 13) and by noting the position of the individuals who introduced energy conservation to council (Question 7). The frequency of staff support is illustrated in Figure 29.

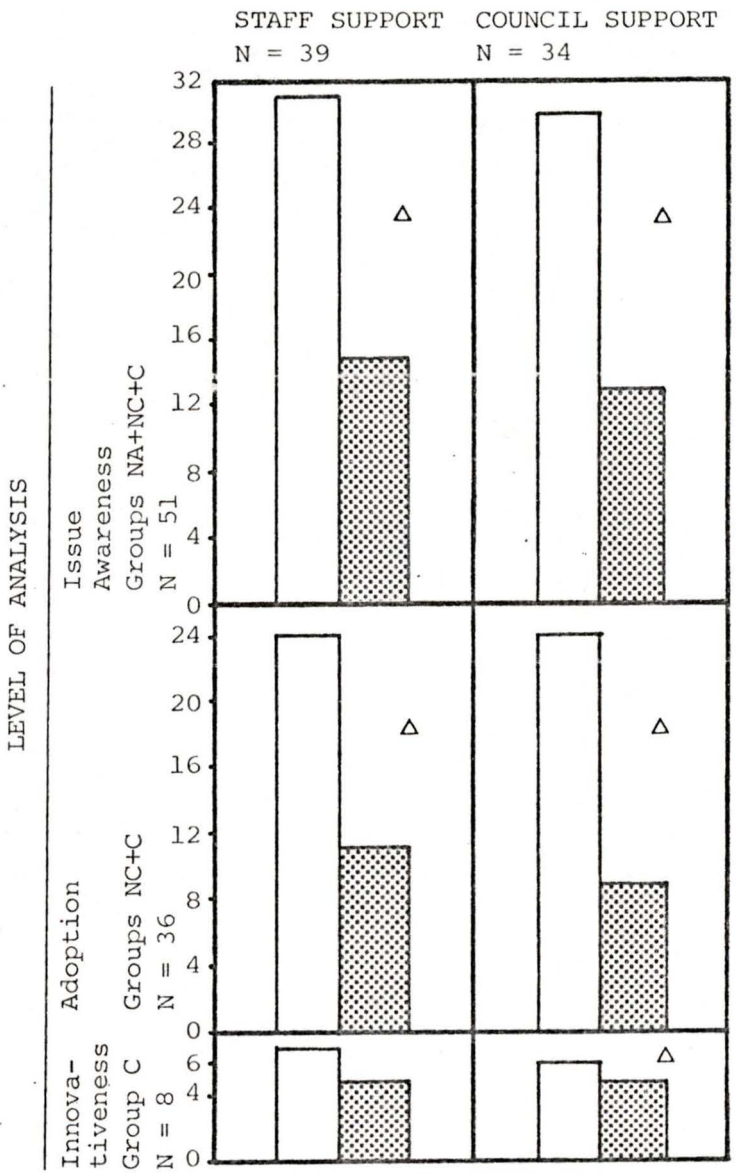
As expected, innovative municipalities report staff support more frequently than predicted from the provincial frequencies. This relationship is probably strongly reinforced by the fact that it is more likely respondents are aware of the energy conservation supporters in communities which have energy conservation activities. As a result, the data presented here is insufficient to support this hypothesis. However, that this is valid and the factor one of the most important ones determining energy conservation innovativeness, will be shown later in this chapter.

19. Have strong political support for energy conservation. As explained above, data for testing this hypothesis was provided by two questions. Results are illustrated also in Figure 29. As with staff support, political support shows a strongly positive relationship with energy conservation innovation. Again, the data may be more the result of energy conservation activity rather than the cause of it. That this is not so cannot be shown with this data but will be discussed later in this chapter.

## Barriers to Energy Conservation

One last area of analysis to regard before summarizing the preceding observations is the reported barriers to energy conservation. This topic has already been introduced and partially analyzed in Chapter Six. In that chapter, regional differences in responses were noted. Now it is useful to analyze the responses in terms of the levels of analysis used here.

FIGURE 29 - Staff and Council Support Summary




Source: Question 7 and Question 13 (see Appendix).

Observed (blank) and predicted (shaded) freuqencies of the more innovative grouping at each analysis level.

Δ indicates significant difference between observed and predicted frequencies in the $Chi^2$ test.

Figure 30 depicts graphically the magnitude of agreement or disagreement with various suggested local barriers to municipal energy conservation programs. Respondents were asked to rate each potential barrier according to whether it was not a barrier or was a minor, moderate or major barrier to the adoption of programs in their communities. The height of the bars in the diagram represents the percentage of each group choosing a specific response.

In this analysis, responses from each of the four innovation groups appear to reflect the provincial trends observed. However, there are a few minor variations:

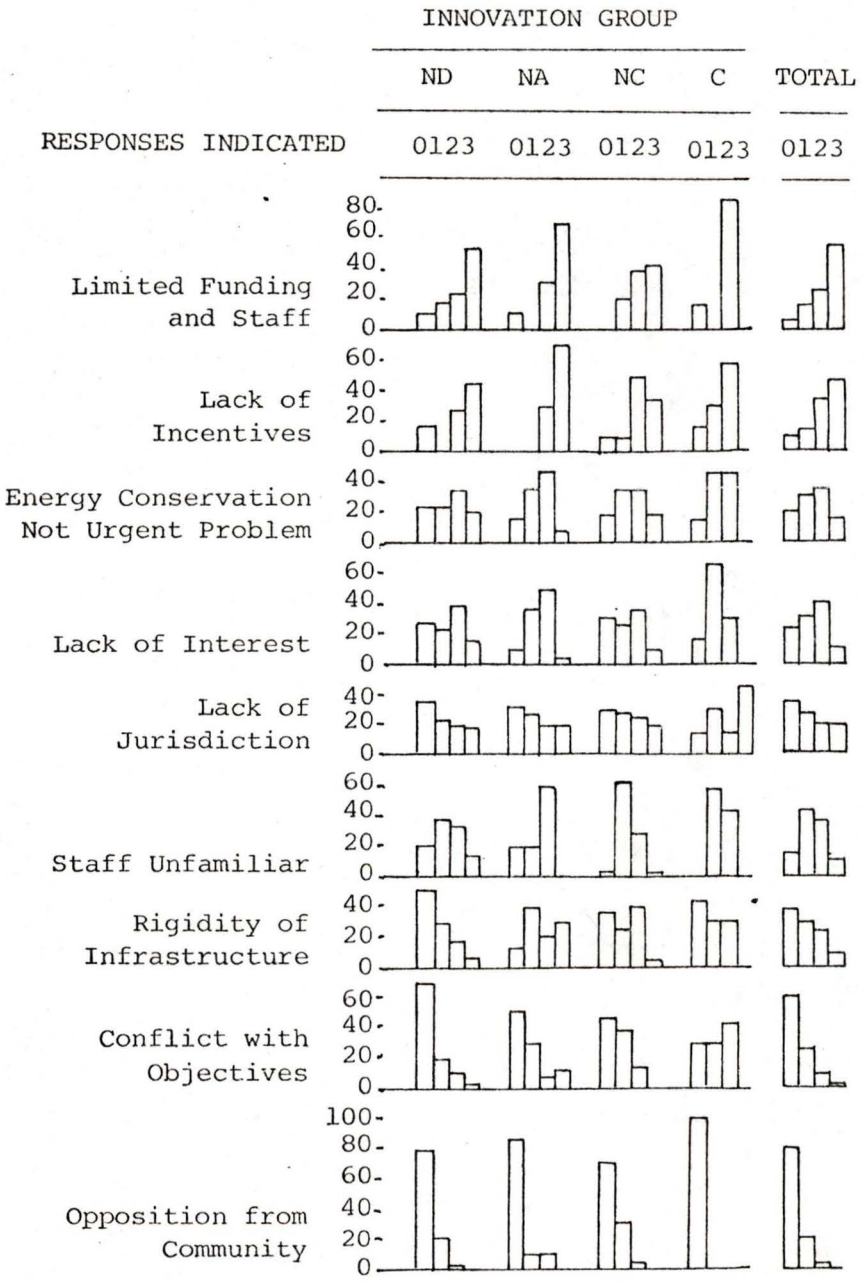
1. 'Lack of federal and provincial incentives' appears to be slightly less of a barrier to communities which have introduced 'not comprehensive' measures. This is reasonable since many of these measures adopted by these communities are inhouse measures, such as improved insulation and conversion 'off oil', which can be funded under existing grant programs. Government incentives tend to support specific activities rather than comprehensive programs.

2. 'Staff unfamiliar with techniques' was perceived to be much more of a barrier to municipalities which have discussed energy conservation but have taken no action. This is an excellent excuse for their inaction.

3. 'Rigidity of the municipal infrastructure' was reported to be unimportant in municipalities which have not discussed energy conservation. This is likely a reflection of the fact that this potential problem has not yet been faced by these communities.

4. 'Conflict with municipal objectives' is less of a problem with municipalities who have not discussed energy conservation and/or taken no action than with the others. Those which have adopted comprehensive

FIGURE 30 - Barriers to Energy Conservation: By Innovation Group




Source: Question 15 - Below is a list of possible obstacles facing any municipality wishing to establish local energy conservation programs. Rate each one according to how serious a problem you believe it to be at present in your community.

Height of bars represents percentage of region choosing specific responses as follows:

0 - Not a problem
1 - Minor problem
2 - Moderate problem
3 - Major problem

programs reported more concern over this problem. This certainly is reasonable in terms of comprehensive programs where tradeoffs with other political demands must be made.

Summary

In summary, then, it appears that the most innovative municipalities tend to be large (in area and population), old, densely populated cities located in the Lower Mainland, have large staff sizes, high revenues and large surplus borrowing power. These cities tend to be controlled by a senior administrator or manager, have local recycling activities supported by council and have citizens who are both involved in local government affairs and are concerned about energy issues.

Table 17 categorizes the investigated characteristics according to innovation level. This matrix outlines the previous discussion by indicating where strong relationships were observed between specific factors and energy conservation activities at each level of analysis. The lower portion of the chart indicates those factors whose relationships with energy conservation are thought to be correlated with size or location.

Generally, characteristics which appear to be important in determining awareness also affect adoption and innovativeness (though at this final level limited data provides only weak evidence). In a few factors, some differences are apparent. Small population does not affect awareness but is negatively related to adoption. This may be a result of modern communication systems which allow information to reach all areas equally well (leading to general awareness). However, the opportunities for the necessary person-to-person contacts (leading to adoption) will be greater

TABLE 17 - SUMMARY CHART OF FINDINGS

| | | LEVELS OF ANALYSIS | | | CORRELATED WITH: | |
|---|---|---|---|---|---|---|
| | | Awareness | Adoption | Innovativeness | Size | Location |
| CITIZENS | Interested in e.c. | (+) | + | | | |
| | Encouraged to participate | + | (+) | (+) | | |
| RECYCLING | Recycling supported | + | + | | | |
| | Recycling available | + | + | | | |
| SUPPORT | Council support | + | + | + | | |
| | Staff support | + | + | | | |
| CLIMATE | Degree days | (-) | - | | | * |
| OTHER | Manager or Administrator | + | + | | | |
| | Rapid growth | (+) | | | | |
| | Basic services problem | (-) | (-) | | | |
| | Borrowing power | + | + | (+) | | |
| | Transportation costs | | (-) | (-) | | * |
| | Number of employees | .+ | + | | * | |
| REGION | South | (-) | (-) | | | * |
| | North | (+) | (-) | | | * |
| | Vancouver Island | | | | | * |
| | Lower Mainland | | (+) | | | * |
| AGE | Post-1969 | | | | | |
| | 1940 to 1969 | (-) | (-) | | | |
| | Pre-1940 | (+) | (+) | | * | |
| SIZE | Large area | + | + | | * | |
| | Dense population | | + | | | * |
| | Small population | | - | | * | |
| | Large population | + | + | | * | * |

+ indicates statistically significant observed positive relationship.
- indicates statistically significant observed negative relationship.
Brackets indicate observed but not statistically significant relationship at p = 0.05 level.

in larger cities. The same circumstances may explain why a Lower Mainland location affects adoption but not awareness. For similar reasons, being in the North may make communities more inclined to be aware of energy conservation but less willing to adopt conservation measures.

Rapid growth appears to affect awareness but not adoption. This may be the result of the need for councils in rapidly growing communities to search for ideas and solutions. In this process, councils may become aware of energy conservation but may quickly reject or ignore it in light of more pressing issues (thus it becomes a non-issue).

There is strong agreement between these study conclusions and previous innovation research. This data not only supports findings in environmental models of decision making and innovation, but also supports classic geographic gravity models. Vancouver, as the largest city in the province, has likely 'infected' other municipalities in the Lower Mainland while having little influence in other B.C. regions.

However, like all studies focusing on average conditions, there are many variations from the main conclusions. Hazelton, for example, is classified as a comprehensive innovator and yet it is a small, northern village. Some of the large Lower Mainland municipalities are in the NOT DISCUSSED group. This apparent inconsistency can be explained by one further, but major, factor. Previous research and further evidence to be explored presently provide a strong indication that this single factor has the power to override all other municipal characteristics in determining a community's innovativeness in energy conservation. This factor is the existence of concerned, dedicated and, most importantly, influential individuals within the community.

## Importance of Individual Actors

The importance of individual actors in local decision making and innovation is definitely not a new concept. Rogers, in his earlier works on innovation, recognized that collective decision making requires input from several different individuals. These he called the stimulators, initiators and legitimizers. This opinion is also suggested by an important area of study in political science--'elitist' government. In this view:

> decision making in local communities is largely in the hands of a small group of individuals. . . . They are relied upon to identify what the urgent issues are and to propose which action should be taken.[7]

This concept of the importance of influencing individuals has also been highlighted in many of the recent reports on municipal energy conservation. Gibson, for example, in her review of local energy initiatives in Canadian urban settlements concluded that:

> Almost unanimously those involved in energy management programs stressed how essential support at the most senior levels is if programs are to succeed. Discussions indicate that this commitment from the top must in fact be matched by a keenly committed individual or group of individuals at the operational level, and staff motivation is very important. . . . At least 50% of the projects described were inspired and carried through as a result of the determination and commitment of one or several individuals, rather than solely as political or bureaucratic initiatives.[8]

In light of these current findings it is now useful to review the environments of some of the comprehensive innovators to determine the extent to which individual have played significant roles.

## Individual Actors in Comprehensive Programs

Hazelton. Hazelton is an interesting community with which to begin this review since, as has been already pointed out, it does not conform to the 'average' conditions. Hazelton's deviation from the norm is the

result of interest by local entrepreneurs (stimulators) in developing a potential hydro electric site and in utilizing wind energy. The involvement of the mayor (legitimizer) and other municipal employees has no doubt also given the project impetus.

Vancouver. Vancouver's progressive program is the result of a major initiative by a former alderman, M. Harcourt, who is presently the mayor. The program also has the enthusiatic support of the Director of Civic Buildings and the Energy Conservation Officer.[9]

Victoria. Victoria's program, too, has been legitimized in council by an insistent alderman, R. Blencoe. In Victoria's case, however, it appears that the alderman holds less power than Mayor Harcourt of Vancouver did in the early stages of that city's program. Progress in Victoria has been much slower owing to less commitment on the part of municipal staff and less indication of community support.[10]

Vernon. The design of the demonstration project to introduce energy conservation to Vernon was based largely on a model incorporating the concepts of stimulators, initiators and legitimizers.[11] Accordingly, the program was started by a trained 'stimulator' who was placed in the community by the federal government and by a local 'initiator' chosen for the job. These two individuals, through a great deal of behind the scenes effort, managed to enlist the support of an alderman. Together these three have spearheaded the program in Vernon.

It is interesting to note, however, that at the end of the original federal government project when partial funding from the government ceased, the project did not have enough political and internal support to remain active. Clearly further individual support was required.

One further piece of evidence can be brought forward in support of

the important role played by key initiators. Concurrently with the mail questionnaire, the author had the unanticipated opportunity to conduct a partial participant observation experiment on the introduction of a municipal energy conservation program in the City of Nanaimo.

## Municipal Energy Conservation in Nanaimo[12]

Nanaimo is a large, central city on Vancouver Island. While serving as the principal service and supply centre for the central and northern Vancouver Island regions, it also has a major integrated forest products mill and an important, expanding deep sea port function. It is presently undergoing rapid economic expansion under the helping hand of a development-oriented city council. Energy conservation does not appear to be a major concern in the expanding economy of the city.

In spite of this situation, there are several individuals in the city and regional government bureaucracies who feel there is both an opportunity and a need to include energy conservation in Nanaimo's growth plans. In late summer 1980, the Economic Development Officer for the Nanaimo Regional District, acting as a 'stimulator', prepared a short brief outlining the region's present energy situation and the energy constraints to be realized in the near future. The report recommended the establishment of a "Regional Energy Task Force" with a mandate to "plan, coordinate and stimulate a regional energy policy compatable with both provinical and national goals."[13] This report was presented to the Regional Board in August 1980 for their consideration but the Board failed to adopt the report and, thus, did not consider the formation of the Task Force. Insufficient concern in the community was the reason given for rejecting the recommendations.[14]

Although the local politicians failed to see the significance of the

report, many staff level municipal and regional employees agreed with its concepts. A small, informal meeting of these and other individuals was called in the late fall to discuss the potential for local energy management. At this meeting it became apparent that many individuals in the Nanaimo region are actively working on energy conservation initiatives, with each person working alone. The meeting concluded with a consensus opinion that these diverse activities and interests should be pulled together for mutual support and encouragement.

Shortly after the meeting, a chairman of the 'ad hoc' committee was appointed and the group began its battle upwards toward political awareness of the importance of local energy initiatives. The group's progress was hampered by the lack of any official sanction or status. It was decided, therefore, that the initial public impetus would be most successful if it appeared to be coming from the local college, Malaspina College (a neutral institution capable of acting as a stimulator).

The culmination of the ad hoc committee's work with the college was the presentation of a one and a half day workshop on energy management in the Nanaimo region. This workshop provided for both initiation (local adaption of the concept) and legitimization since it was attended by representatives of the city administration, the Chamber of Commerce and many local businesses and interest groups. A great deal of support and interest in the concept was evident. The workshop closed with the passing over of responsibility for further action to a city employee. This individual has been placed in charge of the city's conservation activities by an internal management committee of the city administration. The city administrator also gave his support to municipal energy conservation. These two individuals agreed to work together to develop a proposal for

council with regard to the establishment of an energy information centre in a retrofitted house under a provincial government program.

Unfortunately, summer vacations suspended further action on this project until the fall. With the passing of the working year went the original momentum of the group. The bid for the conservation house fell through and Nanaimo subsided back into inactivity.

This lengthly discussion of the Nanaimo situation should help to illustrate the role of individuals. The original impetus was the direct result of one person's efforts to instill in the local decision makers a concern for energy conservation. His initial effort failed but his interest was not lost. With the formation of the ad hoc committee his role as chief innovator was passed on to an individual of slightly different position within the community--a college instructor with no government involvement. This permitted the city and regional government officials to be approached at a different level. This individual was able to further stimulate interest in this topic.

With the passing on of responsibility to the municipal employee, stimulation of the local government's interest appeared almost complete. Initiation now appeared possible since this individual had the inside knowledge to adapt the concept to one which would be of interest to the local decision makers. The involvement of the city administrator, too, began the process of legitimization. It is interesting to note the importance of the commitment of these individuals. At any point in this process, if any one of the designated leaders had abandoned the project, the venture would have collapsed.

In spite of all of this commitment in the community and in the local bureaucracy, the scheme faltered. By the end of the research period the

necessary legitimization by a council member or regional board director had not been obtained and the project appeared to be dropping into oblivion.

FOOTNOTES

[1]R. Hammond and R.S. McCullagh, Quantitative Techniques in Geography (Oxford: Clarendon Press, 1974), p. 137.

[2]See John C. Hudson, Geographical Diffusion Theory, Northwestern University, Studies in Geography, No. 19 (Evanston, Illinois: Northwestern University, 1972) and Poul Ove Pederson, "Innovation Diffusion Within and Between National Urban Systems," Geographical Analysis 2 (July 1970): 203 - 254.

[3]Gerald Zaltman, Robert Duncan and Johnny Holbeck, Innovations and Organizations (New York: John Wiley and Sons, 1973), p. 135.

[4]Reg Lang and Audrey Armour, New Directions in Municipal Energy Conservation: the Calfornia Experience (Toronto: Ontario Ministry of Energy, 1980), p. 121.

[5]Personal communication from Gerald Bachmeyer, Coordinator Internal and Municipal Conservation Programs, Energy Resources Branch, Ministry of Energy, Mines and Petroleum Resources, June 1, 1982.

[6]Zaltman, Duncan and Holbeck, Innovations and Organizations, p. 135.

[7]W.R.D. Sewell and H.D. Foster, Analysis of the United States Experience in Modifying Land Use to Conserve Energy, Lands Directorate, Environment Canada, Working Paper No. 2 (Ottawa: Supply and Services, 1980), p. 65.

[8]Judith Gibson, Local Energy Initiatives in Canadian Urban Settlements, working paper (Ottawa: Central Mortgage and Housing, 1979), p. 12.

[9]Art Langely, Director, Civic Buildings Department, City of Vancouver, presentation at U.B.C. Seminar on Municipal Energy Management, March 19 and 20, 1981, Vancouver.

[10]Personal communication from Robin Blencoe, Alderman, City of Victoria, November 17, 1980.

[11]Louis J. D'Amore, "Energy Conservation - The Canadian Experiment," Business Quarterly (Winter 1980):18 - 29.

[12]The following is based on personal observation as Chairman of the ad hoc committee.

FOOTNOTES

[13]Nanaimo Regional Economic Development Commission, "Energy - The Island's Options," report prepared by the Commission, August 1980, np.

[14]Personal communication with John Barnard, Economic Development Officer, Nanaimo Regional District, several occasions 1980 and 1981.

# CHAPTER EIGHT

## Summary and Conclusions

> Although it is true that we live more than ever before in an era of change, prevailing social structures often serve to hamper the diffusion of innovations. Our activities in education, agriculture, medicine, industry, and the like are often without the benefit of the most current research knowledge. The gap between what is known and what is effectively put to use needs to be closed. To bridge this gap we must understand how new ideas spread from their source to potential receivers and understand the factors affecting the adoption of such innovations. We need to learn why, if 100 different innovations are conceived simultaneously, ten will spread while ninety will be forgotten.[1]

Over the last half century a great tradition of diffusion literature has been developed. Many of the controlling factors are now understood. However, the very complex nature of the diffusion process prevents accurate prediction of how a 'new', unexplored social system will react. Will diffusion in this new system exhibit the same pace and form that has been shown to occur in other areas?

Such was the underlying question from which this study emerged. Much work has been done on the diffusion of municipal energy conservation programs in the U.S. and in larger Canadian cities. These studies have provided great insight into how the rate of adoption of these activities may be accelerated. This information is useful, but how well does it apply to the B.C. municipal system? The results of this study suggest that the findings of previous research are reflected in the B.C. situation.

There is strong evidence to confirm that, on the average, the urban hierachy model, in which large municipalities are the early adopters, and

the epidemiology model, in which municipalities close to adopters will tend to adopt innovations sooner than other municipalities, conform to the results of this study. In addition, these findings support various environmental models of decision making and innovation discussed earlier in this thesis. It appears that while mathematical models may explain the 'average' condition, environmental models supply an explanation for the majority of the deviations from these models.

The data collection technique utilized in this study did not permit an in depth review of local government policy making processes. However, the evidence suggests that in many ways the decisions and non-decisions regarding energy conservation made by the councils are 'good' decisions in the rational sense. Many councils are making the small, obvious contributions to conservation such as using smaller vehicles and reinsulating public buildings. The incentives for developing comprehensive programs do not exist. The citizens, it appears, do not regard conservation as a burning issue and the provincial and federal governments have not, until very recently, actively promoted such a comprehensive approach for all communities no matter how small.

In terms of the concepts of power and rationality, power is, by far, the more important dimension in the final outcome. This is well illustrated by the Nanaimo case. While rational analysis indicated a need for energy conservation, the concentration of power in the hands of a few decision makers prevented the concept from being implemented in policy.

In the same way, 'need' appears to have little relationship to the adoption of energy conservation initiatives. Energy conservation is adopted not in those communities where the need is greatest, but rather in those communities where an aware and committed individual holds

sufficient power to get the concepts accepted. Perhaps the need for energy conservation has not yet been widely accepted in this province where energy is presently relatively cheap and 'surplus energy' makes the news almost daily.

## Areas for Further Study

Municipal energy conservation has become a familiar research theme. Those, like this study, which focus on the diffusion of energy conservation as an innovation, generally appear to provide further evidence for already well accepted innovation concepts. Although it may be interesting to repeat this study in a few years when, one hopes, municipal energy conservation has become widespread in B.C., it appears likely that the innovation will diffuse according to the various, well-documented theories. Research on this topic is likely to be more fruitful in the specific areas of barriers to innovation and the sources of funding and information exploited.

## Conclusions

The results of research undertaken for this study offer a number of suggestions for governments wishing to initiate energy conservation in municipalities:

1) At the senior government level, energy conservation may be encouraged in municipalities by making it an easily comprehended technique, by showing that costs are easily recoverable and by outlining model bylaws and resolutions for those municipalities who lack the staff to develop their own.

2) At the local government level, energy conservation can be encouraged by involving municipal staff and citizens in the energy decision

making, and by carefully tuning energy conservation techniques to the local situation.

3) At the citizen level, individuals can encourage municipal energy conservation by enlisting the support of influential members of the local government and by showing strong support from 'legitimate' citizens of the community.

It is hoped that these suggestions do not go unheeded for:

> conservation energy is not so simple to recover as it might seem. Unfortunately, it is a diffuse source, and it has no clear constituency in the way that oil, gas, coal, and nuclear do. Public policy must be its champion. With such a commitment, many different strategies will be needed. Public policy must create a hospitable environment for the expeditious exploitation of this source. If we had decades, then the market alone, working through gradual rise in prices, would be sufficient. But the decades are not there. For conservation to make the kind of contribution it should in the relevant time span, there must be found that adroit mixture of signals--of price, regulation, incentives, and information. Only in that way can conservation actions become as economically attractive to individual decision-makers as they are to the society at large.[2]

FOOTNOTES

[1]Everett M. Rogers and F. Floyd Shoemaker, Communication of Innovations: A Cross Cultural Approach, 2nd ed., (New York: Free Press, Macmillan Publishing Co., 1971), p. 1.

[2]Robert Stoubaugh and Daniel Yergin, eds., Energy Future: Report of the Energy Project at the Harvard Business School (New York: Random House, 1979), p. 227.

# BIBLIOGRAPHY

Agnew, John A.; Brown, Lawrence A.; Herr, J. Paul. "The Community Innovation Process: A Conceptual and Empirical Analysis." Urban Affairs Quarterly 14(1978):3 - 30.

Altshuler, Alan A. The City Planning Process: A Political Analysis. Ithaca, New York: Cornell University Press, 1965.

Aucoin, Peter. "Public Policy Theory and Analysis." In Public Policy in Canada: Organization, Process and Management, pp. 1 - 26. Edited by G. Bruce Doen and Peter Aucoin. Toronto: Macmillan Co. of Canada Ltd., 1979.

Babcock, Richard F. The Zoning Game: Municipal Practices and Policies. Madison, Wisc: The University of Wisconsin Press, 1966.

Barth, Ernest A.T., and Johnson, Stuart D. "Community Power and a Typology of Social Issues." Social Forces 38 (1959):29 - 32.

Becker, Selwyn W., and Whisler, Thomas L. "The Innovative Organization: A Selective View of Current Theory and Research." Journal of Business 40 (1967):463 - 469.

Bingham, Richard D. The Adoption of Innovation by Local Government. Lexington, Mass.: Lexington Books, D.C. Heath and Company, 1976.

Bonjean, Charles M.; Clark, Terry N.; Lineberry, Robert L. Community Politics: A Behavioural Approach. New York: The Free Press, 1971.

B.C. Ministry of Energy, Mines and Petroleum Resources. Analysis and Forecasting Division. Energy Resources Branch. British Columbia Energy Supply and Requirements Forecast, 1979 - 1996, Summary Report, February 1979.

B.C. Ministry of Municipal Affairs. Municipal Statistics, Including Regional Districts for the Year Ended December 31, 1979.

B.C. Ministry of Municipal Affairs and Ministry of Energy, Mines and Petroleum Resources. Fuel for Thought: A Primer on Energy Management for Local Government. 1981.

Butler, David. The Study of Political Behaviour. 3rd ed. London: Hutchinson and Co., 1970.

Canada. Energy, Mines and Resources. Energy Conservation in Canada: Programs and Perspectives. Report EP 77-7. Ottawa: Supply and Services, 1977.

Canada. Energy, Mines and Resources. The National Energy Program, 1980. Ottawa: Energy, Mines and Resources, 1980.

Castles, F.G.; Murray, D.J.; Potter, D.C., eds. Decisions, Organizations and Society. Harmondsworth, Middlesex, England: Penguin Books, 1971.

Claire, W.H., ed. Handbook on Urban Planning. New York: Van Nostrand Reinhold Co., 1973.

Clark, Terry N., ed. Community Structure and Decision-Making: Comparative Analyses. San Francisco: Chandler Publishing Co., 1968.

Cohen, Yehoshua S. Diffusion of an Innovation in an Urban System: The Spread of Planned Regional Shopping Centres in the United States, 1949 - 1968. University of Chicago, Department of Geography, Research Paper, No. 140. Chicago: University of Chicago, 1972.

Coulter, Philip B. "Comparative Community Politics and Public Policy: Problems in Theory and Research." Polity 3 (1970):22 - 43.

Crain, Robert L.; Katz, Elihu; Rosenthal, Donald B. The Politics of Community Conflict: The Flouridation Decision. New York: Bobbs-Merrill Co. Inc., 1969.

Crenson, Matthew A. The Un-politics of Air Pollution: A Study of Non-Decisionmaking in the Cities. Baltimore: Johns Hopkins University Press, 1971.

Daft, Richard, L., and Becker, Selwyn W. The Innovative Organization: Innovation Adoption in School Organizations. New York: Elsevier North-Holland, Inc., 1978.

D'Amore, Louis J. "Energy Conservation - the Canadian Experiment." Business Quarterly (Winter 1980):18 - 29.

Dearlove, John. The Politics of Policy in Local Government: The Making and Maintenance of Public Policy in the Royal Borough of Kensington and Chelsea. London: Cambridge University Press, 1973.

Dillman, Don A. Mail and Telephone Surveys; The Total Design Method. New York: John Wiley and Sons, 1978.

Doen, G. Bruce, and Aucoin, Peter. Public Policy in Canada: Organization, Process and Management. Toronto: Macmillan Co. of Canada, ltd., 1979.

Downs, George W., Jr., and Mohr, Lawrence B. "Conceptual Issues in the Study of Innovation." Administrative Science Quarterly 21 (1976): 700 - 714.

Dye, Thomas R. Understanding Public Policy. Englewood Cliffs, NJ: Prentice-Hall, 1975.

Eyestone, Robert, and Eulau, Heinz. "City Councils and Policy Outcomes: Development Profiles." In City Politics and Public Policy, pp. 37 - 65. Edited by James Q. Wilson. New York: John Wiley and Sons, 1968.

Feldman, L.D., and Goldrick, M.D. Politics and Government of Urban Canada: Selected Readings. 3rd ed. Toronto: Nethuen Publications, 1976.

Feller, Irwin, and Menzel, Donald C. "Diffusion Milieus as a Focus of Research on Innovation in the Public Sector." Policy Sciences 8 (1977):49 - 68.

Fliegel, FrederickC., and Kiulin, Joseph E. "Attributes of Innovations as Factors in Diffusion." American Journal of Sociology 72 (1966):235 - 248.

Forward, Roy. "Issue Studies in Community Power Studies." Australian Journal of Politics and History 15 (1969):26 - 44.

Friend, J.K., and Jessop, W.N. Local Government and Strategic Choice: An Operational Research Approach to the Processes of Public Planning. London: Tavistock Publications Ltd., 1969.

Gander, James E., and Belaire, Fred W. Energy Futures for Canadians: Long-Term Energy Assessment Program. Energy, Mines and Resources, Report EP 78-1. Ottawa: Supply and Services, 1978.

Gibson, Judith. Local Energy Initiatives in Canadian Urban Settlements. Working Paper. Ottawa: Central Mortgage and Housing, 1979.

Haefele, Edwin T. Representative Government and Environmental Management. Baltimore: Johns Hopkins University Press, 1973.

Hamilton Wentworth, Regional Municipality."Energy Consideration in Urban and Regional Planning." Report prepared for the City of Hamilton by Planning and Development Department of the Regional Municipality of Hamilton Wentworth, January 1978.

Hammond, R., and McCullagh, P.S. Quantitative Techniques in Geography: An Introduction. Oxford: Clarendon Press, 1974.

Hartle, D.G. A Theory of the Expenditure Budgetary Process. Toronto: University of Toronto Press, 1976.

Havens, A. Eugene. "Increasing the Effectiveness of Predicting Innovativeness." Rural Sociology 30 (1965):149 - 165.

Hawkins, Brett W. Politics and Urban Policies. New York: Bobbs-Merrill Co. Inc., 1971.

Heywood, Phil. Planning and Human Need. Newton Abbot, Devon: David and Charles, 1974.

Hudson, John C. Geographical Diffusion Theory. Northwestern University, Studies in Geography, No. 19. Evanston, Ill: Northwestern University, 1972.

Jenkins, W.I. Policy Analysis: A Political and Organizational Perspective. London: Martin Robertson and Company Ltd., 1978.

Jones, Charles O. "American Politics and the Organization of Energy Decision Making." Annual Review of Energy. 4 (1979):99 - 121.

Kernaghan, Kenneth, ed. Public Administration in Canada: Selected Readings, 3rd ed. Toronto: Methuen Publications, 1977.

Knight, Kenneth E. "A Descriptive Model of the Intra-firm Innovation Process." Journal of Business 40 (1967):478 - 496.

Lang, Reg, and Armour, Audrey. New Directions in Municipal Energy Conservation: The California Experience. Toronto: Ontario Ministry of Energy, 1980.

_____. Sourcebook: Energy Conservation in Twenty Canadian Cities. Toronto: Information Services, Planning and Development Department, City of Toronto, 1980.

Leijendendeckers, P.H.H. "Consumer Attitudes." In Non-Technical Obstacles to the Use of Solar Energy. Proceedings of the International Symposium, Brussels, Belgium, May 20 - 22, 1980. Edited by A. Stubb and T.C. Steemers. Brussels and Luxembourg: Harwood Academic Publishers, 1980.

Leiss, William. Quality of Life and Energy Conservation. Toronto: Royal Commission on Electric Power Planning, Province of Ontario, 1977.

_____, ed. Ecology versus Politics in Canada. Toronto: University of Toronto Press, 1979.

Lindblom, Charles E. The Policy-Making Process. Englewood Cliffs, NJ: Prentice-Hall, 1968.

Lithwick, N.H., and Central Mortgage and Housing Corporation. "An Introduction to the Problems of Urban Canada." In Politics and Government of Urban Canada: Selected Readings. 3rd ed. Edited by L.D. Feldman and M.D. Goldrick. Toronto: Methuen Publications, 1976.

McLoughlin, J. Brian. Control and Urban Planning. London: Faber and Faber Limited, 1973.

Martin, F.; Swan, N.; Banks, I.;Barker, G.; Beaudry, R. The Interregional Diffusion of Innovation in Canada. Report prepared for the Economic Council of Canada. Hull, Quebec: Canadian Government Publishing Centre, 1979.

Maslove, Allan M. "Review Article: A Theory of the Expenditure Budgetary Process." Canadian Public Administration 21 (Spring 1978):125 - 130.

Middleton Associates. Energy Management at the Local Level. Toronto: Royal Commission on Electric Power Planning, Province of Ontario, 1978.

Mohr, Lawrence. "Determinants of Innovation in Organizations." American Political Science Review 63 (1969):111 - 126.

Nanaimo Regional Economic Development Commission. "Energy - The Island's Options." August 1980.

Ontario. Ministry of Energy. Energy Conservation Opportunities for Municipalities. 1978.

Organization for Economic Cooperation and Development. Environment and Energy Use in Urban Areas (The Household and Commercial Sector). Paris: OECD, 1978.

Pack, Howard, and Pack, Janet Rothenberg. "Urban Land-Use Models: The Determinants of Adoption and Use." Policy Sciences 8 (1977): 79 - 101.

Pederson, Poul Ove. "Innovation Diffusion Within and Between National Urban Systems." Geographical Analysis 2 (1970): 203 - 254.

Plunkett, T.J., and Betts, G.M. The Management of Canadian Urban Government: A Basic Text for a Course in Urban Management. Kingston, Ontario: The Institute of Local Government, Queens University, 1978.

Poel, Dale H. "The Diffusion of Legislation among the Canadian Provinces: A Statistical Analysis." Canadian Journal of Political Science 19 (1976):605 - 626.

Portland, Oregon. Policy Analysis Section, Bureau of Planning. Energy Conservation Choices for the City of Portland, Oregon. 6 Vols. Office of Policy Development and Research, Department of Housing and Urban Development. Washington, DC: Government Printing Office, 1977.

Ray, G.F., and Uhlmann, L. The Innovation Process in the Energy Industries. Cambridge: Cambridge University Press, 1979.

Rogers, Everett M., and Shoemaker, F. Floyd. Communication of Innovations: A Cross-Cultural Approach. 2nd ed. New York: The Free Press, Macmillan Publishing Co. Inc., 1971.

Rogers, Everett M.; Williams, Linda; West, Rhoda B. Bibliography of the Diffusion of Innovations. Council of Planning Librarians, Exchange Bibliography # 1420 - 22. Monticello, Illinois: Council of Planning Librarians, 1977.

Rogers, Everett M., et al. "The Innovation Process in Public Organizations: Some Elements in a Preliminary Model." Ann arbor: University of Michigan, Department of Journalism, 1977.

Rogers, Everett M., and Adhikarya, Ronny. "Diffusion of Innovations: An Up-to-date Review and Commentary." Communication Yearbook 3 (1979): 67 - 81.

Rothman, Jack. Planning and Organizing for Social Change: Action Principles from Social Science Research. New York: Columbia University Press, 1974.

Rowan, Malcolm. "A Conceptual Framework for Government Policy-Making." Canadian Public Administration. 13 (1970):277 - 296.

Rowat, Donald C. Your Local Government: The Intelligent Canadian's Guide to Local Government: What it is and How it Works and Some of the Ways it can be Improved. 2nd ed. Toronto: Macmillan Company of Canada Limited, 1975.

Russel, Clifford S., ed. Collective Decision Making: Applications from Public Choice Theory. Baltimore: Johns Hopkins University Press, 1979.

Rydant, Albert Louis. "Regional Information Systems and the Diffusion of Social Innovations in British Columbia." Ph.D. dissertation, University of Victoria, 1979.

Sewell, W.R.D., and H.D. Foster. Images of Canadian Futures: The Role of Conservation and Renewable Energy. Environment Canada, Planning and Finance Service, Office of the Science Advisor, Report No. 13. Ottawa: Supply and Services, 1976.

_____. Analysis of the United States Experience in Modifying Land Use to Conserve Energy. Lands Directorate, Environment Canada, Working Paper No. 2. Ottawa: Supply and Services, 1980.

Shepard, Herbert A. "Innovation-Resisting and Innovation-Producing Organizations." Journal of Business 40 (1967):470 - 477.

Simeon, Richard. "Studying Public Policy." Canadian Journal of Political Science 9 (1976): 548 - 580.

Smith, Brian. Policy Making in British Government: An Analysis of Power and Rationality. London: Martin Robertson and Company Ltd., 1976.

Stobaugh, Robert, and Yergin, Daniel, eds. Energy Future: Report of the Energy Projcet at the Harvard Business School. New York: Random House, 1979.

Tindal, C.R., and Tindal, S. Nobes. Local Government in Canada: An Introduction. Toronto: McGraw-Hill Ryerson Limited, 1979.

U.S. Department of Energy. Local Government Energy Activities. 3 vols. Report DOE/PE-0015/2, Assistant Secretary Policy and Evaluation, Division of Environmental and Institutional Impacts Evaluation. Springfield, VA: National Technical Imformation Service, 1979.

U.S. National Research Council. Energy Consumption Measurement: Data Needs for Public Policy. Washington, DC: National Academy of Sciences, 1977.

Wilson, James Q. City Politics and Public Policy. New York: John Wiley and Sons, Inc., 1968.

Wood, Colin J.B. "Some Aspects of the Processing of Innovations Requiring Community Decisions." In Resources, Recreation and Research, pp. 22 - 30. Edited by H.D. Foster. Western Geographical Series, Vol. 3. Victoria: University of Victoria, 1970.

_____. "The Diffusion of Innovations Requiring Community Decisions: A Geographical Analysis." Ph.D. dissertation, McMaster University, 1970.

_____. "Some Characteristics of Searching by Municipal Governments." Geografiska Annaler 53B (1971):138 - 145.

Yin, Robert K.; Heald, Karen A.; Vogel, Mary E. Tinkering with the System: Technological Innovations in State and Local Services. Lexington, Mass.: Lexington Books, D.C. Heath and Company, 1977.

Zaltman, Gerald; Duncan, Robert; Holbeck, Johnny. Innovations and Organizations. New York: John Wiley and Sons, Inc., 1973.

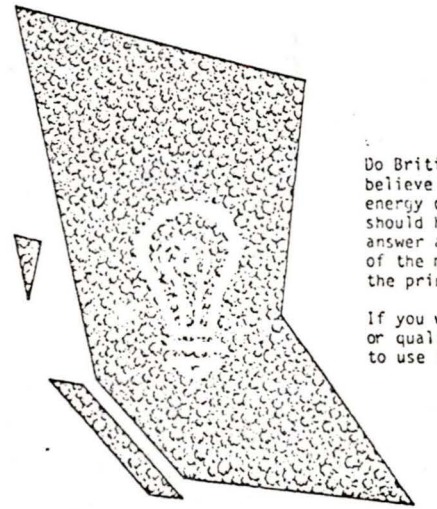
# APPENDIX

Questionnaire and Covering Letters

Questionnaire was produced in a booklet format measuring 6" by 8".

ENERGY FOR BRITISH COLUMBIA:

A Survey of Municipal Energy Conservation Activities in B.C.



Do British Columbia's municipalities believe they have a role to play in energy conservation? This study should should help to find out. Please answer all of the questions in terms of the municipality for which you are the principal appointed officer.

If you wish to comment on any questions or qualify your answers please feel free to use the space in the margins.

Thank you for your help.

This study is sponsored by the Department of Geography, University of Victoria.

Please return the questionnaire to:

Department of Geography
University of Victoria
Box 1700
Victoria, B.C. V8W 2Y2

Q-1 Energy problems vary greatly from one place to another depending on such things as climate, remoteness and the type and amount of industrial activity. To what extent do you feel the local energy supply situation is seen as a problem in your community by the municipal council and by the population at large?

(Please circle number of one choice in each column)

| By municipal council | By population at large | |
|---|---|---|
| 1 | 1 | URGENT PROBLEM |
| 2 | 2 | SIGNIFICANT PROBLEM |
| 3 | 3 | SOMEWHAT OF A PROBLEM |
| 4 | 4 | MINOR PROBLEM |
| 5 | 5 | NO PROBLEM |

Q-2 To your knowledge, has the local energy supply situation in any way restricted the expansion of local industries and/or reduced local employment opportunities over the last 5 years? (Circle the number corresponding to your answer)

1 NO
2 DONT KNOW → IF YOU KNOW OF NO SUCH RESTRICTION, SKIP FROM HERE TO Q-3 BELOW
3 YES

(If yes)
→ To what degree has this restriction affected the community?

1 SEVERE RESTRICTION - SIGNIFICANTLY RESTRICTING INDUSTRIAL EXPANSION AND/OR EMPLOYMENT OPPORTUNITIES

2 MODERATE RESTRICTION - SLIGHTLY REDUCING OVERALL EMPLOYMENT OPPORTUNITIES

3 MINOR RESTRICTION - ONLY A FEW INDIVIDUALS AFFECTED TO A MINOR DEGREE

Q-3 Over the next 3 years, is it anticipated that the local energy supply situation will in any way restrict the expansion of local industries and/or reduce local employment opportunities?

1 NO
2 DONT KNOW
3 YES

Q-4 Have there been any citizen groups in your community who have publically expressed concern over any energy issues?

1 NO
2 DONT KNOW → IF YOU KNOW OF NO GROUP THAT HAS EXPRESSED CONCERN, SKIP FROM HERE TO Q-5
3 YES

(If yes)
→ Please identify this group or groups.

What are the major energy related concerns of these citizens?

Q-5 Recycling of household waste materials such as newspapers, paper bags and tin cans is often considered to be an important community energy conservation activity. Which, if any, of the following recycling activities are available in your community? (Circle as many numbers as necessary)

1 RECYCLING DEPOT WHERE HOUSEHOLD WASTES CAN BE DROPPED OFF
2 REGULAR CURBSIDE PICKUP OF RECYCLABLE HOUSEHOLD WASTES
3 STREET CORNER BINS WHERE RECYCLABLES CAN BE DEPOSITED
4 NEWSPAPER PICKUP DRIVES BY COMMUNITY GROUPS
5 NO LOCAL HOUSEHOLD WASTE RECYCLING
6 OTHER (please specify) _____

Q-6 Has the municipal council been active in supporting any household waste recycling activities?

1 NO
2 YES
(If yes)
→ In what ways has the council supported these activities?

Next we would like to know if your council is doing anything else about energy conservation.

Q-7 Has your municipal council ever discussed the proposition that the municipality should consider implementing measures designed to reduce energy consumption either in municipal operations or in the community as a whole? (Circle number of your answer)

1 NO → IF YOUR COUNCIL HAS NOT DISCUSSED THIS, SKIP FROM HERE TO Q-13
2 YES

(If yes)
When was this proposition first discussed at a council meeting?

YEAR _____

MONTH _____

Who was the individual responsible for initiating this discussion?

NAME _____

POSITION _____

Do you know the circumstance which prompted this initial discussion?

1 NO
2 YES
(If yes)
Briefly describe this circumstance.

Q-8 As a result of this or later discussions, has the council taken any actions with regard to initiating any local energy conservation policies, programs or specific measures? (Circle number)

1 NO → IF NO ACTION HAS BEEN TAKEN, SKIP FROM HERE TO Q-13
2 YES

IF COUNCIL HAS TAKEN NO ACTION, SKIP THIS PAGE

Q-9 Has your council passed any resolutions or bylaws which are directly intended to lead to reduced energy consumption in the community or in municipal operations?

1 NO → IF NO, SKIP FROM HERE TO Q-10
2 YES
(If yes)
Please summarize these resolutions or bylaws passed by your council.

For each resolution or bylaw listed above, please give the month and year of adoption. (List the answers below the column headings)

RESOLUTION OR BYLAW | MONTH, YEAR OR ADOPTION

IF COUNCIL HAS TAKEN NO ACTION, SKIP THIS AND THE FACING PAGES

Q-10 Have any specific energy conservation activities been investigated and/or implemented as a result of these resolutions, bylaws or other council decisions?

1 NO → IF NO ACTIVITIES HAVE BEEN IMPLEMENTED OR INVESTIGATED, SKIP FROM HERE TO Q-11

2 YES

(If yes)

→ Briefly describe these activities.

When did each of the above activities begin operation? (List your answers under the column headings)

| ACTIVITY | MONTH, YEAR OF COMMENCEMENT |
|---|---|

IF YOUR COUNCIL HAS NOT PASSED ANY CONSERVATION INITIATIVES, PLEASE START AGAIN ON THE NEXT PAGE

Next we would like to find out how your programs were developed.

Q-11 Did any agency or individuals provide monetary assistance to be used in the development and/or operation of any of these energy conservation policies, programs or measures?

1 NO

2 YES

(If yes)

→ For each of your municipality's energy conservation initiatives (policies, programs or measures) which have received outside funding, please indicate the name of the individual or agency which provided these funds and, where applicable, the name of that agency's program under which it was funded. (List the answers under the column headings)

| INITIATIVE | AGENCY OR INDIVIDUAL | FUNDING PROGRAM |
|---|---|---|

Q-12 The following agencies could supply an interested community with technical assistance or general information on municipal energy conservation. Which, if any, of these have given your municipality nonmonetary assistance in the development of these energy conservation initiatives. (Circle as many numbers as necessary)

1 NO OUTSIDE ASSISTANCE
2 UNIVERSITIES OR COLLEGES
3 REGIONAL GOVERNMENT
4 PROVINCIAL GOVERNMENT MINISTRIES
5 FEDERAL GOVERNMENT DEPARTMENTS
6 ENERGY SUPPLY COMPANIES
7 PUBLIC INTEREST GROUPS
8 INDIVIDUAL CITIZENS
9 OTHER MUNICIPALITIES
10 LOCAL BUSINESSES OR INDUSTRIES
11 CONSULTANTS ON CONTRACT WITH THE MUNICIPALITY
12 OTHER (please specify) _____

Now we would like to know if any action is being taken outside of council.

Q-13 Regardless of whether or not your council has taken any steps towards energy conservation, are there any individuals on the present or previous councils or in the senior administration who actively supported local energy conservation activities? (Circle number of your answer)

1 NO
2 YES

(If yes)
→ Please name these supporters and give their official positions. (List your answers under the column headings)

NAME POSITION

Q-14 Are you aware of any measures designed to reduce energy consumption in municipal operations that have been introduced by municipal employees or departments on their own without the direction of the council? (Circle number)

1 NO → IF YOU ARE NOT AWARE OF ANY SUCH MEASURES, SKIP FROM HERE TO Q-15
2 YES

(If yes)
→ Briefly describe these measures.

Approximately when did each of these staff initiated measures begin operation? (List your answers under the column headings)

MEASURE YEAR OF COMMENCEMENT

Q-15 Below is a list of possible obstacles facing any municipality wishing to establish local energy conservation programs. Rate each one according to how serious a problem you believe it to be at present in your community. (Circle one answer for each item)

NOT means it is not a problem
MINOR means it is a minor problem, easily solved
MODERATE means it is a moderate problem
MAJOR means it is a major problem, difficult to overcome

| | Size of Obstacle to Conservation (Circle your answer) | | | |
|---|---|---|---|---|
| 1 Lack of interest in the community | NOT | MINOR | MODERATE | MAJOR |
| 2 Conflict with other municipal objectives | NOT | MINOR | MODERATE | MAJOR |
| 3 Opposition from groups and organizations within the community | NOT | MINOR | MODERATE | MAJOR |
| 4 Rigidity of the existing municipal infrastructure (including buildings, road system, vehicle fleet and machinery) | NOT | MINOR | MODERATE | MAJOR |
| 5 Lack of jurisdiction over this issue | NOT | MINOR | MODERATE | MAJOR |
| 6 Staff unfamiliar with techniques | NOT | MINOR | MODERATE | MAJOR |
| 7 Energy conservation not seen as an urgent problem | NOT | MINOR | MODERATE | MAJOR |
| 8 Limited funding and staff available for such programs | NOT | MINOR | MODERATE | MAJOR |
| 9 Lack of federal and provincial incentives | NOT | MINOR | MODERATE | MAJOR |

Q-16 Are there any other obstacles hindering the establishment of energy conservation programs in your community?

1 NO
2 YES

(If yes)
→ Please describe these obstacles.

This last section gathers general information about your community. It will help give some clues as to why some municipalities have decided to concern themselves with energy conservation while others have not.

Q-17 Listed below are seven different things which most municipal councils would like to do. However, no one council can accomplish all of these at the same time. Please indicate which one of these your council appears to have considered most important, second important and third important over the last 5 years. (Put item number in appropriate box)

☐ MOST IMPORTANT

☐ SECOND IMPORTANT

☐ THIRD IMPORTANT

1 Seeing to it that the community has a good climate for business which would encourage economic growth.

2 Seeing to it that the municipality becomes a very attractive place to live -- with good residential areas and pleasant, convenient facilities.

3 Seeing to it that the municipality provides its disadvantaged and senior citizens with adequate facilities.

4 Seeing to it that the interests of environmental, business, industrial and other groups are carefully balanced.

5 Seeing to it that the municipality maintains its heritage and traditional values.

6 Seeing to it that the municipality has a government which is efficient, honest and economical.

7 Seeing to it that the municipality is a place where citizens play an active role in government.

Q-18 In your opinion, on the average over the last five years has the local economy been growing rapidly, growing gradually, remained stable or been declining? (Circle one number)

1 GROWING RAPIDLY
2 GROWING GRADUALLY
3 STABLE
4 DECLINING

Q-19 In the next five years is the local economy expected to grow rapidly, grow gradually, be stable or decline? (Circle one number)

1 GROW RAPIDLY
2 GROW GRADUALLY
3 STABLE
4 DECLINE

Q-20 What do you think have been the three most important problems faced by your municipal council over the last 5 years?

1.

2.

3.

Q-21 Here is a list of subjects which sometimes pose problems for communities. In order that we may compare the direction of your municipality's development with that of other communities, please indicate which of these problems have been the subject of resolutions or bylaws in your municipality. (Circle as many numbers as necessary)

1 PROTECTION AND RENOVATION OF HERITAGE BUILDINGS
2 PROVISION OF SUBSIDIZED HOUSING FOR LOW INCOME CITIZENS
3 DOWNTOWN REVITALIZATION
4 PROTECTION OF SHORELINE AREAS FOR ENVIRONMENTAL OR RECREATIONAL PURPOSES
5 FLUORIDATION OF LOCAL WATER SUPPLY
6 SEWAGE TREATMENT
7 ADOPTION OF A WARD SYSTEM FOR MUNICIPAL ELECTIONS
8 MUNICIPALLY OWNED RECREATION COMPLEX
9 NONE OF THE ABOVE → IF NONE, SKIP FROM HERE TO Q-22 BELOW

(If items 1 to 8)
For each of the items you have marked above please provide the year in which resolutions or bylaws were first passed on each of these subjects.

_____ 1 PROTECTION AND RENOVATION OF HERITAGE BUILDINGS
_____ 2 PROVISION OF SUBSIDIZED HOUSING
_____ 3 DOWNTOWN REVITALIZATION
_____ 4 PROTECTION OF SHORELINE AREAS
_____ 5 FLUORIDATION OF LOCAL WATER SUPPLY
_____ 6 SEWAGE TREATMENT
_____ 7 ADOPTION OF A WARD SYSTEM FOR MUNICIPAL ELECTIONS
_____ 8 MUNICIPALLY OWNED RECREATION COMPLEX

Q-22 How many people are employed full time by your municipal corporation?

NUMBER OF EMPLOYEES _____

Q-25 What is the present estimated population of your municipality?

POPULATION _____

Is there anything else we should know about your community's energy situation? If so, please feel free to use the space below for that purpose.

Also, if your municipality has produced any reports which expand on the information you have provided in this questionnaire, we would like to know about them. Please list the titles of any of these reports that are available either here or in a separate letter so that we may obtain copies of them.

Questionnaire completed by: _____

Title: _____

Municipality: _____

Your contribution to this effort is very greatly appreciated. If you would like a summary of results please check the box below. We will see that you get it.

☐ Yes, I would like a summary of results.

Department of Geography

TELEPHONE (604) 477-6911, TELEX 049.7222

University of Victoria
P.O. BOX 1700, VICTORIA
BRITISH COLUMBIA, CANADA
V8W 2Y2

In its new National Energy Program the Federal Government has recognized the important role municipalities can play in promoting energy conservation. Most local governments in B.C. would agree that energy conservation is good policy. Few municipalities, however, have taken visible steps to actively pursue this goal. Why? Is it because they lack necessary information and resources? Or do council members feel citizens are more concerned about other issues? Why is it that some municipalities have considered conservation programs while similar communities have not?

Both the Federal and B.C. Governments want to help municipalities set up local conservation programs. However, in order that available resources are invested in sensible and effective programs, it is essential that they understand what our municipalities are presently thinking and doing about energy conservation.

Due to Vancouver Island's unique energy situation and the increasingly restricted supply we face for several years, this region's response is most critical. The Department of Geography is undertaking a pilot study as a first step in a province-wide survey. Since there are only 29 municipalities on the Island it is important that each questionnaire be completed and returned. Your experience in the local municipal administration will be invaluable in this regard and we ask your help in completing this study. Please answer all questions in terms of the municipality for which you are the principal appointed officer.

Your personal responses will be treated confidentially. Summaries of the results will be made available to government officials and to all interested municipalities and regional districts. You may receive a summary of results by ticking the box on the back cover of the questionnaire.

I will be happy to answer any questions you have. Please write or call. The telephone number is 477-6911, local 4226.

Thank you for your assistance.

Sincerely

Karen K. Kemp
Project Coordinator

Last week a questionnaire seeking information on your municipality's energy conservation efforts was mailed to you.

If you have already completed and returned it to us please accept our sincere thanks. If not, please do so today. There are only 29 municipalities on Vancouver Island. If the results are to accurately indicate what is happening here it is extremely important that yours is included in the study.

If by some chance you did not receive the questionnaire, or it got misplaced, please call me, collect, at 753-3245 and I will mail one to you immediately.

Sincerely

Karen K. Kemp

Department of Geography

TELEPHONE (604) 477-6911, TELEX 049.7222

University of Victoria
P.O. BOX 1700, VICTORIA
BRITISH COLUMBIA, CANADA
V8W 2Y2

Three weeks ago I wrote to you seeking information about your municipality's energy situation and about conservation programs presently being considered in your community. As of today we have not yet received your completed questionnaire.

Both the Provincial and Federal Governments are presently drawing up programs aimed at aiding municipalities plan their own local energy conservation programs. This research is being undertaken by the Department of Geography in order that up-to-date information is available for their program planning.

I am writing to you again because of the significance each questionnaire has to the usefulness of this study. In order that the results accurately reflect the entire situation on Vancouver Island it is essential that each questionnaire be completed and returned. As mentioned in our last letter please answer the questions in terms of the municipality for which you are the chief appointed officer.

In the event that your questionnaire has been misplaced, a replacement is enclosed. If you have any questions please write or call.

Your cooperation is greatly appreciated.

Sincerely

Karen K. Kemp
Project Coordinator

Department of Geography

TELEPHONE (604) 477-6911, TELEX 049.7222

University of Victoria
P.O. BOX 1700, VICTORIA
BRITISH COLUMBIA, CANADA
V8W 2Y2

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Both the Federal and B.C. Governments want to help municipalities set up local conservation programs. However, in order that available resources are invested in sensible and effective programs, it is essential that they understand what our municipalities are presently thinking and doing about energy conservation.

The Department of Geography has already undertaken a study of the municipal energy conservation initiatives on Vancouver Island. This survey is the next step in assessing the needs and accomplishments of all of B.C.'s municipalities. Since each community responds to the energy situation in an individual way, it is important that every questionnaire be completed and returned. Your experience in the local municipal administration will be invaluable in this regard and we ask your help in completing this study. Please answer all questions in terms of the municipality for which you are the principal appointed officer.

Your personal responses will be treated confidentially. Summaries of the results will be made available to government officials and to all interested municipalities and regional districts. You may receive a summary of results by ticking the box on the back cover of the questionnaire.

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Sincerely

Karen K. Kemp
Project Coordinator

Department of Geography

TELEPHONE (604) 477-6911, TELEX 049.7222

University of Victoria
P.O. BOX 1700, VICTORIA
BRITISH COLUMBIA, CANADA
V8W 2Y2

I am writing to you again about our study of municipal energy conservation efforts in British Columbia. We have not yet received your completed questionnaire.

We are very pleased with the large number of questionnaires received to date. However, whether we will be able to accurately describe what the municipalities in B.C. are thinking and doing about energy conservation depends upon those municipal officials who have not yet responded. This is because past experience suggests that those municipalities who have not yet responded may be reacting to the Island's energy situation in a quite different manner.

This is the first comprehensive survey on municipal energy conservation that has been done in British Columbia. Therefore, the results are of particular importance to government departments presently working on programs aimed at aiding communities in B.C. plan effective energy conservation programs. They cannot be sure these programs will be effective and useful unless they know what is presently going on.

It is for these reasons that I am sending this by certified mail to insure delivery. In case our other correspondance did not reach you a replacement questionnaire is enclosed. May I urge you to complete and return it as quickly as possible.

We will be happy to send you a copy of the results if you wish. If so, place a tick in the box on the back cover of the questionnaire. The results should be ready late in the summer.

Your contribuation to the success of this study will be appreciated greatly.

Most sincerely

Karen K. Kemp
Project Coordinator

VITA

Surname: KEMP Given Names: KAREN KATHLEEN

Place of Birth: AJAX, ONTARIO Date of Birth: SEPTEMBER 15, 1954

Educational Institutions Attended, with Dates of Entering and Leaving:

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Publications:

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Municipal Energy Conservation Programs in B.C.: A Study of Innovation Decisions

Author: [redacted]

Karen Kathleen Kemp