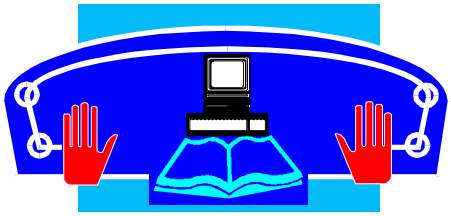

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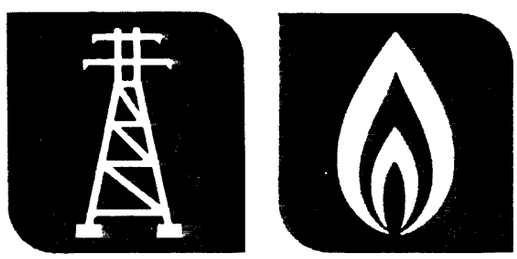

Northwest
Territories Public Utilities Board

ELECTRICAL RATE STRUCTURE REVIEW

OCTOBER 1990

A REPORT OF THE PUBLIC UTILITIES BOARD
RESPECTING
ELECTRICAL RATE STRUCTURES
IN THE NORTHWEST TERRITORIES

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SECTION 1 INTRODUCTION

On April 5, 1990, pursuant to the provisions of Sections 14.(1) and 56.(1) of the Public Utilities Act (the Act), the Executive Council and the Minister responsible for the Public Utilities Board (Board) directed the Board to conduct a public review into NWT electrical rate structures. The Terms of Reference under which the review was to be conducted are set forth in Appendix A.

The Board was directed to provide a written report to the Executive Council, and in that report to provide an analysis of the areas listed in the Terms of Reference. If changes were found to be advisable, the Board was directed to include options, recommendations and methods of implementation to effect these changes.

At present, electrical consumers in the NWT are served by three utilities. Two of the utilities, ICG Northern Utilities Ltd. (ICG) and Northland Utilities (NWT) Ltd. (NUL) are investor-owned and their rates are fixed by the Board. The third utility, the Northwest Territories Power Corporation (NWTPC), is a Crown corporation. NWTPC establishes-its own rates, which if approved by the Executive Council of the Government of the Northwest Territories (GNWT), are brought into force by regulation. The corporation's predecessor, the Northern Canada Power Commission (NCPC), was under the jurisdiction of the Federal Government. Its rates were allowed to evolve over time without the benefit of a consistent set of rate principles.

ICG and NUL purchase power from NWTPC and function primarily as distributors.

NWTPC is a generation, transmission and distribution utility. Diesel generators provide electricity to a majority of the communities served by NWTPC. The wholesale rate charged by NWTPC affects the rates of ICG and NUL.

A complex system of subsidies is provided to customers of the electric utilities in the NWT. Customers within the same communities are subsidized in a variety of ways. The methods employed to provide subsidies have varied over time. Most consumers and ratepayers are unaware of the actual cost of electricity and the extent of electrical subsidization.

SECTION 2 CONDUCT OF THE REVIEW

In conducting its review, the Board used three sources of information, the first source being the public hearing process. Hearings were conducted on an informal basis and were designed to allow the participants every opportunity to provide comments and to stimulate the free exchange of information. The Board invited comments on certain topics, although participants were encouraged to raise any other concerns they might have relating to electric rates and rate structures.

The second source was written submissions received from those who attended a hearing, or from those who were unable to attend any of the hearings.

The third source of information was a rate design consultant retained by the Board, whose primary responsibilities were to provide the Board with technical information on rate design principles and to assist the Board in evaluating the comments received from the public.

Notices of the Rate Structure Review were placed in territorial newspapers in late May and early June. Notices containing hearing locations and dates were published from mid-June until mid-July.

Three separate notices were mailed to representatives of all communities in the NWT. Preliminary notice of the review was sent out in late May, followed by background material on the need for the review at the beginning of June. Further information regarding the main issues to be addressed in the hearings and a schedule of the hearing dates and

locations was provided in late June.

The Board notified all electrical consumers in the Territories through information provided with the bills rendered by ICG, NUL and NWTPC. These notices provided an explanation of the review and the location and date of the hearings.

Notice was also sent to all Chambers of Commerce in the NWT.

The Board held hearings in Iqaluit, Cambridge Bay, Rankin Inlet, Fort Smith, Hay River and Inuvik. The hearings in these locations were non-technical and provided the Board with the opportunity to hear consumers on a wide variety of electrical service issues.

Hearings were held in Yellowknife to review rate structure issues at a more technical level. Submissions at these hearings were received from the three electrical utilities, interested parties and representatives from the GNWT.

SECTION 3 PRINCIPLES OF RATE STRUCTURE

The Board was asked to review the current rate structures of all electrical utilities in the NWT and to consider whether these rate structures produce just and reasonable rates. To perform its task, it was necessary for the Board to ascertain those principles of rate structure that are considered to be generally acceptable.

The most widely accepted measure against which rates are determined to be just, reasonable and not unduly discriminatory is the cost standard. The traditional principle is that "rates as a whole should cover costs as a whole"[1] and that consumers pay for the service they receive. In order that the cost standard may be applied, a cost of service study is normally undertaken.

A cost of service study is not a precise measurement of costs, but an approximation of cost responsibility by class of customer. In the preparation of a cost of service study, a utility makes an allocation of plant, property and operating expenses to each customer class, in an attempt to measure the costs of rendering service to the classes of customers under study. Although a cost of service study does not establish directly the structure of rates, it does provide useful cost information for rate design.

The design of rates is not limited to the recovery of cost. One of the most widely accepted lists of ratemaking objectives or criteria is that of Dr. James C. Bonbright, author of Principles of Public Utility Rates. A list of Dr. Bonbright's eight objectives, hereafter referred to as the Bonbright criteria, is found on page 1 in Appendix B.

The Board sought comments from participants on the relationship between costs and rates and whether different rate structures would help to promote conservation. The consensus from the hearings was that rates should reflect costs and that there should not be undue discrimination among customer groups. Opinions were mixed on whether the promotion of conservation was a valid rate design objective. A few participants argued that designing rates to promote conservation is inappropriate as much of the electrical consumption in the North is related to climatic conditions and household size and is not discretionary on the part of the consumer. Other participants felt that rates should be designed to promote conservation.

ICG recommended that NWTPC rates be brought under the jurisdiction of the Board, and stressed the importance of a fully allocated cost-of-service study as a guide in setting rates. In ICG's view, the best way to discourage waste is to send appropriate price signals from rates which reflect the cost of service.

NUL's position was that the best guide to a fair allocation of costs is a cost-of-service study reflecting how costs are caused. In turn, rates should be set to recover the costs allocated to each customer group, keeping cross-subsidization between customer groups to an absolute minimum while encouraging efficient consumption decisions. Costs should define the starting point in rate design, modified to the extent dictated by other relevant criteria.

NWTPC was of the opinion that rates should reflect costs in order to give an appropriate price signal to consumers and in order to minimize cross subsidization. NWTPC supported the use of the Bonbright criteria notwithstanding some difficulties of interpretation.

The City of Yellowknife also supported the use of the Bonbright criteria giving them no particular ranking. It emphasized that use of the criteria should recognize the unique conditions, problems and concerns of the North. The City recommended a system whereby individual concerns can be voiced in the ratemaking process.

Ecology North recommended electrical rates be set to reflect the actual cost of producing the service being provided. In a later written submission, Ecology North adopted conservation as the primary principle to guide rate setting and said that equity is important and should be considered.

The GNWT pointed out that rates should provide utilities sufficient revenues not only to cover current costs, but also to provide financial strength to meet growing demands reliably and efficiently; rates or prices should reflect the cost to the utility so that consumers can make an informed economic choice and undue discrimination should be avoided. According to the GNWT, the implications of applying the Bonbright criteria in restructuring NWTPC rates are that:

1. the overall level of rates must increase if NWTPC is to earn the required return;
2. rates should reflect costs, modified by practical considerations; and
3. rate structure changes must be phased in.

Having considered the submissions of the participants, the Board is of the opinion that the following rate design principles are relevant to the concerns and needs of the Northwest Territories:

Bonbright Primary Objectives

1. Capital attraction, revenue requirement or fair-return
2. Consumer-rationing, optimal-use
3. Fairness to ratepayers, fair-cost-apportionment

It is the Board's opinion that rates should reflect costs. Rates which reflect costs mean that customers pay for the electrical service which they receive. Having rates which reflect costs will contribute to efficient economic decisions and reduce wasteful consumption, thereby promoting conservation.

From the perspective of the utility, having rates which reflect costs means that the level of costs to be allocated among customer groups must represent the total revenue requirement for the utility. The Board concurs with the GNWT that rates should provide utilities sufficient revenues to cover current costs and provide a fair return to ensure the utilities' financial strength to meet growing demands reliably and efficiently.

The Board is aware that, as noted by various participants, there is difficulty in interpreting objectives such as "fairness", "undue discrimination" and "efficiency", though the objectives are generally accepted. The Board notes and accepts the recommendation of participants that the implementation of rates reflecting costs be gradual. In terms of Bonbright's criteria, and in a northern context, participants stressed the need for stability of rates with a minimum of unexpected changes seriously adverse to existing customers.

A comprehensive discussion of rate design principles, supplemented by a description of the

nature of electric utility costs, was submitted by the Board's consultant. The complete text of the technical appendix to his testimony in Yellowknife is provided in Appendix B.

SECTION 4 REVIEW OF CURRENT RATE STRUCTURES

The Board was asked to review the current rate structures of all electrical utilities in the NWT, including but not limited to whether the current rate structures of the electrical utilities produce just and reasonable rates.

The rates of ICG and NUL have been fixed by the Board for some twenty years. Over these years, both utilities have developed fully allocated cost-of-service studies and have designed rates bearing in mind the Bonbright criteria. The Board has had before it information that enabled it to conclude that cost-of-service information from ICG and NUL is sufficiently developed to provide a standard against which their rates may be measured to determine if they are unjust, unreasonable or unduly discriminatory. The Board concludes that their rates are just, reasonable and not unduly discriminatory given that the wholesale price paid to NWTPC is not being regulated by the Board.

As was noted earlier, NWTPC is a Crown corporation. NWTPC establishes its own rates, which if approved by the Executive Council of the GNWT, are brought into force by regulation. NWTPC's predecessor, NCPC, was under the jurisdiction of the Federal Government. Its rates were allowed to evolve without the benefit of a consistent set of rate principles.

The Board and all parties to the hearings, including NWTPC, observed that current NWTPC rates fail to meet the Bonbright criteria. Use of rate categories such as government and

non-government; varying energy charges by community when demand charges are uniform; varying relationships between wholesale and retail rates by community; an inverted block rate design for some, but not all, rates; and uniform street lighting rates in communities with differing residential and commercial rates all indicate an inconsistency with the Bonbright criteria. NWTPC indicated it was only beginning to assemble the necessary cost-of-service information. Therefore, the Board cannot reach the conclusion that NWTPC's current rate structure produces just and reasonable wholesale, industrial, commercial and domestic rates since the standard against which its rates can be measured is not fully developed.

SECTION 5 ELECTRICAL UTILITY RATES AND THE CONCERNS OF CUSTOMERS AND RATEPAYERS

The Board was asked to determine whether the current rate structures of electrical utilities meet the concerns of the industrial, commercial, government and residential consumers and ratepayers, at various locations in the NWT.

The rates of ICG and NUL have been fixed by the Board as just and reasonable and not unduly discriminatory. Under the provisions of the Public Utilities Act, ICG and NUL may apply for changes in rates, subject to a public hearing. Also, under the Act, a municipal or settlement council, or interested person may complain to the Board that the utilities' rates contravene the Act because the rates are not just, reasonable and are unduly discriminatory and request the Board to hold a public hearing. No application having been made, the Board concludes that the rate structures of the two utilities currently meet the concerns of industrial, commercial, government and residential consumers and ratepayers in the service areas of ICG and NUL.

As previously stated, NWTPC rates and rate structures are set by the GNWT and are not under the jurisdiction of the the Board. NWTPC cannot make application to the Board for a change in rates nor can a municipal or settlement council or interested person make a complaint to the Board.

The Board and all parties to the hearings, including NWTPC, observed that current NWTPC rates fail to meet the Bonbright criteria. Further, NWTPC indicated that it was only

beginning to assemble the necessary cost of service information.

Therefore, since the Board cannot examine NWTPC's rates in the light of a full public hearing, due to the lack of jurisdiction; there is a lack of fully developed cost of service information; and current rates of NWTPC fail to meet the Bonbright criteria, the Board cannot conclude that the current rate structure of NWTPC meets the concerns of the industrial, commercial, government and residential consumers and ratepayers in the NWTPC service areas.

SECTION 6 SUBSIDIZATION OF THE COST OF ELECTRICITY

The Board was directed to review matters relating to the subsidization of the cost of electricity in the NWT, the methods through which this subsidization is provided, and its impact on the supply and price of electricity to consumers and ratepayers.

Witnesses for the GNWT indicated that the total cost of electric subsidies, including an unknown amount for federal employees, is approximately $20 million as estimated for 1989-1990. The GNWT submission pointed out that as a result of population growth, increasing per capita consumption of electricity, capacity additions and projected increases in the price of oil, the support payments by government could increase by $10 million to an annual level of $30 million by 1995 or 1996. Changes in oil prices which have taken place since the GNWT made its submission may well affect the level of increase in support payments.

Based on a sample of eight communities served by NWTPC, it was estimated that residential customers paid for about 25 percent of the total amount billed for their usage, with the balance paid for primarily by government.

Participants in the hearings supported continued subsidization of the cost of electricity by the GNWT. The Board concurs with this opinion.

Opinions were divided on the degree and form of subsidization that should be provided. In general, those participants who were in favor of a cost standard for testing rates recognized

that subsidy programs should be implemented outside of the rate structure.

The following quotation, taken from the NUL submission, effectively summarizes the position of the utilities:

> "Provision of subsidies is a government decision not a utility decision. Subsidies are incompatible with economic efficiency but social goals may occasionally override efficiency considerations. If subsidies are provided, they should be implemented separately from rate design in order that the price signal is not obscured."

A short description of the ways in which the GNWT currently subsidizes electricity prices follows.

A. The Territorial Power Support Program (TPSP) applies to non-government domestic customers in areas outside of Yellowknife that have higher electric rates than Yellowknife.

B. The Territorial Rate Relief Program (TRRP) applies to small commercial customers in areas outside of Yellowknife who apply for a refund.

C. Tenants of the NWT Housing Corporation (the Housing Corporation) pay 3 cents per kWh for electricity consumed; the balance of their bill is paid by the Housing Corporation.

D. Employees of the GNWT living in remote areas in government housing pay an annual electricity charge of $9.51 per square meter of housing floor area; the balance

of their bill is paid by the GNWT Department of Public Works.

E. In communities served by the NWTPC, there are two rate categories, government and non-government, the government rate being the higher of the two.

These subsidies have evolved over a period of years. The TPSP, TRRP, and separate government and non-government rates originated with the Federal government. With the transfer of NCPC in 1988, the responsibility for the subsidies was assumed by the GNWT.

The GNWT said that it will continue to provide subsidies to some consumers, but will consider changes to current programs. It put forward the following criteria to evaluate current subsidy programs and develop new programs:

"1. The true cost of power must remain evident.

2. The method of subsidization must:

(a) be simple to understand and to administer;
(b) be fair and perceived as fair;
(c) promote price predictability from year to year.

3. The price structure after subsidization must:

(a) foster due care in the use of power;
(Corollary: subsidies must be provided to the occupant who has responsibility for and control of use and payment.)

(b) permit basic use within the means of the average family;
(Corollary: affordability must apply to "winter" consumption as well as that in the summer.)

(c) foster a sense of community responsibility for the cost of generation and a willingness to consider demand management, cogeneration, and conservation approaches;
(Corollary: residents of the community must be exposed to a "per unit" price that is related to the cost of generation in the

community: the higher the cost, the higher the price.)

4. The total cost of the subsidy program must remain affordable to the Government."

In what follows, each method through which subsidization is being provided is examined in detail and analyzed in terms of the GNWT criteria quoted above. Certain conclusions respecting the methods, alternative methods and comment on the impact on the supply and price of electricity to consumers and ratepayers are then given.

A. The Territorial Power Support Program

The TPSP applies to non-government domestic customers in areas outside of Yellowknife that have higher electric rates than Yellowknife. The TPSP reduces the cost of the first 700 kWh per month to the Yellowknife level. The amount of the subsidy estimated to be paid to the utilities in 1989-90 with respect to approximately 3,000 customers, is $2.4 million. The subsidy is applied by the individual utility and is shown separately on each domestic customer's bill. The cost to the GNWT of administering the TPSP is 10% of a person-year or approximately $6,000 to $8,000 per year.

Since the bills rendered by NUL and NWTPC clearly show the domestic rate applied to the level of consumption and then show the subsidy separately as a reduction, the cost of the first block of power consumed by domestic customers outside Yellowknife is evident.

Participants were unclear as to whether the TPSP was intended to accomplish equalization of the cost of some level of consumption for all domestic customers to a Yellowknife

consumers' cost for the same level of consumption, or was intended to provide some level of consumption to low income consumers at an affordable cost. The GNWT must determine the intention of the program.

If, as thought by many participants and the Board, the program is intended as equalization for all domestic customers, the present support level of 700 kWh per month maybe suitable, though increases and decreases both received support. The Board suggests that if equalization is the intention of the program, a study be undertaken to determine an appropriate support level. The GNWT may wish to consider using the average level of consumption that is typical in the North given variables such as climatic conditions, hours of darkness, appliance efficiency and the average family size. Additionally, consideration should be given to staggering the number of kWh per month over the calendar year. For example, the subsidy could be reduced to 500 kWh per month for June and July and increased to 900 kWh per month for December and January.

On the other hand, if the TPSP is intended to provide some level of consumption to low-income consumers at an affordable cost, i.e. is based on a lifeline concept, the GNWT should determine whether the present support level is appropriate.

Until the objective of the TPSP has been determined, a matter which is a GNWT policy decision, it is difficult to determine whether or not the TPSP meets the GNWT criteria.

Whatever the objective is, it must be recognized that the impact of subsidization may be to reduce consumer responsibility for use, increase the demand, increase the capacity required

to meet that demand and raise the price of electricity by adding the cost of new plant.

Since all participants felt that the TPSP would continue to be needed, given the unique conditions of the NWT and historical policies of the GNWT, a number of proposals were discussed. The basic elements of these proposals were:

- Make rate design and subsidization two distinct steps.
- Have individuals, to the extent possible and practical, pay for their own electric consumption.
- If, for administrative reasons, the subsidy must be part of the utility bill, the consumption, the full amount of the bill, the amount of the subsidy, and the net bill should be clearly identified.
- As an alternative to showing subsidies on utility bills, have the subsidy amount paid to recipients separately, perhaps as a general cost of living subsidy rather than tied specifically to electricity.
- Support levels could vary according to geographic location, climatic conditions, and family size.
- Levels might be coupled with inverted or penalty rates for exceeding the support level.
- Consideration could be given to a lump sum subsidy independent of electricity use. A subsidy set as a fixed amount would have the advantage of being easy to forecast for budget and administrative purposes.

- Consideration should be given as to whether or not the Yellowknife domestic rate is the proper standard for equalization or for a lifeline rate.

B. The Territorial Rate Relief Program

The TRRP applies to small commercial customers in areas outside of Yellowknife who apply for a refund. The TRRP subsidy reduces the cost to the small commercial customer of the first 1000 kWh of electricity consumed per month to the Yellowknife level. The amount of the subsidy estimated to be paid in 1989-90, to the approximately 90 customers involved, is $200,000. The cost to the GNWT of administering the TRRP is 40% of a person-year plus $2,000 to $3,000 for advertising, or approximately $25,000 to $30,000 per year.

The TRRP provides a rebate for which commercial customers, meeting certain qualifications as to size of business, may apply. The rebate program is completely outside the electric rate structure and the billing process and is administered in a manner that clearly separates electric rates and subsidy payment. The consumer is responsible for paying for total consumption and receives a clear price signal.

A number of participants suggested that the program be made more widely known. Others suggested it be made automatic, not requiring application for rebate.

It is not clear whether the objective of the TRRP is the encouragement of economic development, or the equalization of cost of a level of consumption for all commercial

consumers.

In light of the small number of customers applying for the rebate and the small amount involved, it is questionable whether either objective is being reached.

If the objective is economic development, then the evaluation should include consultation with small business, and should focus on whether or not qualifications should be relaxed, public awareness should be increased, or the program should be made automatic. The evaluation should also consider whether there are more appropriate means of encouraging economic development.

If the objective is equalization of costs of a level of consumption, then it would appear that the program should be made automatic, not requiring application for rebate. The question of basing the subsidy on Yellowknife rates should also be examined.

C. Tenants of the NWT Housing Corporation

Tenants of the Housing Corporation pay 3 cents per kWh for electricity consumed; the balance of their bill is paid by the Housing Corporation. The amount of the subsidy estimated to be paid in 1989-90 with respect to the approximately 4,800 customers, is $13 million.

Subsidies offered by the Housing Corporation are administered in different ways. Tenants

of the Housing Corporation living in areas served by ICG and NUL receive a bill for consumption of electricity at the domestic rate. The Housing Corporation pays a rebate to such tenants effectively reducing the cost of electricity to them to 3 cents per kWh. Tenants of the Housing Corporation living in areas served by NWTPC are billed by NWTPC at 3 cents per kWh for consumption of electricity. The balance due under the government domestic rate is paid directly to NWTPC by the Housing Corporation.

The price of power consumed by each tenant of the Housing Corporation is evident from the bill rendered to the tenants.

The Housing Corporation used to receive and pay all electric bills for its tenants. The tenant now receives a bill and effectively pays 3 cents per kWh. The Housing Corporation stated that the exposure of tenants to electrical bills has had a positive effect on the amount of electricity consumed.

A Housing Corporation tenants' rate may not be the best way to address the needs of low income consumers. The GNWT may wish to consider two approaches to deal with the Housing Corporation tenants' rate. In the first approach, the Housing Corporation could consider increasing the 3 cent per kWh rate to a rate which more accurately reflects the cost of electricity. A reasonable target might be the support level of the TPSP. Increases could be implemented over a period of years. A second approach might be to have low income tenants pay the full cost of electricity and receive assistance from the Housing Corporation through rent reductions or a subsidy from Social Services. The GNWT may also wish to consider a combination of these approaches.

The Housing Corporation might also consider whether or not, for communities served by NWTPC, tenants could be billed directly and then apply for a rebate.

As stated by the Housing Corporation "the mandate of the Northwest Territories Housing Corporation is to provide adequate, suitable and affordable shelter to households in need . . . . residential electricity is treated as a housing cost in our program".

A complication faced by the Housing Corporation in undertaking further steps to encourage conservation and efficiency is the relationship between the Housing Corporation and Canada Mortgage and Housing Corporation (CMHC). The cost of electricity paid by the Housing corporation is offset by revenue from CMHC. However, the portion of the electrical bill paid by the tenant is not a cost to the Housing Corporation and cannot be claimed from CMHC.

The potential reduction of revenue to the Housing Corporation from CMHC maybe offset in part. A rise in the portion of electric rates paid by the tenant could increase the conservation of electricity, thereby potentially lowering the Housing Corporation's operating costs and the overall cost to the GNWT of the housing subsidy.

The relationship between CMHC and the Housing Corporation should be closely examined by the GNWT in order to determine the effects of increasing the amount paid for electricity by subsidized rental tenants.

D: Employees of the GNWT

Employees of the GNWT living in certain communities in government housing pay an annual electricity charge of $9.51 per square meter of housing floor area. The amount of the subsidy estimated to be paid in 1989-90 is $2 million. A similar program, with the costs of all utility services combined, applies to federal government employees.

As a result of the method of administering the programs, government employees in certain communities living in government housing do not receive a price signal. Bills are sent directly to, and paid by, the government.

Employees in government-provided housing should receive a bill. The bill would accomplish the function of informing the employee about his consumption and the cost of that consumption. A next step might be to do away with the annual electricity charge in its present form and to have the employee directly responsible for payment of his own electricity bill.

The entire housing and utility assistance package is now under review by the GNWT.

E. Government and Non-Government Rates

In communities served by NWTPC, there are two rate categories, government and non-government, the government rate being the higher of the two. The policy of setting

government rates higher than non-government rates has been considered in this report as a subsidy program, since it results in cross-subsidization of the non-government rates by government.

Without a cost of service study for NWTPC it is impossible to determine the extent of this cross-subsidization. In some communities, where the overall revenue/cost ratio is less than 100% the government may be contributing to the deficit of NWTPC. In other communities the reverse may be true.

The Board is of the opinion that the government rate classification should be eliminated. Since NWTPC cannot yet quantify the amount by which the payment of higher government rates by the GNWT subsidizes the non-government rates, the Board is unable to suggest an appropriate point in time at which to eliminate this classification. The GNWT may wish to maintain the government rate at least for a period of time while other rates move toward reflecting costs thereby minimizing unexpected changes seriously adverse to existing customers.

The relationship between govemment/non-govemment rates and NWTPC's revenue has an impact on whether conservation efforts by the GNWT to reduce government consumption should even be undertaken.

Participants to the review suggested that if the government/non-government classification is eliminated, there will be a disparately large impact upon non-government customers requiring that new rates be phased in over a period of time. If higher rates for non-

government customers are phased in, the shortfall in revenue to NWTPC could possibly be offset by phased payments from government out of the savings resulting from the elimination of the government/non-govemment classification.

SECTION 7 RECOMMENDATIONS

The Board was directed that, if it found changes were advisable as a result of its analysis of the areas listed in the Terms of Reference, it should include options, recommendations and methods of implementation to effect the changes in its report. In this section the Board will address its recommendations for changes. Section 8 will address methods of implementation.

Having provided an analysis of the areas listed in the Terms of Reference with respect to the rate structures of ICG and NUL, the Board finds that no changes are advisable.

Having provided an analysis of the areas listed in the Terms of Reference with respect to the rate structure of NWTPC, the Board finds that a change is advisable.

The Board's recommendation is as follows:

> That **legislative changes be made to give the Public Utilities Board the power to fix the rates of the Northwest Territories Power Corporation.**

Placing NWTPC under the full jurisdiction of the Board will allow cost of service information to be placed before the Board. Consumers and ratepayers can be given the opportunity to test the rates against that information and the Board can commence the task of fixing just and reasonable rates for NWTPC. With NWTPC under the full jurisdiction of the Board, all electrical utilities in the NWT will be regulated in the same manner.

The Board makes this recommendation in the light of the submissions made by participants initsrate review hearings, including NWTPC.

The Board's recommendation in this regard is not new. It should be noted that previous investigations have made the same recommendation. The Penner Report in 1982 recommended that to achieve effective regulation, "All electrical power utilities operating in the Yukon and the Northwest Territories should be fully subject to regulation by their respective public utility boards."[2]

Similar recommendations were made by participants in the Board's review. ICG and NUL both said that NWTPC should be fully regulated by the Board. NWTPC observed that it is not currently subject to rate regulation by the Board; the Board currently approves the revenue requirement and terms and conditions of service while the GNWT approves the rates to be charged. NWTPC noted its understanding "that future legislation will eliminate this anomaly." "

Having provided an analysis of matters relating to the subsidization of the cost of electricity in the NWT, the methods through which this subsidization is provided, and its impact on the supply and price of electricity to consumers and ratepayers, the Board found that changes are advisable.

The Board's recommendation is as follows:

> **That the provision of subsidies be separated from the rate structure of electrical utilities in the Northwest Territories.**

The Board examined the subsidy programs offered by the GNWT and found that the reasons for, and objectives of, the subsidy programs are unclear and have become obscured over time. Since subsidies should be separate from the rate structure, and should not obscure price signals, the GNWT should determine the need for each subsidy, target the beneficiaries of any subsidy and fund the subsidy outside of the electric revenue requirement of the utilities. The method of providing required subsidies should be examined. It may be concluded that paying the required subsidy to the utilities may be the most efficient and practical method and in that case the subsidy should be clearly identified on the utility bill.

Determination of the objectives of each subsidy and the amount to be paid is a matter for the GNWT to deal with over such a period as it considers appropriate.

The recommendation made by the Board regarding subsidies has been made previously. The National Energy Board (NEB) in a 1983 inquiry into NCPC concluded with respect to rate design that "any subsidization of electric power rates should be accomplished outside the regulatory process."3

SECTION 8 IMPLEMENTATION

The Board's first recommendation is that legislative changes be made to give the Public Utilities Board the power to fix the rates of the Northwest Territories Power Corporation.

The first recommendation may be implemented fairly quickly. It is the matters which flow from its implementation that will take place over a number of years - a five to seven year horizon appears realistic.

Any changes in the rate structure and rate level of NWTPC will have to take place in a gradual manner taking into account not only the cost of service principles but the unique elements present in the North. Consumers and ratepayers of NWTPC need to be made more aware of the cost of providing electrical service in the North and receive information on how to undertake conservation measures. Rates must not be changed beyond the ability of consumers and ratepayers to adjust to these changes.

The first step towards changing NWTPC's rates will be the preparation by NWTPC of a fully allocated cost of service study and the filing of proposed rates. Due to lack of records kept by NWTPC's predecessor, NCPC, it will take NWTPC some time to prepare and file a fully allocated cost of service study.

The second step in the process will be to test the cost of service study and the proposed rates through public hearings at which public participation will be encouraged, The evidence of experts appearing not only for NWTPC but also for interested parties or groups and

classes of ratepayers will be helpful to the process.

The third step in the process is the fixing of rates by the Board. The Board, in fixing rates, will have to keep in mind the circumstances present in the North as well as traditional ratemaking principles and particularity the need for stability of the rates themselves with a minimum of unexpected changes seriously adverse to existing customers. The appropriate degree of change in the rates would be determined by the Board on the basis of the information before it; however, in broad terms, rate changes in excess of 10% per annum may be adverse to consumers and ratepayers in the NWT.

It is clear that the steps in this process will take some time and may have to be repeated in order to achieve rates which reflect costs in the northern context.

If the Board is to be given the power to fix the rates of NWTPC, the Executive Council may want to consider issuing another directive to the Board to undertake further work with respect to NWTPC. Specifically, the Board, at the conclusion of the NWTPC revenue requirement proceeding, could review and make recommendations on NWTPC's cost of service methodology. Furthermore, at the completion of the cost of service study, NWTPC could be directed to file the study with the Board for the Board's review and comment. This work, in anticipation of the Board receiving the authority to fix NWTPC's rates, would allow for the eventual changes in NWTPC rates to begin on a more timely basis.

The current NWTPC rate structure contains 223 rates and what might be termed 51 rate zones. Questions respecting reduction of the number of rates and rate zones will require

careful examination. Whether or not the NWT should constitute a single rate zone, have separate rate zones for areas principally supplied by diesel generation rather than hydro generation, or a number of rate zones based on other criteria is a matter that requires careful examination, in the light of cost-of-service information and public hearings.

The Board's second recommendation is that subsidies be separated from the rate structure. Implementation of this recommendation could take place fairly quickly.

The Board examined the subsidy programs offered by the GNWT and found that the reasons for, and objectives of, the subsidy programs are unclear and have become obscured over time. The GNWT should determine the need for each subsidy, target the beneficiaries of any subsidy and fund the subsidy outside of the electric revenue requirement of the utilities. The method of providing required subsidies should be examined. It may be concluded that paying the required subsidy to the utilities may be the most efficient and practical method and in that case the subsidy should be clearly identified on the utility bill.

Determination of the objectives of each subsidy and the amount to be paid is a matter for the GNWT to deal with over such a period as it considers appropriate. Options with respect to certain subsidies are set out in Section **6.**

SECTION 9 OTHER MATTERS

A. Rate Zones

In the event the Board's first recommendation is accepted, and NWTPC rates are to be fixed by the Board, one of the issues to be addressed in NWTPC rate hearings is whether the areas of the Territories served by NWTPC should be divided into more than one rate zone.

ICG has a single zone for which it establishes rates -- the Yellowknife area. NUL, which provides electric service to a number of communities in the southern part of the NWT, has established four Board-approved rate zones: Hay River; Ft. Providence/Dory Point/Kakisa; Trout Lake; and Snare Lake. NWTPC, on the basis of the rate structure inherited from NCPC, can be said to have 51 rate zones, as it establishes rates for each community in which it serves or to which it offers wholesale service.

In the course of the hearings, a number of opinions as to rate zones and alternatives to rate zones were put forward. Much of the discussion was in general terms. One approach was to treat individual communities as a zone, with head office and general and administrative costs appropriately allocated to each zone for purposes of determining the zone revenue requirement to be allocated among customer classes. Proponents of this approach were of the opinion that its adoption would lead to the highest achievable degree of cost awareness, resulting in better economic decisions within the communities. Communities that elected to embark on a demand-side management (DSM) program would reap the undiluted economic benefits of their efforts. Development in a community would take place with full knowledge

of the costs of electricity.

Critics of the concept of individual communities as a zone pointed out that certain considerations might mitigate against this approach to rate zones. The diesel generators and other plant facilities in the various communities are costly to install and replace. Localized revenue requirements could fluctuate depending on the need to add or replace major items of equipment subjecting local economies to severe stress.

The grouping of communities into rate zones was discussed. The impacts of equipment additions/replacements could be reduced by spreading the cost over a wider economic base. There would be some cross-subsidization among the communities within a zone and a dilution of the incentive to effect DSM programs.

Creation of a rate stabilization fund, which would allow the phase-in of large rate increases resulting from capital expenditures or dampen the effects of unusually large maintenance expenses, was put forward. This suggestion led to questions as to how the fund might be financed.

A concept put forward by the Town of Iqaluit would provide for capital infrastructure replacement to be handled separately from other electric utility revenue requirements. As an example, there might be capital revenue requirement zones with other revenue requirements zoned by individual community or groups of similar communities.

In its submission the GNWT provided a discussion of rate zones and options, as follows:

"There are a number of rate zone options to consider for the NW. Atone extreme, the entire NWT could be one rate zone and all domestic customers would be charged the same rate. At the other extreme is the present system, where each community has its own rates. Between these two options, there are many alternatives for the PUB to consider.

The NWT service area is unlike any other in North America, in that it comprises many geographically isolated communities, with a wide range of costs of service. The costs of service vary because communities have different fuel transport options, and their infrastructures are at various stages of development. Therefore, it is appropriate to consider the costs of supplying electricity and geographic location when developing options. There are many ways in which these factors can be used to develop rate zones, but the principal rate zone options for the NWT are:

1. **A single rate zone**

   - customers throughout the NWT would be charged the same rates.
   - the advantages of cost-based rates would be lost, as most customers would pay rates far higher or lower than the costs of supply.
   - there would be a great deal of cross-subsidization from the hydro areas to the small diesel communities.
   - rates in many communities would change significantly.

2. **Several geographic zones**

   - grouping communities by geographic location simplifies the utility's cost allocation procedure.
   - communities with widely different costs would be included in a single zone, so economic efficiency and fairness would be reduced.

- there would be little incentive for the smaller communities to participate in load management programs because their efforts would be overwhelmed by electricity use elsewhere.

3. Several **zones, consisting of communities with similar costs of service**

- placing communities with similar costs in the same rate zone results in rates that are still related to costs.
- the advantages of cost-based rates - economic efficiency and fairness - are retained.
- if cost is the only consideration then communities in the South Mackenzie, for example, could be in the same rate zone as communities in the Baffin, making it more difficult to introduce load management programs.

4. **Separate rates for each community**

- the rates in a community would rise suddenly if new generating equipment was installed because the increased costs would be recovered from a small number of customers.
- provides an excellent opportunity to use cooperative community action to control long run costs, because cost savings would be reflected in the community's rates.
- rates are cost-based and therefore meet the fairness and economic efficiency criteria of sound rate design.

5. **Several geographic zones, with each zone further divided into cost-based subzones**

- balances two unique characteristics of the NWT service area, the geographic isolation of the communities and the wide range of electricity costs - provides rate stability.
- rates would be related to costs, so economic efficiency and fairness could be achieved.
- zones could be small, and would include communities in the same geographic area, so load management efforts might succeed."

In the choice of rate zone options for the NWTPC, the challenge is to achieve a balance among economically efficient price signals and rate stability, fairness, and incentives to encourage load management and the development of alternative sources of electricity. However, at this point in time, given the lack of cost of service information and the inability to measure the rate/cost impacts of different zone configurations, the Board considers any recommendation with respect to zones or alternatives to rate zones as premature.

The Board would note that should the cost of service information support the need for rate zones for NWTPC, the Board would examine rate zones in a public process. Among the factors which the Board would consider in determining appropriate rate zones are:

1. The similarity of costs among communities;
2. The degree of interconnection of the electrical system;
3. Nature of the generation, Hydro or Diesel;
4. Franchise areas of the respective utilities;
5. Cost of administration;
6. Cost and supply of fuel (by road, barge, air, winter roads);
7. Geography and climatic conditions.

B. Demand Side Management (DSM)

The GNWT submission showed awareness of the need to encourage demand-side management, independent power production, waste heat recovery, and alternative generation sources. A common thread that emerged was the need for increased knowledge of

conservation and of the many ways by which wasteful consumption of energy can be reduced. Implementation of changes in subsidy programs and in rates reflecting costs can best take place in an environment of heightened awareness.

The Board encourages all utilities to study the effect of DSM programs on forecast load growth and such programs' ability to delay the requirement for additional generating capacity. Timely and regular exchange of information, ideas, questions and direction would help to promote various complementary programs.

In order to achieve demand side management goals all utilities must emphasize their commitment to electricity conservation measures. There are many programs offering broad-based, innovative DSM strategies that appear to be effective and that should be investigated for application in the NWT.

C. Acknowledgements

The Board was pleased with the degree of public participation in the hearings. In each of the communities in which a hearing was held, presentations were made by either the Mayor or a Council representative. Presentations were made by groups such as the Chamber of Commerce, Ecology North, and various businesses. The three utilities participated in the regional hearings where appropriate and all participated in the Yellowknife hearing.

The following is a copy of the Terms of Reference provided to the Board in the Executive Council's directive.

WHEREAS the Executive Council may issue directives to the Public Utilities Board;

AND WHEREAS the Minister responsible for the Public Utilities Board may direct the Board to inquire into or to hold a hearing;

AND WHEREAS it is desirable to have the Public Utilities Board hold public hearings regarding the current rate structure of electrical utilities in the Northwest Territories;

THEREFORE, pursuant to the provisions of the Public Utilities Act, the Executive Council and the Minister responsible for the Public Utilities Board hereby directs the Public Utilities Board to hold public hearings in accordance with the following terms and conditions:

TERMS OF REFERENCE

To review **the current rate structures of all electrical utilities in the Northwest Territories, including but not limited to whether the current rate structures of the electrical utilities produce just and reasonable rates.**

To determine whether the current rate structures of electrical utilities meet the concerns of the industrial, commercial, government and residential consumers and ratepayers, at various locations in the Northwest Territories.

To review matters relating to the subsidization of the cost of electricity in the Northwest Territories, the methods through which this subsidization is provided, and its impact on the supply "and price of electricity to consumers and ratepayers.

PROCEDURES

The Public Utilities Board shall hold hearings in one community in each region, and in Yellowknife.

The Board will conduct the public hearings in accordance with such procedures as it may set and as may be necessary to undertake the Terms of Reference in the most expeditious and proper manner.

REPORTING

The Board shall provide a written report to the Executive Council of the Government of the Northwest Territories by October 1, 1990. The report shall provide an analysis of the areas listed in the Terms of Reference. If the Board finds that changes are advisable, the report shall include options, recommendations, and methods of implementation to effect these changes.

Dated this 5th day of April, 1990, at the City of Yellowknife in the Northwest Territories.

Chairman
Executive Council

Minister Responsible for the
Public Utilities Board

The material that follows is a copy of the technical appendix to the testimony of the Board's consultant presented in Yellowknife on August 6, 1990.

APPENDIX B

RATEMAKING OBJECTIVES - HISTORICAL PERSPECTIVE

General pricing or ratemaking objectives are well documented in literature. One of the most widely quoted lists of ratemaking objectives is that of Dr. James C. Bonbright, author of Principles of Public Utility Rates (New York: Columbia University Press, 1961). It is significant to note that these same, or similar, objectives have appeared in the correspondence of the Board relating to the electrical rate review, in the rate design testimony of the utility representatives responsible for the rates of Northland Utilities (NWT) Limited and in the orders and writings of other regulatory boards in Canada. Dr. Bonbright's set of traditional objectives is as follows:

1. The related, "practical" attributes of simplicity, understanding, public acceptability, and feasibility of application.

2. Freedom from controversies as to proper interpretation.

3. Effectiveness in yielding total revenue requirements under the fair-return standard,

4. Revenue stability from year to year.

5. Stability of the rates themselves, with a minimum of unexpected changes seriously adverse to existing customers.

6. Fairness of the specific rates in the apportionment of total costs of service among the different consumers.

7. Avoidance of "undue discrimination" in rate relationships.

8. Efficiency of the rate classes and rate blocks in discouraging wasteful use of service while promoting all justified types and amounts of use:

a. in the control of the total amounts of service supplied by the company:

b. in the control of the relative uses of alternative types of service (on-peak versus off-peak electricity...).

These eight traditional objectives may be reduced to three primary objectives, as Dr. Bonbright goes on to propose:

> Among these objectives, three may be called primary, not only because of their widespread acceptance but also because most of the more detailed criteria are ancillary thereto. They are (a) the revenue-requirement or financial-need objective, which takes the form of a fair-return standard with respect to private utility companies; (b) the fair-cost-apportionment objective, which invokes the principle that the burden of meeting total revenue requirements must be distributed fairly among the beneficiaries of the service; and (c) the optimum-use or consumer-rationing objective, under which the rates are designed to discourage the wasteful use of public utility services while promoting all use that is economically justified in view of the relationships between costs incurred and benefits received.

Dr. Bonbright's objectives, while still applied and accepted today, were published in 1961. An example of more contemporary objectives appeared in the United States in 1978 in the Public Utility Regulatory Policies Act (PURPA), which is mentioned to lend a broader perspective to the Board's deliberations. The stated purposes of PURPA express, in fact, a set of contemporary purposes and objectives that are very much in line with and encompass the concerns in the NWT which have led to the directive to the Board to perform the rate structure review and prepare a report. These purposes are to encourage (1) conservation of energy supplied by electric utilities, (2) the optimization of the efficiency of use of facilities and resources by electric utilities, and (3) equitable rates to electric consumers.

While Dr. Bonbright's eight criteria for a sound rate structure are generally accepted, they

are difficult to follow precisely. The objectives of "fairness," "undue discrimination," and "efficiency," for example, are all subject to interpretation, with no clear-cut definition of the meaning of these terms.

The three primary objectives of Dr. Bonbright are accepted today by many professional economists because of their consistency with the proper functions of prices as perceived by economists. Indeed, the "consumer-rationing, optimal-use" objective is in many respects equivalent to the conservation objective that evolved in the 1970s, and which the Board has recognized as a concern. Additionally, the "fair cost apportionment" objective is essentially similar to the contemporary "equitable rates to consumers" purpose.

A discussion of the meaning of these broad rate design objectives, their implications for the NWT, alternatives for implementation, and the measurement of their achievement will be provided in a later section.

The ratemaking process across North America involves utility executives, regulatory boards, consumers, and politicians, all of whom may have conflicting views on what objectives are important. The increased costs of plant construction and higher fuel costs have led regulators and others to wonder whether dramatic changes in ratemaking policies, or even objectives, are necessary. As society has become increasingly concerned about conservation and environmental protection, questions about the relative importance of various objectives have been raised. In turn, a search has been prompted for utility rate structures that are consistent with these various goals.

Given the diversity of participants in the ratemaking procedure, there is also a diversity of opinion in setting policy to achieve ratemaking objectives. From among identified objectives, some may be in conflict. For example, the economic objective of efficiency may conflict with the social goal of minimization of costs to low-income ratepayers. Presuming that several acceptable goals for rate design may conflict to some extent, the question arises as to the relative importance of the various goals.

These questions appeared years ago in the ratemaking process in Canada. The Yukon Electric Public Utilities Board, for example, addressed them in the early 1980s, and the Alberta Public Utilities Board has for many years addressed the rate design objectives of its jurisdictional utilities and the specific weight given to various rate design criteria and objectives in rates submitted for approval.

In the Northwest Territories, in a manner and to a degree that is uncommon in comparison with the rest of North America, the social aspects of ratemaking have received a significantly greater emphasis than have the economic criteria that are emphasized elsewhere. Before commencing a detailed discussion of ratemaking in the NWT, it should be noted that most localities are served by the Northwest Territories Power Corporation (NWTPC), successor to the former Northern Canada Power Commission. There are two investor-owned electrical utilities, Northland Utilities (NWT) Limited (hereinafter referred to as NUL) and ICG Northern Utilities Limited (hereinafter referred to as ICG). NUL provides service to approximately 1,950 customers in the areas of Hay River, Fort Providence, Dory Point/Kakisa, Trout Lake and Snare Lakes, generating some of its requirements by means of diesel engines, while purchasing most (90 percent) of its requirements at wholesale from the NWTPC. ICG seines the Yellowknife area with power purchased from the NWTPC. Significantly, the rates of these two utilities are based on costs and are regulated by the Board, though the bill actually paid by a domestic customer is impacted by the Territorial Power Support Program and may also be affected by other subsidies, as discussed elsewhere.

In contrast, the rates of the NWTPC are different for government and non-government customers, are not based on costs, and are affected by the full range of government subsidy programs. Furthermore, the Board, which has the responsibility for NWTPC revenue requirements, does not have jurisdiction over rate design. As the National Energy Board noted in its 1983 report on the NCPC, in discussing the disparities between rates and the cost of service,: "Such inconsistencies are the natural consequences of the historical evolution of rates without clear regulatory direction to the NCPC."

ELECTRICAL UTILITY COSTS

It is so widely accepted that appropriate rate structures should reflect major cost differences that the cost-basing of rates is axiomatic. To the extent that a regulatory board or the government prescribes rates that deviate from costs, the degree of deviation and the reasons therefore should be fully understood.

The NWT, given its vast area, sparse population, and widely separated load centers, has developed an electrical system that is unique in North America. Many of the traditional means of lowering unit costs and increasing reliability, such as generation pooling, high voltage transmission grids, and designed redundancy in distribution systems are simply not feasible. The wide dispersion of load centers precludes economies of scale and the extreme winter temperatures and relatively short summer provide a relatively harsh operating environment. Limited development and utilization of hydro capacity has meant that most communities are served by isolated diesel generations. Fuel costs are extremely high, particularly in remote communities. While the policy of the Government of the Northwest Territories (GNWT) has been to subsidize the cost of electricity, a basic understanding of costs is still relevant to the design of proper electrical rates.

General Nature of Costs

Electric utility operations include the generation, transmission, and distribution of electricity to different consumers. A large proportion of utility costs occurs as a result of investment in relatively long-lived facilities, such as power plants, poles, wire, transformers and meters, to carry out these various functions.

Power production or generation costs include fuel costs, purchased power expenses, operation and maintenance expenses, and the relatively fixed costs associated with investment in generating facilities, including depreciation, taxes, and either return on investment for investor-owned utilities or debt service requirements plus margin for publicly owned utilities.

Energy requirements, measured by the total kilowatthours generated and purchased, are the principal determinant of the utility's fuel cost and the energy portion of purchased power costs.

The rate of consumption during a given time interval is referred to as the demand and is measured in kilowatts. Since the use of electricity varies from hour to hour and from day to day throughout the year, and because electricity cannot be generated at times of low demand and stored for use at times of high demand, the time patterns of the loads on an electric system are important determinants of costs. Generating plant sufficient to meet peak demands, plus an appropriate operating reserve margin, must be provided by the utility. Demands of customers also determine to some extent the amount of transmission and distribution plant that the utility must provide.

Transmission costs include all costs associated with the facilities provided to carry electricity from the point of generation to the distribution system. Because the transmission system must have sufficient capacity to meet peak demands, transmission costs are related primarily to demand.

Distribution costs are those costs associated with delivering electricity from the high-voltage transmission system to the individual customer. As previously noted, some distribution investment is related to demand, but the number of customers served is also an important determinant of the amount of distribution investment by the utility. Customers such as large industries, that take service directly from transmission lines, do not require low-voltage distribution systems. On the other hand, residential and many commercial/industrial customers can be served only through an extensive distribution system that provides electricity at the relatively low utilization voltages of these customers. Thus, each customer class imposes different costs upon the utility. Customer billing and administrative and general costs are a relatively small proportion of total utility costs, but are a significant element in the cost of service to the residential and small commercial classes that are relatively small-use customers.

Cost Effects of Changes in Load Patterns

As previously noted, the usage patterns of a utility's customers are important determinants of costs. Since load patterns change by time of day and by season, the costs of providing electric service also vary by time of use. A utility's load curve is a composite of the load shapes of the individual customers served. Every individual customer's load pattern is different; but the utility will experience peak demands caused by the aggregation of customer demands resulting from such factors as climate, cultural influences, and the specific characteristics of electrical appliances and equipment.

If a utility's load curve can be flattened by reducing customer usage during the peak periods, potentially significant cost benefits may be realized. Capacity carrying costs per kilowatthour will tend to decrease as load patterns are leveled; on the other hand, they will tend to increase if peaks are increased and load factor deteriorates. Fuel costs tend to rise as load increases and peaks become more accentuated, and they tend to decline as load curves are flattened. Purchased power costs may rise with decreases in system load factor and decrease as load factor increases, reflecting the fact that purchased power costs are a function of the capital and fuel costs incurred by the supplier.

Transmission costs may change in a fashion similar to production costs, as described above, but the effect is moderated because transmission requirements are dictated by reliability criteria, distance form the generator, and other factors, and not just by peak demands. "

Distribution costs are not significantly affected by changes in system load patterns. There may be some effects on demand-related costs, such as line transformers, if customer maximum demands are changed.

Customer accounting and administrative and general costs are generally considered to be independent of changes in customer usage and thus would not be altered by changes in load patterns. However, as relatively fixed costs, their effect on a per-unit basis may change as kilowatthour consumption varies upward or downward.

Cost-of-Service Principles

The foregoing discussion has described electric utility costs in general terms. In order to provide a basis for designing rates for pricing service to the various customer groups, costs must be allocated and assigned among customer groups, in what is known as a cost-of-service study. The following discussion is intended to briefly examine the theoretical and practical considerations underlying the various cost study methodologies currently in use. It is basic to the understanding of both accounting and marginal costing methodologies, but is presented in terms of the fully allocated cost-of-service study, since that is the type of study that has historically been presented to the Board.

A fully allocated cost-of-service study assigns plant, property, and operating expenses to each customer class, measuring costs of rendering service to the classes of customers under study and assessing each classification's contribution to rate of return. It should be understood that a cost-of-service study is not a precise measurement of accounting costs, but an approximation of cost responsibility by class of customer. A cost-of-service study does not establish the value of service to the customers or directly determine the structure of rates, although it does provide useful cost information for rate design.

For an investor-owned utility (and only slightly different for a publicly owned utility), the cost-of-service or revenue requirement is comprised of operating and maintenance expenses, depreciation expense, taxes other than income taxes, income taxes, and a return on investment. When accounting or embedded costs are fully distributed or allocated among all rate classes based on customer, kilowatt (kW), or kilowatthour (kWh) class consumption characteristics, the resulting cost distribution is referred to as a fully allocated cost-of-service study. The utility's total average costs have been allocated in their entirety, or fully allocated, to the utility's customer classes. The fully allocated cost-of-service study continues to play a major role in contemporary rate design. The use of fully allocated class costs to evaluate existing and proposed rate design is consistent with the principle that rates be based on the cost to serve (in this case, the utility's average total cost).

The fully allocated cost-of-service study is a process based on utility accounting records that

separates costs into categories culminating, after several screenings, in customer class contributions to rate of return. This categorization proceeds from functionalization to classification and then to the allocation of costs. Functionalization assigns costs by type of related electric plant, while classification of functionalized costs categorizes costs by demand-, energy- and customer-related components. These classified costs are then allocated to customer classes based on selected usage characteristics. A fully allocated cost-of-service may be done in two ways:

- Determine revenue-to-cost ratio or rate of return under a given set of rates or revenues.

- Determine total revenue requirements to obtain a specified revenue-to-cost ratio or rate of return.

Fully allocated costing methodologies begin with the utility's total revenue requirement which is separated (functionalized) into production, transmission, distribution, and administrative and general functions using an acceptable system of accounts. The functionalized plant is then classified according to the basic cost components: demand-, energy- and customer-related costs. Customer class cost responsibility is determined by three components: the class contribution to the system capacity or demand requirements; the relative amount of energy consumed (kWh); and electric system access costs imposed by the class, regardless of consumption. Class revenue requirements, when determined by a fully allocated cost study, preserve equitable relationships based on known costs according to acceptable allocation methods. An analysis of relative class contributions to return on rate base isolates classes subsidized and classes providing subsidies to others.

Cost Functionalization and Classification

Rate base and operating expenses are grouped into functional cost classifications (functionalized) such as production, transmission, subtransmission and primary distribution, based on the utility's books and records. The utility plant and operating expense accounts

are then examined to determine assignment to a specific class of service or customer.

If not specifically assignable, the plant and operating accounts are classified in terms of customer use characteristics, such as customer, demand or energy use, and would be subject to allocation to each customer class.

a. Demand Related

The costs classified as demand related are those determined to vary or occur in proportion to or resulting from the kilowatts of demand which the customers impose on the system. Demand-related costs can be considered in at least two subcategories: system peak demand related (coincidental) and customer maximum demand related (noncoincidental). Also, a portion of base load unit capacity costs may in some instances be considered related to average demands (energy). Since these terms are not necessarily synonymous, it is important for the analyst to understand the distinction between fixed costs and demand-related costs before attempting any cost classifications.

Generally, responsibility for production and transmission demand-related costs is considered to be proportional to coincidental demands, while distribution and other demand-related expenses are considered to be proportional to noncoincidental demands. The purpose of this distinction is to reflect a difference in the underlying cost causation. For example, electric line transformers and other distribution system components are generally sized to meet the customer's expected maximum demand, regardless of time of occurrence, rather than his demand at the time of the system peak (coincidental). This philosophy generally dictates the use of noncoincidental demands for distribution system cost allocation.

b. Energy Related

Energy-related costs are those determined to vary in proportion to the kilowatthours consumed by the customer. The principal costs in this category are fuel burned, variable maintenance, and portions of purchased power expenses representing fuel. Base load

capacity costs may also be considered as energy related, particularly in a must-run situation such as a run-of-river hydro plant or where other conditions negate the influence of system load conditions on plant operations.

c. Customer Related

Costs assigned to this functional category are those which vary in proportion to the number of customers served. At least two subcategories are generally considered: average number of customer related and weighted customer related. This latter category, weighted customers, is utilized when the primary cost causation is number of customers, but where it would be incorrect to assume all types of customers are to be equally counted. An example is commonly found in the consideration of meter investment where each customer has a meter, but commercial and small industrial meters, for instance, generally cost much more than residential meters. Employment of appropriate weighting, in this case weighting the commercial customers more heavily, corrects for the secondary cost differential.

Costs assigned to this customer-related category usually include a portion of the distribution system as required to supply a minimum or nominal load to the customer, as well as metering costs and customer accounting costs. There are two generally accepted methods of determining customer-related distribution costs. These are the “zero intercept” and the “minimum size” methods. The use of one or both of these methods is usually heavily influenced by the available data.

The general classifications of functional plant assignments are shown in the following table:

Plant Item	Cost Classifications
Production	Demand/Energy
Transmission	
Substations	Demand
Lines	Demand

Distribution	
Substations	Demand
Lines	Demand/Customer
Transformers	Demand/Customer
Services	Customer
Meters	Customer
Street Lighting	Specific
General and Intangible	As Determinable/Pro Rata

Upon completion of the classification process (demand, energy, customer), costs are spread to the classes of service based upon appropriate allocation factors.

Applicability of Marginal Costs

The previous discussion has treated costs and cost-of-service in terms of embedded or accounting costs as found on the books and records of the utility. Another cost basis that has received increasing attention since the mid-1970s, more so in the United States than in Canada, is marginal cost. Marginal cost can be defined as the additional or incremental cost associated with the production of an additional unit of output; conversely, it can be the savings associated with a unit decrease in output. The usefulness of marginal costs in electrical pricing rests on the economic proposition that the most economically efficient way to allocate society's scarce resources, including electricity, is to price all units of output at the marginal cost.

Since marginal costs provide the foundation for some innovative rate designs, it is necessary that anyone involved with contemporary rate proceedings understand marginal costs, how they are calculated, and their value to rate design.

In the context of the NWT the continued use of fully allocated embedded costs is consistent with the principle that rates be based on the cost of service. However, in certain cases, as, for example, setting rates in a community served primarily by hydro but with supplemental diesel generation, the pricing of the runout block in a rate should take into account the fuel cost associated with serving increased energy consumption with diesel generation, a marginal costing concept. On the other hand, in an isolated diesel community, the marginal cost of

producing additional energy may be lower than the average cost because diesel plant efficiency increases from low load levels to maximum output. In this case a declining energy block price might be appropriate, or, at the least, a case could be made against an inverted rate form. These are given as specific examples of how marginal cost concepts might be applied in rate structures designed to obtain levels of revenue based on embedded costs.

SPECIFIC RATE DESIGN PRINCIPLES FOR THE NWT

As pointed out previously, the three foundation principles for NWT electrical rate design are to encourage:

1. conservation of energy supplied by electric utilities
2. optimization of the efficiency of use of facilities and resources by electric utilities, and
3. equitable rates to electric consumers

Also applicable are the eight traditional sound rate design criteria of Dr. Bonbright. The latter are more economic as opposed to social or political in concept, but provide a useful guide as to possible ways to achieve desirable social or political rate design objectives while minimizing unfavorable economic consequences.

While the GNWT is committed to economic development, continuing increases in the cost of providing electricity may cause cutbacks in other desirable programs. Since the GNWT is interested in getting the greatest value for its expenditures, the GNWT should be compellingly interested in electrical rate designs that promote the first two principles, energy conservation and efficiency of use of facilities and resources. However, its policies of subsidization in the interests of the third principle, equitable rates, can be shown to be seriously interfering with the achievement of the first two principles. Also, close examination reveals that some of the effects of the various subsidy programs promote inequity in rates. As a background for identifying proper rate design objectives and setting rates to achieve

them, a discussion of principles is in order.

Conservation

The need to encourage conservation is a problem which too many ratesetting bodies have ignored, for conservation is a pricing objective that has in recent years been particularly controversial. Most people agree that conservation is desirable, but there are a number of different definitions or concepts of conservation. In its most simplistic sense, conservation may mean a reduction in the use of energy. From that point, the definition may be tightened to include only the wasteful use of electricity. The second definition, while connoting that an undesirable use is involved, has difficulty specifying what is wasteful use of electricity, for what may be one user's waste may be another's necessity.

By substituting the word "energy" in place of the word "electricity," the definition of conservation given above is broadened. This puts aside the problem of the specification, but adds the troublesome concept of conserving on the basis of total energy, bringing in all of the implications of conserving nonrenewable resources, such as oil and natural gas, and of encouraging development of energy obtained from renewable resources, such as wind generation.

A concept of conservation that is more quantifiable is that of specifying conservation-in terms of improved efficiency in the use of energy, that is, output per unit of input.

Finally, a very broad definition of conservation encompassing the optimum use of all resources, including energy, would make conservation essentially equivalent to the concept of economic efficiency put forward as a principal foundation for marginal cost pricing.

The Board should note that because of the confusion about the meaning of the term "conservation," the U.S. Department of Energy issued an interpretation:

> Conservation is interpreted to mean the reduction or increased efficiency in electric

consumption which occurs when electric prices reasonably reflect significant variations in the cost of providing electric service. Elements that could be incorporated in this interpretation are:

(1) Conservation is not necessarily or only "nonuse," but rather wise use.

(2) Wise use assumes that the rates or tariffs reflect the full cost of providing the electric service.

In summary, end-use conservation can result when: (1) allocation of energy resources over time is optimized, (2) when wasteful electricity consumption by the end-user is reduced, (3) when overall electricity usage is reduced, or (4) when energy consuniption is postponed because of a particular ratemaking action. Each of these interpretations has a slightly different emphasis, but all would seem to conform with the various concepts of conservation previously described. The Board must decide from these and other possible interpretations what the NWT should focus on to achieve conservation through electrical rate design.

RECOMMENDATION

IT IS RECOMMENDED THAT OPTIMUM ALLOCATION OF ENERGY RESOURCES AND REDUCING WASTEFUL CONSUMPTION OF ELECTRICITY BE GIVEN HIGHER WEIGHTING THAN OTHER DEFINITIONS OF CONSERVATION.

In order to establish whether the conservation objective is being met, measures must be established that relate to the objective, realizing that to some extent measures may conflict. For example, conversion to electricity from a less efficient energy source may increase electricity consumption, but at an overall energy savings. The list of measures that may indicate that the objective of conservation is or is not being met might include the following:

1. reductions in peak electricity usage
2. reductions in the growth rate of electricity usage
3. reduction in the use of scarce energy resources
4. application of energy-saving techniques and informing the public of how these techniques may be applied
5. reductions in kilowatthour usage per unit of industrial output
6. reductions in total electricity usage
7. reductions in overall energy consumption as the result of using more efficient conversion technology
8. reductions in electricity usage by individuals
9. reductions in electricity usage by households
10. conversion of end-use devices to renewable energy source devices
11. higher saturation of energy-efficient appliances
12. load management implementation
13. application of energy-saving devices and informing the public of ways in which these devices can be applied
14. reduction in kilowatthour usage per employee by commercial and industrial establishments

RECOMMENDATION

CONSERVATION EFFORTS AND MEASUREMENT OF THE ACHIEVEMENT OF THE CONSERVATION GOAL CAN MOST EFFECTIVELY BE MEASURED BY THE INDICATORS PREVIOUSLY LISTED AS NUMBERS 1, 2,3,4 AND 5. IT IS RECOMMENDED THAT THESE MEASURES BE GIVEN THE HIGHEST WEIGHTING IN THE DETERMINATION OF WHETHER THE CONSERVATION COAL IS BEING ACHIEVED.

Given the above recommendations for defining conservation and measuring its achievement, there are at least two useful conclusions to be drawn:

1. The rate structure and rate level should reasonably reflect the cost of providing the service, and
2. The concept in and of itself does not provide any guidance as to what "costs" are; that is, embedded versus marginal.

Efficiency

Just as for conservation, there are several interpretations that are possible for the objective of "efficient use of facilities and resources by utilities." As pointed out in EURDS Topic Paper TwoI/, there are at least three schools or concepts of efficiency:

(1) optimum use of all society's resources, also called economic or allocative efficiency
(2) utility efficiency
(3) engineering efficiency, including operational or technical efficiency

It appears that a proper rate design objective would be oriented toward the second definition, utility efficiency, in terms of the notion that the most efficient use is made of electric generating and related facilities. The U.S. Department of Energy, in its Proposed Guideline for the PURPA Cost of Service Standard, clarified the meaning as follows:

> "The utility efficiency purpose of PURPA is directed at minimizing the total resource cost associated with the production of electricity in the quantities and at times that consumers wish to purchase it at prices which discourage wasteful (i.e., noneconomic) use."2/ (Emphasis added.)

In terms of the various concepts of efficiency, it is clear that in order to contribute to utility efficiency, electric rates must encourage efficiency from both the demand side as well as the supply side. In other words, electricity that is generated, transmitted, and distributed efficiently (supply side) should be electricity that is also used efficiently (demand side).

An array of possible definitions of efficiency might include the following:

1. allocations of society's scarce resources are optimized;
2. technical efficiency is optimized;
3. operating efficiency is optimized;
4. rates are cost justified;
5. capacity is rationed among valued end-uses; and
6. electricity loads are controlled as in the case of conservation.

RECOMMENDATION

IT IS RECOMMENDED THAT DEFINITIONS NUMBERED 1, 2, AND 3 BE GIVEN THE HIGHEST WEIGHT IN THE SPECIFICATION OF THE MEANING OF EFFICIENCY

A number of measures may be employed to establish whether or not efficiency is being achieved. Among these measures are: (1) improvement in load factor; (2) use of less expensive fuels; (3) improvements in capacity factors; (4) optimization of maintenance scheduling; (5) reduced growth rate in the total cost of operations; (6) reductions in total capital costs; (7) improvements in heat rate; (8) use of improved technologies; (9) improvements in labor productivity, either by increasing output per man-hour of labor input or by maintaining output with reduced man-hour input; (10) reductions in financial and operational risks; (11) optimization of fuel mix; (12) optimization of plant mix; and (13) improved efficiency of generation/transmission and distribution systems by minimizing loss factors.

RECOMMENDATION

IT IS APPARENT THAT SEVERAL DEFINITIONS AND SEVERAL MEASURES OF EFFICIENCY ARE POSSIBLE, AND IT IS INCUMBENT UPON THE BOARD TO SELECT APPROPRIATE DEFINITIONS AND MEASURES.

IT IS RECOMMENDED THAT THE MEASURES NUMBERED 1,2,3,4,5 AND 6 BE GIVEN PRIORITY CONSIDERATION IN THE MEASUREMENT OF THE ACHIEVEMENT OF EFFICIENCY.

Equitable Rates

Another very important pricing objective, also found among both traditional and contemporary goals, is called “fairness” or “equity.” Equity can be defined as fairness between the utility and its customers; it can also mean fairness among customers, both individually and by class or group. The concept of equity or fairness has long been regarded as an important objective in ratemaking, though it is perhaps the most difficult to define, for fairness is largely a subjective judgment of the beholder (consumer, regulator, and manager) as viewed from his perspective in the light of his set of goals. Dr. Bonbright, in his book Principles of Public Utility Rates, outlined three general interpretations of equity commonly employed by utilities and regulatory authorities. These definitions go to the heart of the equity issue as it relates to electric utility rate design in general, and the equity standard more specifically. His three concepts of equity include the “good faith” standard, income distribution, and notional equity.

The good faith standard with respect to ratemaking pertains mainly to the concept of gradualism in rate structure and rate level changes. Good faith considerations suggest that customers who have been induced to behave in certain ways due to past regulatory practices or utility rates are entitled to a reasonable degree of rate stability,

The second standard of equity, termed “income-distributive” by Dr. Bonbright, addresses the role rates play in impacting income distribution between and within customer classes. The “indemnity” principle, the most commonly accepted income-distributive standard, holds that rates should be based upon the costs which the consumer imposes on the utility system. Under the indemnity principle, ability to pay is irrelevant.

Dr. Bonbright terms his third equity category “notional equity.” In it is set forth the idea that

like customers should pay like amounts for equal amounts of electric usage irrespective of differences in cost incurrence. For example, residential customers in remote communities, according to the notional equity standard, should pay the same amount per kWh as residential customers in Yellowknife despite load density considerations, extra capacity costs, or the much higher costs of energy from diesel generation. Couched in these terms, the Territorial Power Support Program for rate equalization to the Yellowknife level is a subsidy program that addresses notional equity.

Economic principles of ratemaking are inherently concerned with issues of efficiency and revenue adequacy, as opposed to "social" principles or objectives. Nonetheless, a practical interpretation of equity involves distributional neutrality. In other words, any rate which unduly discriminates within or between customer classes is in conflict with the equity standard. Even though, for example, a rate which fails to recover a utility's out-of-pocket cost of supplying customers may be economically unsound and unfair, it may be socially desirable if those covered by the rate are extremely poor, or infirm, or old, or all three. It therefore makes sense to recognize from the outset that making rates equitable is an ethical or social question, not an economic one; hence, the rough guidelines which follow are admittedly judgmental.

The following is a list of possible definitions of equity:

1. Equitable rates are those that reflect no undue discrimination either within or among the customer classes.

2. Equitable rates are based on the cost of service, meaning that customers should pay the cost of what they receive.

3. Rates are deemed equitable if they are considered to be "just and reasonable" by duly authorized ratesetting bodies.

4. Rates are established consistent with the economic principle of equating the cost of

providing more or less service or supply with the perceived benefits associated with that service.

5. Equitable (nondiscriminatory) rates are based on the concept of value of service.

6. Cost of service and value of service maybe considered simultaneously in establishing equitable rates.

7. Equitable rates reflect no undue discrimination when based on embedded costs.

8. Equitable rates may be based on the construction of a legitimate historical rate base and a fair return on this rate base.

RECOMMENDATION

IT IS RECOMMENDED THAT EQUITY BE INTERPRETED GIVING PRIMARY EMPHASIS TO DEFINITIONS NUMBERED 1, 2 AND 3, PREVIOUSLY LISTED.

There are several measures that could be used to relate to the equity objective. Some of these measures are listed below.

1. Rates result in similar rates of return or revenue to cost ratios for all customer classes to the extent practicable.

2. Rates reflect the efficient use of utility resources.

3. Rates recognize fairness, understandability, and revenue stability, and yield required revenues.

4. Rates reflect customer, energy, and demand components of costs of service.

5. Class revenue requirements are based on embedded, fully allocated cost of service.

6. Rates reflect the marginal cost of service.

7. Rates reflect voltage level differentials in costs.

8. Rates reflect an identical average cost of electric energy for each user.

9. Rates include cost-based, time-of-use differentials for all customer classes.

10. Rates are based on ability to pay.

11. Rates provide for reductions for interruptible service.

RECOMMENDATION

GIVEN THE PREVIOUSLY RECOMMENDED INTERPRETATION OF EQUITY, IT IS RECOMMENDED THAT MEASURES NUMBERED 1, 2, 3, 4, 5, AND 6 BE GIVEN PRIORITY CONSIDERATION IN DETERMINING WHETHER EQUITY IS BEING ACHIEVED.

It is of more than passing interest to note that the same conclusions can be drawn from the recommendations with respect to equity as were drawn in the case of conservation:

1. The rates should reflect costs, and

2. The concept does not inherently provide guidance as to how "costs" are to be determined.

As noted previously, pricing objectives often conflict. No single set of rates is capable of

satisfying all of the pricing objectives that the Board may wish to recognize, nor is a single set of rates capable of fully satisfying several objectives. The preceding evaluation measures are given as a guide to the Board as to how to make trade-offs between conflicting objectives.

The alternatives for establishing rate structures to meet pricing objectives involve both cost and noncost standards. Most authorities have concluded that rates should be based on costs, and that cost-based rates are best able to satisfy the multiple facets of the various pricing objectives previously discussed. Preceding discussion emphasized Dr. Bonbright's three primary objectives:

- Revenue adequacy
- Fair cost apportionment
- Optimal use of customer rationing to discourage waste

and more recently three purposes:

- Conservation of electric energy
- Efficient use of facilities and resources by utilities
- Equitable rates to consumers

Obviously, neither utilities nor regulators are limited to the objectives listed. Concern for low-income users of electricity in the NWT, for example, should certainly be considered along with the previously stated objectives. An understanding of how various rates, both cost-based and noncost-based, satisfy the listed objectives will, in turn, shed light on how additional objectives might be obtained by changes in rates.

Establishing the Cost of Electricity

While it appears that rates based upon costs appear to be best suited to meeting the greatest number of pricing objectives, it must be obvious that there is widespread disagreement as

to the meaning of cost. If one looks to clarify the meaning of cost, it might be found that a sufficient ratemaking philosophy for the NWT specifies the use of embedded costs, encourages consideration of marginal costs, and allows the use of time-differentiated accounting or marginal costs.

Elsewhere in North America, the philosophy expressed would have given greater emphasis to time-differentiation and marginal costs. This philosophy is termed as "sufficient" for the NWT, given the NWT's electrical cost characteristics, the current inability of any utility in the NWT to produce detailed cost-of-service information supported by extensive load research data, the problems of the NWTPC in producing even rudimentary cost-of-service studies for the communities it serves, and the historical perspective of ratemaking in the NWT. As background for the discussion that follows on cost of service, it should be made clear that the cost of service is a revenue requirement that is sufficient to pay all of the costs of operation and maintenance, depreciation, taxes and return on investment. This total cost of service may, given sufficient information, be allocated and apportioned among the various classes of customers following the concepts previously described. However, an important factor in determining cost of service in the NWT, and particularly for the NWTPC, is the degree of disaggregation of the total cost of service for serving over 50 communities. From a pure cost-of-service viewpoint, each community should constitute a rate zone within which costs would be allocated among domestic, general service/industrial, and other classes. Based on administrative simplicity and similarity of costs, a reduced number of zones might be possible. A more complete discussion of possible approaches to rate zones will be provided in the final report. At this point, the allusion to costs in the context of cost-based rates refers to cost information provided under procedures to be established by the Board that reasonably balance the unique cost characteristics of the NWT, the expense of obtaining cost information, and the benefits to be derived in the ratesetting process.

The contemporary definition of cost of service makes it clear that cost-of-service studies in theory should permit the identification of differences in cost for different times of the day and seasons of the year. This definition also indicates that cost-of-service studies should take into "account additional capacity added to meet peak demand, relative to base demand, and

costs associated with additional kilowatthours of electric energy delivered to electric consumers.

Both accounting cost and marginal cost calculations may be required. An important point, however, is that the methodology for accounting cost-of-service calculations, specifically the manner in which demand costs are allocated to the various classes of service, may need to be specified separately for each utility, depending on such practical considerations as data availability. Likewise, with respect to marginal cost, it is possible that not one of the methodologies that have been described in the literature (the peaker approach, the perturbation approach, the production function approach, the linear programming approach, the incremental units approach, the alternative scenario approach, and so on) may be meaningful for the NWT.

Fully allocated class cost-of-service studies, as previously described, distribute a utility's total accounting costs among rate classes on the basis of certain cost classifications. Distributed costs are therefore identifiable by cost component and thus maybe unitized for the purposes of pricing, if the cost components are identified by rate class.

Marginal cost studies, of course, have nothing to do with the accounting costs as they are recorded in the books and records of the utility. Marginal cost studies are forward-looking in nature and have to do with the additional cost of providing one more kilowatthour (or one less) at any particular time during some future period and providing an additional kilowatt of capacity (or one less) in order to assure that the above-mentioned kilowatthour may be supplied at the time when capacity is constrained. Since marginal costs are forward-looking in nature, they are only estimates and cannot be developed with the precision of aggregate accounting costs. Marginal costing is subject to a great deal of controversy with respect to the way in which the capital cost expenditures for future plant additions are to be estimated, whereas fully allocated accounting cost studies are accurate with respect to total costs. They, too, entail judgmental decisions with respect to the method by which demand costs are allocated to the various classes of service.

It is therefore the responsibility of the Board to make decisions with regard to which costing methodologies are appropriate and how they are to be used to develop rates. It is likely that the Board will wish to place a high priority on reflecting, to the extent practicable, the true cost of providing electricity to NWT consumers so they can make rational decisions regarding current and future use of electricity.

Despite the emphasis upon cost-based rates, it should be clearly understood that rates not based on costs will satisfy a limited number of valid pricing objectives. Historically, many practical considerations, such as metering costs, customer acceptance, and simplicity have caused rates to be not strictly cost-based.

Another noncost-based rate concept is that of "value of service," where the price is based upon the apparent value of the service to the consumer rather than the cost of providing the service. Value of service is most often thought of as placing an upper limit on price. Incremental pricing of natural gas at prices linked to an oil-equivalent price is a recent example of this concept. In this sense the Territorial Power Support Program can be related to value of service as well as equity, as previously mentioned. Clearly, though, whatever the justification for the support program, an erroneous and severely distorted price signal is given to residents of isolated communities as to the cost to society of providing electric service.

Specific recommendations for applying the foregoing principles in setting rate policy in the NWT will be made in the question and answer section of my testimony.

Abbreviations and Definitions

Abbreviations

the Act	Public Utilities Act
the Board	Public Utilities Board of the Northwest Territories
CMHC	Canada Mortgage and Housing Corporation
DSM	Demand-Side Management
GNWT	Government of the Northwest Territories
ICG	ICG Northern Utilities Ltd.
kW	Kilowatt
kWh	Kilowatthour
NCPC	Northern Canada Power Commission
NEB	National Energy Board
the North or NWT	Northwest Territories
NWTPC	Northwest Territories Power Corporation
NUL	Northland Utilities (NWT) Ltd.
TPSP	Territorial Power Support Program
TRRP	Territorial Rate Relief Program

Definitions

Cost of Service	The total cost to a utility of providing energy and related utility services to its customers. Includes the cost of invested capital and operating costs.
Cross-Subsidization	One customer class is charged an electric rate in excess of its cost of service in order that the utility can provide an electric rate to another customer class that is less than its cost of service.
Inverted Block Rate	A rate for a customer class for which the unit energy charge for electricity increases as usage increases.
Revenue Requirement	The total annual revenues that a utility is entitled to collect as approved by a Board. The revenue requirement is the sum of the operating and maintenance expenses, depreciation, taxes, and the cost of capital invested in the utility.

Participants

The Board held hearings at Iqaluit on July 10, at Cambridge Bay on July 13, at Rankin Inlet on July 17, at Fort Smith on July 19, at Hay River on July 21, at Inuvik on July 24, and at Yellowknife on August 6-7, 1990.

The members of the Board who took part in the hearings were:

J. Hill	Chairman
R. Mercer	Member
M. Patterson	Member
R. Hardy	Member

Persons who appeared at the hearings were:

D. Thomson	Board Staff
M. Schauerte	Board Staff
R. Marshall	Board Staff
S. Freitag	Board Counsel
E. Chick	Board Consultant
P. Alvarez	Government of the Northwest Territories
N. Nicholls	Government of the Northwest Territories
P. Hart	Government of the Northwest Territories
H. Logsdon	Government of the Northwest Territories
S. Spicoluk	Northwest Territories Power Corporation
Patrick McMahon	Northwest Territories Power Corporation
G. Green	Northwest Territories Power Corporation
D. Ramsden	Northwest Territories Power Corporation
J. O'Brian	Northwest Territories Power Corporation
H. Cheriyan	Northwest Territories Power Corporation
J. Davies	Northwest Territories Power Corporation
B. Boyle	Northwest Territories Power Corporation
W. Martin	Northwest Territories Power Corporation
L. Moran	Northwest Territories Power Corporation
R. Hilton	Northwest Territories Power Corporation
F. Martin	ICG Northern Utilities Ltd.
L. Heikkinen	ICG Northern Utilities Ltd.
A. Mantei	ICG Northern Utilities Ltd.
B. McClusky	ICG Northern Utilities Ltd.
R. Jones	Northland Utilities (NWT) Ltd.

S. Brooks	Northland Utilities (NWT) Ltd.
R. Stout	Northland Utilities (NWT) Ltd.
R. Simpson	Northland Utilities (NWT) Ltd.
S. Savage	Northland Utilities (NWT) Ltd.
G. Constantinescu	Northland Utilities (NWT) Ltd.
R. Hay	Frobisher Developments Ltd.
J. Sullivan	Town of Iqaluit
J. Cucheran	Town of Iqaluit
A. Csicsely	Member of the Public
D. Fox	Member of the Public
N. Carter	Government Services, GNWT
D. O'Neill	Executive, GNWT, Cambridge Bay
W. MacDonald	Ningmac Holdings Ltd.
W. Wilcox	Mayor of Cambridge Bay
M. Nartok	Mayor of Pelly Bay
S. Bedingfield	Member of the Public
W. Lyall	Member of the Public
P. Evorlik	Public Works, GNWT
S. DingWell	Member of the Public
T. Curley	Councillor, Hamlet of Rankin Inlet
N. Kusugak	Councillor, Hamlet of Rankin Inlet
M. Limousin	Hamlet of Rankin Inlet
W. Graham	Keewatin Chamber of Commerce
B. Palfrey	Evaz Group
J. Ayaruaq	Member of the Public
D. Bevington	Mayor of Fort Smith
A. Bevington	Member of the Public
W. Kudelik	Mayor of Hay River
H. Beaver	Chief, Fort Smith Band
C. Brodeur	Hay River Chamber of Commerce
G. Hoist	Member of the Public
C. Hill	Councillor, Town of Inuvik
J. Heath	Town of Inuvik
C. Harper	Inuvik Drum
H. Joujan	Inuvik Chamber of Commerce
G. Robertson	East Three Enterprises
Patricia McMahon	Mayor of Yellowknife
L. Burgess	City of Yellowknife Counsel
T. Buracas	Ecology North

Footnotes

1 Dr. James C. Bonbright, Albert L. Danielsen and David R. Kamerschen, ***Principles of Public Utility Rates,*** **2nd** ***ed.*** (Arlington, Virginia: Public Utilities Reports, Inc, 1988), p. 116

2 Subcommittee on the Northern Canada Power Commission, Standing Committee on Indian Affairs and Northern Development, House of Commons, Parliament, Canada, ***Electrical Power North of 60 Degrees.*** **(Ottawa, 1982),** p. ***50***

3 National Energy Board, Canada, ***In the Matter of a Public Inquiry Into Matters Relating to the Northern Canada Power Commission.*** (Ottawa, 1983), p. 18

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(1) Canada. Parliament. House of Commons. Standing Committee on Indian Affairs and Northern Development. Subcommittee on the Northern Canada Power commission. Electrical Power North of 60 Degrees. Ottawa, 1982. (Penner Report)

(2) Canada. National Energy Board. In the Matter of a Public Inquiry Into Matters Relating to the Northern Canada Power Commission, Report. Ottawa, August 1983.

Summary
of the Report of the Public Utilities Board
Respecting
Electrical Rate Structures
in the Northwest Territories

This summary has been prepared by the Public Utilities Board (the Board), prior to the release of its final report. The final report is being prepared in response to a request by the Executive Council of the Government of the Northwest Territories (GNWT) for the Board to conduct a public review into electrical rate structures in the Northwest Territories (NWT).

In accordance with the directions of the Executive Council, the Board held hearings in Iqaluit, Cambridge Bay, Rankin Inlet, Fort Smith, Hay River and Inuvik. The hearings in these locations were non-technical and provided the Board with the opportunity to hear consumers on a wide variety of electrical service issues.

Hearings were held in Yellowknife to review rate structure issues at a more technical level. Submissions at these hearings were received from the three electrical utilities, interested parties and representatives from the GNWT.

The Board also received written submissions from interested parties unable to attend any of the hearings. In all phases of this review, the Board received assistance from a rate design consultant.

The Board was asked to review the current rate structures of all electrical utilities in the NWT. In order to review current rate structures and consider whether these rate structures produce just and reasonable rates, it was necessary for the Board to ascertain those principles of rate structure that are considered to be generally acceptable.

The most widely accepted measure against which rates are determined to be just, reasonable and not unduly discriminatory is the cost standard. The traditional principle is that “rates

as a whole should recover costs as a whole" and that consumers pay for the service they receive. In order that the cost standard may be applied, a cost of service study is normally undertaken.

A cost of service study assigns plant, property and operating expenses to each customer class, measuring costs of rendering service to the classes of customers under study and assessing each classification's contribution to rate of return. It should be understood that a cost of service study is not a precise measurement of accounting costs, but an approximation of cost responsibility by class of customer. A cost of service study does not establish directly the structure of rates, although it does provide useful cost information for rate design.

The Board reviewed current electrical utility rate structures in the NWT. In the course of its review, the Board concluded that cost of service information from ICG Northern Utilities Ltd. (ICG) and Northland Utilities (NWT) Ltd. (NUL) is sufficiently developed to provide a standard against which their rates may be measured to determine if they are unjust, unreasonable or unduly discriminatory. The Board concluded that their rates are just, reasonable, and not unduly discriminatory.

The Northwest Territories Power Corporation (the NWTPC) indicated it was only beginning to assemble cost of service information. Therefore, the Board cannot reach the conclusion that the current rate structure of the NWTPC produces just and reasonable rates since the cost standard against which rates can be measured is not fully developed.

The Board was also requested to determine whether the current electrical utility rate structures in the NWT meet the concerns of consumers and ratepayers. In the course of its review, the Board concluded that the rate structures of ICG and NUL meet the concerns of consumers and ratepayers. In the case of both ICG and NUL, the Public Utilities Board acts as the forum before which consumers and ratepayers may raise their concerns. No consumers or ratepayers have requested the Board to hold a hearing or inquire into ICG or NUL rates.

The Board was not able to reach a conclusion as to whether the rate structure of the NWTPCmeetsthe concerns ofconsumers andratepayers. Participants submittedthatthere was not an appropriate forum in which to raise concerns with respect to the NWTPC rate structure. Many participants suggested that a forum should be made available and that the Board would be the most appropriate forum.

The Board was also asked to review matters relating to the subsidization of the cost of electricity in the NWT, the methods through which this subsidization is provided and its impact on the supply and pricing of electricity to consumers and ratepayers. The Board found strong support for continued subsidization. However, current methods of subsidization do not provide consumers with an understanding of the effect of consumption on the cost of electricity. Generally, consumers do not receive full information on the monthly bill indicating actual charges for electrical service. Many consumers receiving service from the NWTPC do not receive an electric utility bill at all. Current price signals do not encourage conservation, but result in an increasing demand for electricity as it appears to be an inexpensive source of energy. Increasing demand must be met by increases in electrical generation capacity and the increases in capacity drive up the price of electricity.

The Board, in its final report, will be making two recommendations.

The first recommendation is that legislative changes be made to give the Public Utilities Board the power to fix the rates of the Northwest Territories Power Corporation.

Placing the NWTPC under the full jurisdiction of the Board will allow cost-of-service information to be placed before the Board. Consumers and ratepayers can be given the opportunity to test the rates against that information and the Board can commence the task of fixing just and reasonable rates for the NWTPC. With the NWTPC under the full jurisdiction of the Board, all electrical utilities in the NWT will be regulated in the same manner.

The first recommendation may be implemented fairly quickly. It is the matters that flow

from its implementation that will take place over a number of years - a five to seven year horizon appears realistic. The fixing of rates will take place in the full light of public hearings.

The current NWTPC rate structure contains 223 rates and what might be termed 51 rate zones. Questions respecting reduction of the number of rates and rate zones will require careful examination. Whether or not the NWT should constitute a single rate zone, have separate rate zones for areas principally supplied by diesel generation rather than hydro generation, or a number of rate zones based on other criteria is a matter that requires careful examination, in the light of cost-of-service information and public hearings.

The Board's second recommendation is that subsidies be separated from the rate structure. Implementation of this recommendation could take place fairly quickly. The Board examined the subsidy programs offered by the GNWT and found that the reasons for, and objectives of, the subsidy programs are unclear and have become obscured over time. Since subsidies should be separate from the rate structure, and should not obscure price signals, the GNWT should determine the need for each subsidy, target the beneficiaries of any subsidy and fund the subsidy outside of the electric revenue requirement of the utilities. The method of providing required subsidies should be examined. It may be concluded that paying the required subsidy to the utilities may be the most efficient and practical method and in that case the subsidy should be clearly identified on the utility bill.

Determination of the objectives of each subsidy and the amount to be paid is a matter for the GNWT to deal with over such a period as it considers appropriate. Some suggestions with respect to certain subsidies will be provided in the report.