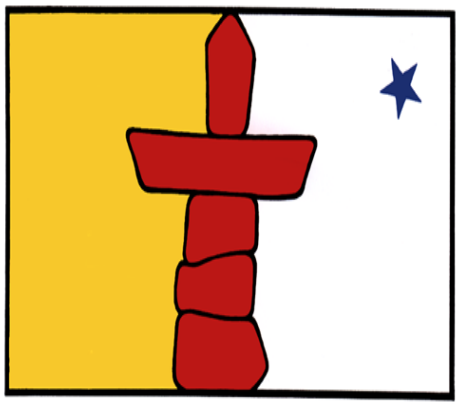
Ikuma II Report

Meeting Nunavut's Energy Needs



Structures and Strategies for Energy Self-Reliance

Executive Summary

March 21, 2002

EXECUTIVE SUMMARY

1.1 Introduction

Some Nunavummiut can recall when their communities depended only on the land for heat, light and travel. They were energy self-reliant. Now those communities are totally dependent on imported oil. Without it they would freeze in the dark. Imported oil fuels the heaters, generators, aircraft and vehicles essential to today's Nunavut. Like other industrialized nations, Nunavut is addicted to imported oil. It is an expensive habit.

Energy costs take almost one-fifth of the GN budget and must be managed

The Government of Nunavut (GN) pays for this both as a major consumer and as a supplier of subsidies. It pays for energy directly for its schools, hospitals, government offices and other public buildings. It also pays indirectly through subsidies aimed at keeping essential energy affordable for the average Nunavummiut. Estimates are that last year these energy costs accounted for almost 18% of the GN's total budget—over $121 million. The amount is expected to increase to over $140 million over the next 4 years. Although this is a significant part of its budget, the GN has no way to track the real costs or to control these expenditures. Unless controlled, an increasing share of the budget will have to be taken from health, education and other social programs to pay for energy.

Nunavut can be energy self-reliant again, but needs control of its resources

This is not a permanent problem—Nunavut should be a major energy exporter within 25 years. It is rich in oil, gas and hydro resources; but they will take time to develop. The problem is to manage the energy situation over the next 25 years so that Nunavut can control its costs and ultimately the development of its resources. To tackle the problem, the GN needs to understand it, to create the tools to manage it, and to develop a long-term strategy to deal with it. The purpose of this Report is to help with the first two—understanding and tools. And to lay the foundation for the third—a comprehensive energy strategy.

1.2 Electricity Supply

Nunavut Power Corporation (NPC) has been the supplier of electric energy throughout Nunavut since April 1, 2001. It operates separate diesel generation based electric systems in 25 communities serving roughly 11,000 customers. The GN owns the company and appoints the Directors, who are responsible for running it. The governance framework is set out in the *Nunavut Power Utilities Act*.

NPC supplies power for Nunavut using a standard public utility model for cost tracking and rate setting

The company has about $86 million in plant, equipment and distribution systems. It operates on a standard utility model, borrowing the capital it needs, backed by a GN guarantee, and recovering the cost of its capital and operations through rates and government subsidies. The company develops rate proposals using a standard utility cost recovery approach—rates should recover all costs of providing the service including depreciation and a return on investment. NPC's rates must be approved by the Minister responsible for the corporation, but before they can be approved they must be reviewed by the Utility Rates Review Council. Although the Council does not have full regulatory powers, its rate recommendations can be binding on NPC if the Minister fails to make a decision on the company's proposal.

The GN subsidizes NPC's rates through the Territorial Power Support Program (TPSP). Because NPC uses a traditional regulated utility system of accounts, it is possible to track the costs that go into providing power. The review process ensures

that these costs are subject to independent and informed scrutiny. The TPSP structure also enables the subsidy cost to be tracked, although the present system makes it very difficult for the GN to control the amount of the subsidy.

Rough numbers—1/2 of power cost is fuel; 1/4 of fuel imported is for NPC; 1/3 of NPC fuel used for Iqaluit

This fiscal year (ending March 31, 2002) it will cost NPC about $55 million to provide electricity to Nunavut. Slightly over half of this will go to buy diesel fuel. NPC uses about 23% of the diesel fuel imported into Nunavut for public use, about 36 million litres last year. Of this amount more than 55% is purchased from the PPD and the rest is imported directly by the NPC. By 2005 it is expected that over one third of the fuel burned by NPC will be used to supply power to Iqaluit. That means Iqaluit should be a prime target for projects to reduce consumption and find some source of energy other than diesel fuel.

Almost 2/3 of the energy in oil is lost turning it into electricity

From an energy perspective, turning diesel fuel into electricity is a great waste since only about one third of the energy in the fuel comes out as electric energy. The rest is lost as heat—at an estimated cost to the GN of over $12 million a year. NPC has shown that in the right circumstances much of this heat can be captured and put to use to heat buildings. Such heat recovery projects can quickly pay for themselves in energy savings and encouraging them should be part of the GN's energy strategy.

1.3 Fuel Supply

PPD should become a sister company of NPC under a Crown corp responsible for fuel and electricity

We recommend the Petroleum Products Division (PPD) be restructured to become a sister corporation of NPC within a Crown corporation responsible for supplying all Nunavut's electricity and fuel. That recommendation is based on a detailed analysis of the present system for fuel supply. Fuel products are imported into Nunavut by the PPD of the Department of Public Works and Services (Public Works) and NPC. The PPD supplies heating, diesel, aviation fuel products and gasoline to all Nunavut consumers, including the NPC.

(1) PPD Operations

PPD is responsible for importing, storing and distributing fuels throughout Nunavut. Restructuring it as a Crown will require consideration of a number of issues:

- **Annual Re-supply**— The PPD arranges for the annual re-supply with multi-year contracts for the supply and transportation of the fuel to each community. Transportation costs in the Kitikmeot and Kivalliq Regions are especially high. A consolidated energy company may be able to reduce transportation costs by developing new re-supply strategies and consolidating NPC and PPD volumes.
- **Community Delivery**—PPD has a long-term contract in place in each community for the operation of the bulk storage facility and delivery of fuels. These contracts will need to be honoured in any restructuring.
- **Environmental Impacts**—There is contaminated soil in seventeen PPD sites. The estimated clean-up cost is $4.22 million over 10 years. It is not clear how that will be funded. A second major environmental cost will be the increasingly strict regulations and controls for fuel operations resulting from amendments to the *Canada Shipping Act*. Additional money will be needed to build better facilities and train operators.

(2) Product Pricing and Subsidies-The Revolving Fund

PPD operates under a Revolving Fund that makes utility-type total cost accounting difficult

PPD operations are financed through the Petroleum Products Revolving Fund (PPRF) and a Petroleum Products Stabilization Fund. The *Revolving Funds Act* caps the PPRF at $55 million and requires PPD to operate out of the Fund on a "break-even" basis. The Stabilization Fund allows a mismatch between costs and revenues of up to $5 million so that prices do not need to be constantly changed to track oil prices. All costs of PPD operations charged to the PPRF are included in its fuel prices. Although PPD tracks these costs on a community specific basis, the rates are set so that the prices in high cost locations are subsidized by the prices in lower cost locations. Rates are calculated by the PPD and submitted to the GN Financial Management Board for approval when the balance in the Stabilization Fund nears its limit.

Costs exceed rates by an estimated $10 million, producing "hidden subsidies"

In addition to the costs charged to the PPRF, there are other real costs of providing the service that are not included in the pricing. These are often called "hidden subsidies" since they are not clearly identified in any budget documents or formal subsidy policy. It is estimated these hidden subsidies amount to roughly $10 million annually. This cost cannot be managed if it is not identified.

1.4 Comparing NPC and PPD

NPC and PPD are similar in areas like fuel, information systems and billing

The PPD and NPC are similar in that buying and managing fuel is a vital part of each of their operations and consequently both operate and maintain bulk fuel storage and distribution facilities. They also share many of the same customers and provide similar services such as billing. The GN subsidizes both, although by different subsidy programs. And both have a price stabilization mechanism to avoid frequent rate changes.

NPC and PPD differ, however, in several key areas:

- **Legal structure**—The PPD is within a GN department whereas NPC is a GN Crown corporation. Consequently they differ substantially in the financing of operations, financing of capital investment, accountability, policy development and overall direction.
- **Price setting**—NPC electrical rates are subject to review and approval by an independent URRC. Rates for each community are based on the actual cost of serving that community. The PPD rates are subject to review and approval by the Financial Management Board (FMB) of the GN. There is no specific rate policy in place other than intent to avoid excessively high costs in any particular location.

NPC and PPD differ in legal structure, financing, tracking costs and setting rates, and subsidies

- **Subsidy funding**—The NPC subsidy program is a formally approved and funded program for which all costs are disclosed for approval by the Legislative Assembly. The NPC program targets certain customers for rate subsidies and these customers are aware of the value of the subsidy on each electrical invoice. The PPD subsidy is funded from a number of different sources within the GN and actual costs are neither calculated nor disclosed. These subsidies are applied to all customers, but the customers are not informed of the true cost of the service or the amount of the subsidy.
- **Rate stabilization**—The NPC Fuel Stabilization Fund allows swings in fuel costs of up to $2 million before temporary rate changes are applied in the form of a rate rider; further URRC approval is not required. The PPD Stabilization

Fund has limits of plus or minus $5 million which applies to all costs of operations including the price of fuel. When the limit is reached, the PPD must request FMB approval of any rate changes or other initiatives that may be required to correct the problem.

The utility model adopted for electricity should work for fuel

Is the NPC model suitable for petroleum products? Yes. The GN established NPC in its present form after a careful study of its options. It concluded that a GN Crown corporation with an independent rate review body (URRC) would best fulfill the GN objectives for an electrical service provider. Given similar objectives for fuel services, the same model would seem appropriate.

We believe the GN can achieve economies and improve its ability to manage energy issues by restructuring the PPD as a sister corporation of NPC. In particular, the restructuring should:

Making NPC and PPD sister companies should reduce duplications and produce savings

- **Remove duplication** - Both the PPD and NPC import and store bulk fuel, in many cases in the same communities. This involves the construction, operation and maintenance of fuel storage facilities and distribution systems as well as procurement contracts and personnel to manage these contracts. Duplication adds to the administration costs and diminishes the benefits achievable through economies of scale.
- **Consolidate volumes** - The lowest cost and best service for the purchase and transportation of fuel can be achieved with the largest volumes. Consolidating the volumes of the PPD and NPC for long-term contracts will improve "buying power".
- **Enable new re-supply strategies** - Preliminary feasibility studies by the GNWT have shown that alternative re-supply routes and strategies, particularly for the Kitikmeot and Kivalliq Regions can be developed for significant cost savings.
- **Facilitate business planning** - Changing PPD from a part of government to a corporation will make it easier to track costs, measure results and implement business practices.

NPC and PPD should use the same rate setting and subsidy systems

We also recommend that both energy suppliers have the same subsidy system. The price subsidy program used for NPC (TPSP) tracks subsidies in a way that avoids the PPD's problems with hidden subsidies. The approach would work for fuel, but it needs changes so that the GN can control the amount of the budgetary impact of the subsidy. For this we propose an Affordable Energy Fund as part of the overall energy management model.

1.5 Energy Alternatives

Nunavut depends totally on imported oil for heat, power and transportation. The cost to the GN varies with world oil prices. As these prices rise an increasingly large part of the GN's budget will be eaten up in energy costs. Our estimate is that if current practices continue, within four years over 20% of the GN's expenditures will go, directly or indirectly, for energy. Using oil as the only energy source also carries a significant environmental cost. Moving it, storing it, and burning it all do damage. These are of particular concern in an ecosystem as fragile as Nunavut's.

To deal with its imported oil dependency problem, the GN will need to develop a comprehensive energy strategy. There are at least three key components of that strategy:

To solve its oil dependency problem the GN needs a strategy to manage costs, reduce use, and find alternatives

(1) **Create the capability to manage the situation**—the GN needs to have the structures and systems in place that will enable it to identify and control energy expenditures and develop and implement effective energy policies. The model proposed in this Report is aimed at achieving that.

(2) **Reduce consumption** - the GN will need policies that make energy conservation a public purpose in Nunavut and price energy so that consumers become stewards. It will also need to encourage efforts to get more energy out of the oil it imports by using heat now wasted in the process of generating electricity. Since almost two thirds of the energy in the oil is lost in this process, the GN could save millions of dollars if the heat from diesel generators were put to use heating buildings.

(3) **Find alternatives to imported oil** - A comprehensive effort is needed to identify and develop hydro-power opportunities, local and imported. Developing local hydro resources, particularly in the Kivalliq, could help meet local domestic and potential industrial energy needs and improve the economics of a transmission tie to the southern grid. Nunavut's wind generation potential needs to be explored and developed along with expansion of wind/diesel hybrid systems, exploring wind/diesel/hydrogen cell technology and biomass generation.

1.6 Issues and Options

(1) The GN's Energy Cost

To mange energy costs they must be known and controlled

The GN has two basic financial problems when it comes to energy—knowing the cost and controlling it. With so many subsidies and no central tracking mechanism, it is very difficult to know what energy really costs. In addition, with no budgetary mechanism to set a level on subsidies in advance, it is very difficult to control them. The GN pays for energy when it buys power or fuel for government institutions, when it pays subsidies to keep prices down, when it gives grants to communities to meet their costs, through the hidden subsidies discussed in dealing with the PPD, and in the cost of travel and purchased services. We estimate the total cost of these payments by the GN in the past fiscal year was roughly $121 million. As the total cost of delivering fuel and electricity increases, there will be increased demands on the GN for fuel and power subsidies to make these essential commodities affordable. This could get out of control unless the GN has the financial policies and procedures in place to manage the subsidy situation.

(2) Design Considerations

Existing Efforts

New energy initiatives should build on strengths of existing GN efforts

Any new energy initiative must take into account existing efforts by GN agencies. These include NPC's efforts to develop wind and hydro power and use waste heat in public buildings, the efforts of Public Works to make old and new government buildings more energy efficient, Sustainable Development's work in developing more environmentally friendly energy sources, and the research work of Arctic College's Nunavut Research Institute. These efforts could be made more effective by an energy management structure that enables Cabinet to stay on top of energy issues, develop related policies, and monitor the implementation and effectiveness of those policies.

Existing Policies

Existing policies and agreements affect structure of energy management model

The design of any such model must take into account existing policies and agreements. Two of critical importance are the Bathurst Mandate and the Federal Formula Financing Agreement. The first creates a policy directive toward energy self-reliance. The second may be a factor in determining the form of the structures created to deal with energy matters. The design must also take into account the policy objectives of maintaining a secure supply, improving delivery system efficiency, communicating costs to consumers and enabling the GN to manage its energy situation.

(3) Potential Models

Examples from Other Jurisdictions

The Yukon and Saskatchewan have instructive energy delivery models

It will be difficult to achieve these objectives with Nunavut's existing energy supply, management and support policies and institutions. In our view, given Nunavut's geography, climate and culture, they also would not be well served by a fully privatized approach such as Alberta's. To manage its energy situation, the GN needs a more hands on approach than such a model would allow.

To find a model appropriate to Nunavut's conditions we looked at several other jurisdictions with some similarities. The Yukon, the Northwest Territories, and Saskatchewan all have Crown corporations that play a central role in energy delivery. The resulting model we propose incorporates elements of the energy governance structures of the Yukon and Saskatchewan for energy supply and of the NWT for advice on energy policy. For rate setting, Nunavut's Utility Rates Review Council already represents a unique blend of the independent regulatory boards of the Yukon and NWT, and the rates advisory panel of Saskatchewan.

Design Goals

Model should ensure secure supply, operate efficiently, signal costs, and make it possible to manage energy issues

In developing an energy management model for Nunavut, we identified four design goals: security of supply, system efficiency, cost communication, and management capacity. The model should ensure consumers will continue to get the energy they need, at a price they can afford to pay, and with no loss of service quality. It should minimize the cost and complexity of procuring, transporting and delivering energy. It should make it possible for the GN and consumers to know, and act on, the true costs of the energy they use. And, most important for the GN, it should enable the GN to manage its energy situation—acquire information, forecast impacts, develop plans and policies, implement them, and assess results. We believe the proposed model can meet these design goals.

1.7 Recommendations

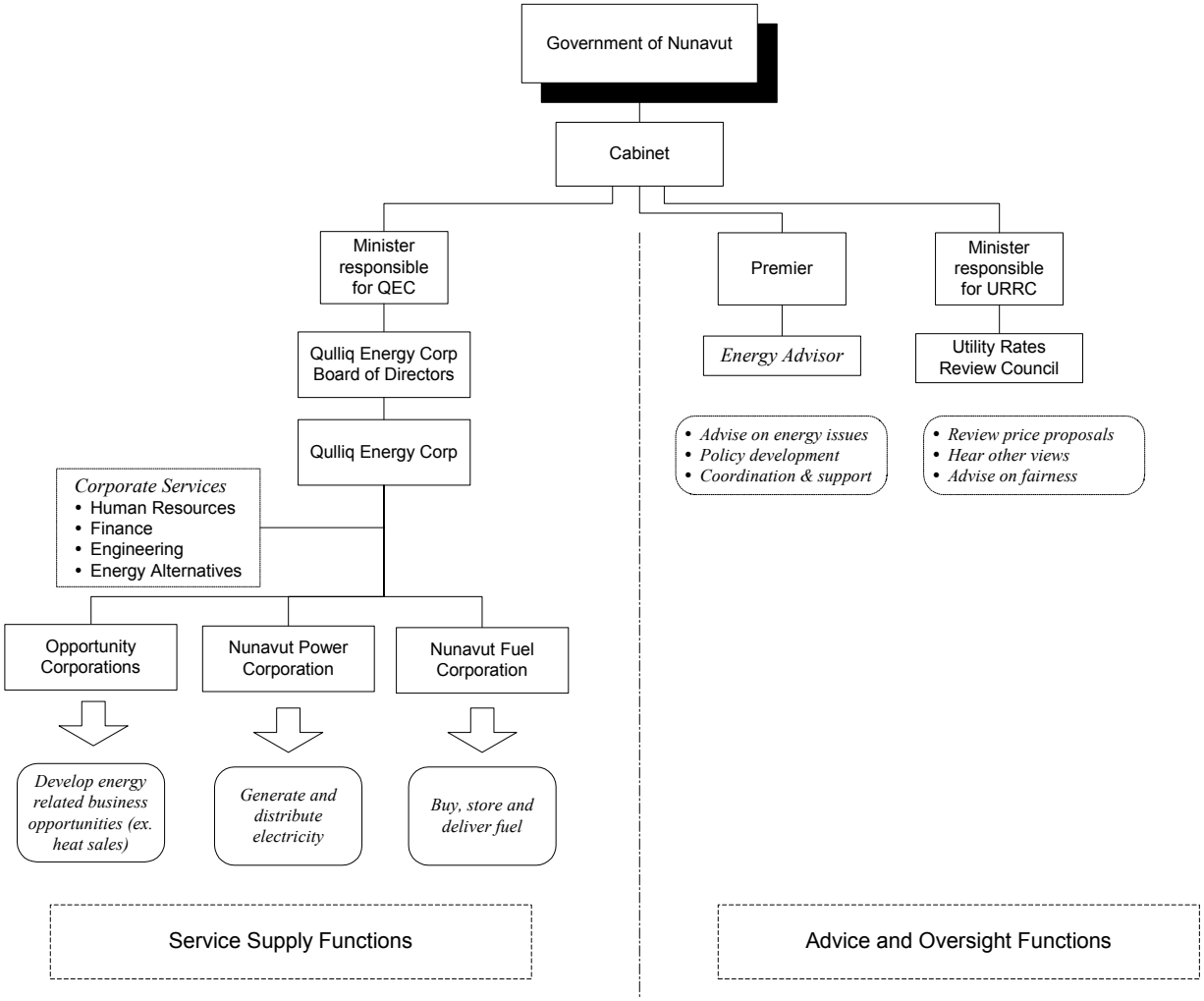
(1) Proposed Model

Model Structure

The model enables coordinated energy supply operations and oversight and advice on energy issues

The proposed model distinguishes two basic functions—operations and oversight. The operational side of ensuring a reliable supply of fuel and power is consolidated in one Crown corporation—Qulliq Energy Corporation (QEC). The oversight side provides a separate input to Cabinet for advice on rates, through the Utility Rates Review Council, and advice on energy policy, through an Energy Advisor. The model is shown below.

Nunavut Energy Management Model



Operations

PPD becomes NFC, a sister company of NPC under a Crown corporation—Quilliq Energy Corporation

On the operations side, we believe the same policy considerations apply to the supply of petroleum products as the supply of electricity. The GN dealt with these in deciding on the Crown corporation model for electricity when it established NPC. We support that approach and recommend the creation of Nunavut Fuel Corporation (NFC) as a sister corporation of NPC. In the interests of economy and coordination NPC and NFC should be wholly owned subsidiaries of QEC with one Board of Directors for all three companies. This could be the existing Board of NPC with one or two additional members with expertise on fuel supply issues. Although power and fuel supply could be completely consolidated in one company, we believe it would be better to keep them as separate corporate entities at least for the duration of the transition period. This will enable NPC to maintain its corporate identity—no change in logos, signs, bills, etc. It will also minimize the impact on NPC operations of converting PPD into NFC. Notwithstanding their separate legal identities, operationally they will likely become integrated over time to meet the business needs of providing affordable energy. For example, the companies can be expected to move towards sharing services in areas such as human resources, finance, billing, engineering and information systems as it makes business sense.

Oversight

Oversight and advice come from URRC (on rates) and an Energy Advisor (on policy)

On the oversight side, Nunavut already has a unique mechanism, the URRC, for reviewing the rate proposals of designated utilities. There is also a need, however, for a second oversight function—monitoring energy issues, ensuring Cabinet has an independent source of advice on these issues, and assisting in developing and coordinating related GN policy. For that function we recommend the creation of an Energy Advisor reporting to the Premier. This is similar to the approach adopted in the NWT. Given the growing share of the GN budget eaten up by energy costs, it should be possible to pay for the position through energy savings.

(2) Setting Prices

NPC and NFC would follow same rate setting principles, with subsidies in one budgeted Affordable Energy Fund

The new fuel corporation, NFC, should be run as a utility subject to the same accounting principles and URRC rate review process as NPC. This "full cost accounting" approach would address hidden subsidy issues identified by the Auditor General and dealt with extensively in this Report. On the down side, we expect it will reveal over $10 million in hidden subsidies that proper fuel pricing will have to recover. Keeping fuel affordable brings us to the third major component of the recommended model—the creation of an Affordable Energy Fund. The Fund would replace existing fuel and power subsidy programs with the goal of enabling the GN to manage its energy subsidies. It would do this by making an annual appropriation to the Fund for the purpose of reducing fuel and power costs. NPC and NFC would then have to set rates, subject to URRC review, so that the revenue from their rates combined with the money in the Fund would offset their total cost of providing service as determined using standard utility costing principles.

(3) Implementation

A team of senior officials needs to develop a transition plan

The proposed structures and procedures could be implemented by policy, regulations, and relatively minor amendments to the existing *Nunavut Power Utilities Act*. Or, they could be put in place by entirely new legislation. This is probably the most significant example of a large number of implementation issues that will need to be addressed if the GN decides to adopt the model. To deal with these issues, we

recommend the GN establish a Transition Team including senior officials from Finance, NPC, and PPD and give them a mandate to develop a transition plan. The plan will need to address issues such as enabling legislation, transfer of assets and employees, whether QEC or its subsidiaries should be the asset holder and employer, and the implications of the Federal Formula Funding Agreement for various structural options. An implementation team will also need to be created for QEC so the Board can oversee the corporate transition.

1.8 Next Steps

The GN needs to lay the foundation for three more steps to energy self-reliance—a comprehensive strategy, control of resources, and resource development

Implementing the proposed model will put the GN in a better position to manage its energy future but it will not move Nunavut very far along the journey to energy self-reliance. Nunavut is rich in energy resources, including oil and gas, and eventually should be not just energy self-reliant but a major energy exporter. That day is probably 20 years away. To get there we see three more stages:

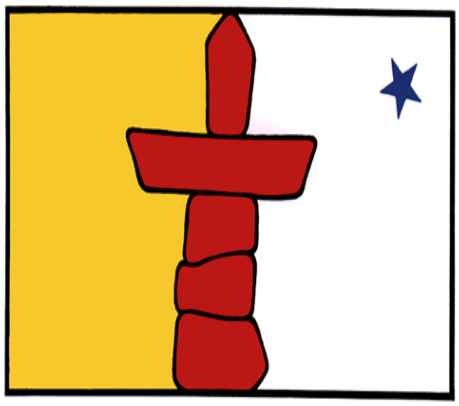
- ***Develop and implement a comprehensive energy strategy.*** To get through the next 20 years the GN needs to be able to identify and develop renewable energy sources, control consumption, and manage energy costs. That will take a comprehensive energy strategy that will be expensive to develop and will require cooperation with other governments with similar objectives.
- ***Acquire control of Nunavut's energy producing resources.*** The GN needs control of water, minerals, and oil and gas to develop Nunavut's energy potential. That makes the devolution talks with the federal government a high priority in any energy self-reliance strategy.
- ***Develop Nunavut's energy resources***. Given its hydro and hydrocarbon resources, Nunavut should some day be an energy exporter. Developing these resources will involve long lead times, planning, and enormous amounts of capital. Although it may take 20 years or more for many of these projects to begin producing energy, the GN should start putting the planning and policy foundation in place within the next five years.

The federal government and others have a shared interest in working on an energy strategy

The GN is not alone in seeking solutions to the energy problems of isolated northern communities. We estimate that over $100 million annually of federal transfer funding to Nunavut is eaten up in energy costs. On that basis alone, the federal government should be very interested in working with the GN on alternatives to reduce energy costs. There are also potential partners in provincial governments and in industry. The GN needs to find partners, including the federal government, and with them begin a major initiative to reduce the north's dependency on imported oil, get control of consumption, and develop greener energy sources.

Ikuma II Report

Meeting Nunavut's Energy Needs



Structures and Strategies for Energy Self-Reliance

March 21, 2002

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1 INTRODUCTION

What the Report is about—High level snapshot of the situation

1.1 Nunavut's Energy Challenge

Loss of energy self-reliance—Implications—The road back

Some Nunavummiut can recall when their communities lived entirely off the land. The only source of energy was the animals and plants found there. The communities were energy self-reliant. That was a different time and a different way of life. Those communities now are totally dependent on imported oil for heat, light and travel.

Five stage return to energy self-reliance

Nunavut can get back to self-reliance, but it will be a long journey. We see it as a journey of five stages:

- ***Stage 1: Get control of electric energy***. That was dealt with in the original Ikuma Report.
- ***Stage 2: Create the capacity for the GN to manage Nunavut's energy situation.*** This Report outlines structures and systems that will enable the GN to rationalize fuel supply and energy pricing, manage energy costs, and make informed energy policy.
- ***Stage 3: Develop and implement a comprehensive energy strategy.*** To get through the next 20 years the GN needs to be able to identify and develop renewable energy sources, control consumption, and manage energy costs. That will take a comprehensive energy strategy that will be expensive to develop and will require cooperation with other governments with similar objectives.
- ***Stage 4: Acquire control of all of Nunavut's energy producing resources.*** The GN needs control of water, minerals, and oil and gas to develop their energy potential. That is the objective of devolution talks with the federal government. The earlier an agreement can be reached the sooner the GN can begin laying the foundation for the fifth stage.
- ***Stage 5: Develop Nunavut's energy resources***. Given its hydro and hydrocarbon resources, in the long run Nunavut will be an energy exporter. Developing these resources will involve long lead times and enormous amounts of capital. Although it may take 20 years or more for many of these projects to begin producing energy, the GN should start putting the planning and policy foundation in place within the next five years.

This Report is about the second stage—putting the structures and systems in place that will enable the GN to take control of its energy situation and begin setting the course for the rest of the journey.

Nunavut has an oil dependency problem

Nunavut is not alone in its oil dependency problem. A lead article in a recent issue of *The Economist* entitled "Addicted to Oil" warned that a dependency on imported oil was increasingly limiting the economic and social policy options of governments throughout the industrialized world. Nowhere are the consequences of this dependency more serious than in Nunavut. For Nunavut, imported oil supplies essentially all heat, power and transportation. An assured supply is literally a matter of life or death. To guarantee energy availability, the GN plays a major role in

supplying the product and subsidizing the price. Increasingly this will limit the GN's economic and social policy options.

Energy costs will limit social policy options if not controlled

Nunavut's oil addiction limits the options of the GN because of the large role the government plays in supplying energy to the Territory and subsidizing its cost. Increases in consumption coupled with increases in international oil prices could cripple the economy. High energy costs, whether for heat, light, or transportation, also create a poor climate for economic development.

Given the importance of an affordable and reliable energy supply to the long-term development of Nunavut, the GN began immediately on its creation to address energy issues. A high priority was the supply of electricity. To ensure reliable supply of electricity to all communities, arrangements were made for the Northwest Territories Power Corporation to continue providing power for the first two years after the Territory was created. During that time the GN commissioned a study to consider Nunavut's options for the supply of electricity. The result was the Ikuma Report tabled by the GN early in 2000.

Control of electricity was a key first step

The Ikuma Report focused on immediate concerns for the supply of electricity in Nunavut. It suggested the GN end its reliance on NTPC and establish its own power company. One key reason was that it would enable the GN to better manage its electric energy situation of an essential and heavily subsidized service being supplied by a corporation it indirectly owned. The Ikuma Report recommended that the GN create its own power company, Nunavut Power Corporation (NPC). It also recommended that electricity rate setting be made simpler and more responsive to GN energy policy initiatives by replacing the Public Utilities Board with a rates review council. Finally, it recommended a new subsidy and budget process that would encourage NPC efficiency and enable the GN to track and control its subsidization of the use of electric energy. Most of this has been done.

While focused on the short-term electric energy situation, the Ikuma Report also looked down the road at the larger energy picture for Nunavut. It pointed out the need for the GN to develop the structures, systems, and strategies needed to take control of its energy situation. This Report on "Structures" is the first step in meeting that need. It looks at the basic machinery the GN needs to have in place to begin developing and implementing a long-term energy strategy.

1.2 The Role of This Report

What the report hopes to accomplish

Situation overview, analysis, advice and work plan

This report is intended as an introduction to the energy situation that will provide:

- An overview of Nunavut's energy situation—what it uses, how it gets it, what it costs, the financial impact on the GN;
- An analysis of key issues and viable options related to meeting Nunavut's energy needs;
- Advice on systems and structures the GN could adopt to deal with its long-term energy situation;
- A work plan outlining how changes can be implemented and a long-term energy strategy developed.

In particular, this report aims to provide the Minister Responsible for the Power Corporation, and Cabinet, with information and recommendations on the GN's energy related resources and structures. The Group reviewed government structures involved in meeting Nunavut's energy needs and developed proposals to better able the GN to address them. The starting point was a look at the energy issues affecting Nunavut.

Controlling dependency, policy, and costs

These issues include:

- Nunavut's growing dependence on imported fossil fuels;
- A lack of government systems to develop initiatives and coordinate GN efforts to address energy issues; and
- The inability to identify and control the total cost to the GN of ensuring the basic energy needs of Nunavummiut are met.

1.3 Situation

Origins of Report—Situation it was intended to address

The original Ikuma Working Group was established in the summer of 1999 for the purpose of developing Nunavut's options for electrical generation and distribution. At the time, there was an agreement between the Office of the Interim Commissioner and the Government of the Northwest Territories that allowed the Northwest Territories Power Corporation (NTPC) to continue to operate in both territories as a jointly owned electrical utility. This agreement covered the first two years following the creation of Nunavut.

Existing agencies have significant expertise on energy issues

The Working Group reviewed the various options and made a recommendation to the Cabinet. With the acceptance of the recommendation, the Nunavut Power Corporation Implementation Secretariat (NPCIS) was created to initiate the development of NPC and the division of assets and liabilities of NTPC. The end result was the establishing of Nunavut's own Power Corporation on April 1, 2001.

During the course of the Working Group's and the NPCIS activities several questions and issues arose that were of concern to most Nunavummiut. In particular, it was evident that there was not a clear focused approach to managing energy related issues within the Government.

The Government of Nunavut has several organizations that deal with energy related issues, but no single organization has a clear mandate to manage these issues in a coordinated manner. Some of these organizations include:

- Nunavut Power Corporation
- Department of Public Works - Petroleum Products Division
- Department of Public Works - Technical Services Division
- Department of Sustainable Development - Oil & Gas Division
- Department of Sustainable Development - Environmental Protection Division
- Arctic College - Research Institute

Within these organizations there is considerable expertise on the energy issues facing Nunavut—indigenous resources, delivery mechanisms, conservation, and environment. The challenge is to coordinate and focus that expertise.

1.4 Mandate

Terms of reference for study—Scope and Output

Finding the structures and strategies to address energy issues

Since its creation, the GN has been grappling with the issue of Nunavut's energy needs. Under the Minister Responsible for the Power Corporation, the Ikuma II Working Group was created to consider structures and strategies the GN could adopt to ensure consumers a secure, low cost supply of energy over the long-term. In particular, the group was asked to investigate and report on:

- Nunavut's energy related resources: current and future;
- Nunavut's current and future energy requirements;
- strategies and energy options that will reduce Nunavut's dependence on hydrocarbons for heat, power and transportation;
- appropriate structures for GN energy activities and funding sources;
- efficiencies attainable within GN's current energy management systems;
- potential funding partners for alternate energy initiatives including new and emerging technologies, wind generation, hydro-electric development and transmission lines; and
- timetables for implementation of recommendations, if accepted.

The Working Group was to look at existing structures inside and outside and provide recommendations early in 2002 as to what structures would best enable the GN to address its energy situation, and what action would be needed to develop a long-term strategy to ensure Nunavut's energy viability.

1.5 Methodology

How report was prepared—Stakeholder consultations, concerns—How the Report will address

We saw two major tasks to develop a Nunavut energy management strategy:

- Review the structure and current relationship between the Petroleum Products Division and the GN, and make recommendations on any efficiencies that could be achieved through a closer relationship with Nunavut Power Corporation, or a realignment of energy related resources that will address Nunavut's dependence on hydrocarbons.
- Investigate options for alternate energy sources that would reduce Nunavut's dependence on hydrocarbons and initiate discussions with interested parties and funding sources. This would include developing a strategy for moving forward to the next step with the Transmission Line Study, in relationship to the development of Nunavut's hydroelectric potential.

Compiling the wisdom of Nunavut experience

This report will deal with the first part of the strategy. A subsequent report will be prepared for the Minister dealing with the second part of the strategy, as an update on activities and progress in dealing with initiatives associated with developing energy alternatives for Nunavut.

This Report required extensive consultation with people in Nunavut involved in producing and delivering energy, in government funding of energy, in measures to reduce energy consumption, and in exploring and developing energy alternatives. The data and ideas assembled here are the result of discussions with senior staff at

PPD, NPC, and the Departments of Sustainable Development and Finance. Discussions with energy related institutions outside of Nunavut, particularly in the Yukon, Saskatchewan, and Manitoba were also extremely helpful in identifying practical alternatives for the management of energy issues.

1.6 Team

Who prepared report and who was consulted

This report was prepared by a work group headed by Peter Scott, a long time senior public servant with the GN and the GNWT. Peter Scott has been involved in housing and energy related matters for many years.

The team includes a wide range of special expertise and Nunavut experience

Peter Scott was assisted by a core group of Bill Shanks, David Stout, and Fred Martin.

- Bill Shanks is a retired executive who was for many years the head of Manitoba Hydro's operations in northern Manitoba. He was part of the team that prepared the Ikuma Report and assisted in the creation of NPC. He now serves on the Board of Directors of NPC.
- David Stout is a partner in the Ottawa law firm Nelligan O'Brien Payne, and a member of the Law Society of Nunavut and Ontario. He has assisted the GN and Nunavut Tunnagavik Incorporated (NTI) in a number of matters essential to the creation and development of the Territory of Nunavut. He was part of the team that prepared the Ikuma Report and assisted in the creation of NPC.
- Fred Martin is a lawyer with 20 years experience in utility law and corporate development. He was part of the team that prepared the Ikuma Report and was also involved in the planning and development of NPC.

Although the core group coordinated the Report's preparation, they relied heavily on other sources of expertise outside of the GN. These included

- Alain Carrierre, a businessman with many years of experience in the utility area;
- Azad Merani, a Chartered Accountant involved in the preparation of the Ikuma Report and instrumental in the planning and development of NPC;
- Les Clegg, a retired senior manager in the NWT government with extensive experience in the delivery of petroleum products in Nunavut who was part of the Ikuma Report team.

As mentioned above, staff in the Department of Sustainable Development and the Department of Public Works also contributed. Without their experience and insights it would have been impossible to understand the current system for meeting Nunavut's energy needs or to develop viable strategies for addressing those needs in the future.

1.7 Report Structure

A brief explanation of the structure of the report

This Report begins by looking at the current energy situation in Nunavut. That situation has to be understood before structures and strategies can be developed to improve it. We begin by looking at Nunavut's electric energy consumption, how the need for electric energy is met, how the cost of providing electricity is determined,

how rates are set, and the GN's role in making electricity affordable. We then address similar issues for fuel supply. That provides an overview of Nunavut's need for energy and how it is met. It is followed by a look at Nunavut's alternatives to importing oil, at existing GN efforts to address energy issues, and at existing policies and laws that create the context for energy options. We conclude the discussion of Nunavut's situation by considering the impact on future GN budgets if the present situation continues.

A look at energy use, energy delivery, GN efforts, options, new structures and next steps

Having summarized the situation, we look at options for the structures and systems needed as a foundation for a long-term energy strategy. The starting point is an overview of what that strategy hopes to accomplish—the GN's goals, objectives, and policy guidelines for its energy strategy. We look at a number of options, including some adopted in other jurisdictions and assess how those fare in meeting the objectives of the GN. This leads to a synthesis of a model that, in our view, best meets the needs of Nunavut. We explain that model and discuss what is required to implement it.

Finally, we look at next steps for the GN—what it can do to move from putting the necessary institutions in place to gathering the data, assessing the feasibility of energy options, and designing and implementing an overall energy strategy.

2 SUPPLYING ELECTRICITY AND FUEL

The basic facts, policies, and other parameters that provide a context for understanding the problem and developing a solution

2.1 Introduction

A look at energy supply and pricing

In this part of the Report we take a look at Nunavut's energy supply systems, starting with electricity. The vehicle supplying electricity is Nunavut Power Corporation (NPC) a Crown corporation owned by the GN. We provide an overview of NPC's structure, how it operates, and some of the challenges it faces in ensuring Nunavut has safe reliable and affordable power. We move on to consider its fuel supply—how much is used and how it is acquired. Finally we look at how prices for electricity are set and the implications for the GN. We then turn to the fuel supply system and cover the same ground for the PPD—the Petroleum Products Division of the GN's Department of Public Works and Services. Finally we compare NPC and PPD to see how they handle various energy supply functions so that a model can be developed to meet the needs of both.

2.2 Electricity—NPC

An overview of the supply and use of electric energy in—How the system works—Fuel consumption data—Product pricing—Costs to GN

(1) Nunavut Power Corporation

How NPC is set up and what it does—Governance, regulation, costing, financing, operations, etc.

An adequate supply of safe, reliable, low cost, electric energy is essential to Nunavut's continued development. To meet that need, the GN established NPC—a Crown corporation responsible for providing power throughout Nunavut. This part of the Report looks at how NPC is set up, the amount of fuel it consumes and the energy it provides, how it is financed, and how it tracks costs and sets power rates. It also outlines how the GN subsidizes power and the implications of those subsidies on present and future GN budgets.

NPC Role in Energy Supply

NPC supplies essentially all the electricity in Nunavut

Outside of a few operating mines and some isolated posts, everyone in Nunavut depends on NPC for a supply of electricity. NPC operates and maintains 25 isolated diesel power systems across Nunavut and is charged with supplying electricity and other services to approximately 10,700 customers. This customer base is three quarters residential and is expected to grow by close to 20% over the next five years.

NPC is an offshoot of Northwest Territories Power Corporation (NTPC)—the power company that served all of the NWT before the creation of Nunavut. In March 1999 a Transition Agreement was reached between the governments of Nunavut and the NWT that provided for NTPC to supply electrical energy to Nunavut customers until March 31, 2001. It also enabled the GN to take over the power company assets in Nunavut on an "as is, where is" basis for the purpose of setting up its own power company. A corresponding Transfer Agreement was concluded on March 30, 2001. On April 1, 2001, under the Transfer Agreement,

NPC effectively acquired the assets, and liabilities, related to NTPC operations in Nunavut.

NPC Governance

NPC is a Crown corporation governed under its own Act

NPC is created by, and operates under, the *Nunavut Power Utilities Act*. The Act creates the framework for NPC governance. It provides a structure for direction and control that enables the GN to appoint the people responsible for running the corporation, provide them with directions and policy guidelines, and monitor their performance. Within that context, full responsibility for managing the corporation rests with the Board of Directors.

The Act provides that:

- The Minister appoints NPC's directors, names the Chair and Vice-chair, appoints the President, and appoints the CEO;
- The Board must act in accordance with directions and policy guidelines set by Cabinet;
- NPC must provide the Minister with any information the Minister requests;
- Cabinet can provide direction on the dividends to be declared by NPC;
- The GN can assist NPC financially by contributions, investments, loans, or loan guarantees;
- NPC must provide annual reports and audits to the Minister for tabling in the legislative assembly;
- Within the constraints created by these conditions, the Board directs the business of the Corporation and has the authority to exercise the powers and perform the duties of the Corporation under the Act.

This creates a basic framework in which the GN has the ultimate power of appointing the managing body, providing general direction and monitoring performance. The governance structure is set out more fully in Appendix A.

NPC Assets

NPC has about $86 million worth of assets

NPC has the responsibility of ensuring all communities in Nunavut have a safe, reliable, and adequate supply of electric energy. Meeting that responsibility requires a major investment in tanks, generators, power lines, and other equipment and facilities. Last year these assets of NPC were valued on the books at almost $86 million. This depreciated value takes into account the age of the assets and is significantly less than the estimated $212 million it would cost to replace them. The table above shows the value by component of NPC's assets.

NPC Capital Assets - Mar 31, '01	Original Cost $	Accumulated Amortization $	Net Book Value $
Electric Power Plants	106,499,495	(36,694,265)	69,805,229
Distribution Systems	19,624,889	(9,944,936)	9,679,954
Facilities, equipment, vehicles	8,985,196	(5,467,292)	3,517,904
Other Utility Assets	2,945,804	(191,795)	2,754,009
Other	198,693	(198,693)	0
Total	138,254,076	(52,496,981)	85,757,095

Table 1 NPC Capital Assets

NPC recovers the cost of the capital needed to finance these assets through its rates. NPC applies normal utility principles in tracking costs and developing rates. Rates must be sufficient to recover asset-related costs such as depreciation, debt servicing, and a return on invested equity. NPC's rates are reviewed by an independent body, the Utility Rates Review Council (URRC), through a process we will describe in greater detail in a later section.

NPC Finance

The electric industry is inherently capital intensive. Large amounts of capital are required to construct, upgrade, repair, and maintain the system needed to meet the power needs of Nunavut. Capital budgets must be prepared and approved, debt financing arranged, and working capital put in place—all within the constraints of a Crown corporation. We will briefly summarize how NPC manages this financing.

Capital Requirements

NPC funds its large capital needs by debt and GN guarantees

NPC forecasts its capital requirements based on past history and the expected growth in demand for electricity in Nunavut. Once it has an estimate of its capital requirement, NPC develops a funding plan. The major sources of financing are internally generated funds and external debt. Debt is structured as a mix of short- and long-term borrowings.

Financial Governance

NPC financing is governed by the *Nunavut Power Utilities Act*, the *Financial Administration Act*, NPC Board resolutions, and corporation policies. These provide the following framework for NPC's financing efforts:

- The *Nunavut Power Utilities Act* provides limits and conditions for NPC's banking, borrowing and investing. It also enables the GN to lend money to NPC, guarantee its debt or make contributions to it.
- The *Financial Administration Act* provides additional constraints on NPC borrowing, for example by prohibiting borrowing without the approval of the Financial Management Board. The Act also contains limits on where NPC can invest and sets out procedures for obtaining government guarantees on debt.
- Board policies and resolutions govern how NPC exercises the financial powers created by legislation. For example, banking agreements, lines of credit, signing authorities, short-term borrowing and long-term debt issues, and other key financial decisions must be approved by the Board.
- The Board also approves an overall financial strategy developed by NPC to create an optimum mix of short- and long-term financing, to retire debt in an economical balanced and prudent manner, and to manage cash flow.

Appendix B, attached, provides more details on NPC's financial administration.

Markets and Customers

NPC has a vast service area consisting of over 10,700 customers in 25 communities located across an area of 2 million square kilometers. Three out of four customers are residential. These residential customers fall into three categories:

- Domestic Federal (housing owned by and utilities paid for by the Federal Government);

- Domestic NHC (housing owned by and utilities paid for by the Housing Corporation); and
- Domestic General which represents housing owned and utilities paid for by individuals and families.

It should also be noted that the "Commercial" category includes schools, hospitals, public buildings, and other government institutions. In other words, the customers are not all "commercial" in the usual sense of being businesses.

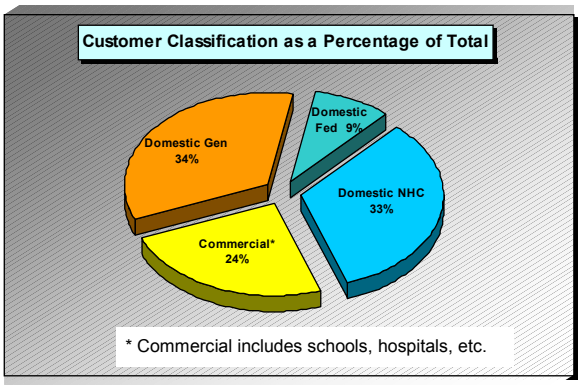


Figure 1 NPC Customer Classes

NPC has a largely residential and stable customer base

The customer base in most communities is stable. In Iqaluit, however, there has been substantial increase in the customer base over the past five or six years due to the selection of Iqaluit as the capital of Nunavut. This growth is expected to continue through 2005-06 with a customer base increase of up to 20%.

Under the *Power Utilities Act*, NPC has the exclusive right to engage in the retail sale of electricity to end users in Nunavut. The Minister responsible for NPC may, however, grant an exemption for special situations. Exemptions are not required for the mines in Nunavut since they only generate power for their own use. They consume significant amounts of electric energy but since it is self-generated accurate estimates of energy consumption in this sector are difficult.

NPC has no industrial customers to help carry the cost

The lack of industrial load, with its unpredictable consumption swings, gives NPC a stable and predictable revenue base. If NPC had more industrial customers, however, it could help reduce residential costs by spreading fixed costs over a larger base. It would also put the GN in a better position to monitor and manage energy use in the Territory. There is potential for mining and industrial development in several areas but it is not possible at this time to predict the in-service date or size of these loads. These projects have long development lead times and the loads for NPC would depend on the size of the project, the availability of power from other sources and the extent of self-generation.

NPC's lack of an industrial load creates another problem for the GN in the special circumstances of Nunavut—the cost of subsidizing power. Most of NPC's 10,700 customers have a large part of their power bill paid for by the government in one way or another. The GN, for example, pays for the territorial power subsidy program. The Ikuma Report (page 102) estimated that this cost was about $4.8 million for 2000–2001. This program subsidizes power to equal the cost of power in the Yellowknife area.

In addition, the GN, either through direct or indirect funding, pays power costs to operate hospitals, health care centers, municipalities and other government funded entities. We estimate that the GN pays, directly or indirectly, about 88% of NPC's

total cost of generating and delivering power.[1] It creates a unique situation where the company owner ultimately pays almost all the power bill.

Reducing GN Costs

As indicated above, developing an industrial load could help NPC lower the cost of serving residential customers and consequently reduce costs for the GN. NPC is engaged in other initiatives that will contribute to this goal, either by reducing the amount of fuel imported or developing new income sources for NPC.

Lowering GN costs through generation efficiency, alternate sources and sales outside Nunavut

- ***Generation efficiency—using more of the energy in the fuel***

NPC is evaluating new technologies to improve the efficiency of diesel generation. Typical diesel engines driving electrical generators convert to electricity only 35% of the thermal energy (BTUs) available in diesel fuel. The remaining thermal energy is dissipated through losses, mainly in the form of heat associated with engine cooling and exhaust. NPC is currently using jacket water heat recovery technology in several locations to heat plant and other buildings. The corporation is looking for additional ways of capturing and utilizing this source of residual energy.

- ***Alternate generation sources—finding other sources than diesel***

NPC is investigating alternate sources of electrical generation such as wind, biomass, and fuel cell technology. It is also considering the possibilities of Nunavut's enormous potential for hydroelectric generation. NPC provides three communities with wind-generated electric energy but this source produces less than 5% of the community requirements. By operating two of its own wind generation units and purchasing electrical power from a private operator, NPC is gaining essential knowledge on the potential and problems of this type of power generation in Nunavut conditions.

- ***External business opportunities—earning income outside Nunavut***

NPC possesses significant expertise in building, operating, and maintaining diesel generating stations, power distribution systems, and fuel storage and delivery systems. These skills and experience are in demand and are marketable assets which NPC is using to pursue new business opportunities. These include:

  - communications services—contract with Northwestel to provide telephone connection services;
  - power plants for mines—opportunities to assist mineral project developers with their energy needs;
  - operating contracts—opportunities to operate diesel plants in other jurisdictions; and
  - engineering services—opportunities to design and construct diesel plants for others.

Such non-core business initiatives currently earn NPC about $500,000 annually.

[1] See Appendix F, Schedule 4.

(2) NPC Fuel Use

Fuel Supply

Half of NPC's budget goes for fuel

About 51% of NPC's annual budget goes to buy fuel for the diesel generators. Consequently, electrical rates are extremely sensitive to the cost of fuel products. To prevent rate instability as a result of diesel fuel prices being tied to the international price of crude oil, NPC's rate structure includes a "shock absorber" to stabilize power rates. There is no change in rates if the accumulated difference between forecast and actual fuel costs is less than $2 million. If the fluctuations exceed this amount, NPC is then able to apply a temporary "rate rider" to the approved rates and thereby avoid the time and expense of applying for frequent rate adjustments through the regulatory process.

NPC Fuel Purchases—2001
(000's) Litres

Region	Direct Purchase	Purchased From PPD	Totals
Baffin Region	6,700	15,070	21,770
Kivalliq Region	5,335	3,580	8,914
Kitikmeot Region	3,807	1,418	5,225
Totals	15,840	20,068	35,909

Table 1 NPC Fuel Purchases

NPC requires about 36 million litres of diesel fuel annually. Approximately 44% of this fuel is purchased directly by NPC from southern suppliers and transportation companies. The remainder is purchased from the Petroleum Products Division (PPD) of the GN Department of Public Works and Services (Public Works) and its community agents. Appendix F shows details of NPC's forecast re-supply needs for 2002 by community, with comments on the means of storage and delivery.

In Section 2.3 we will discuss in detail the procurement, pricing, storage and distribution of fuel by NPC and the PPD.

NPC Fuel Consumption

Over one third of NPC's fuel use is powering Iqaluit

NPC uses about 23% of the diesel fuel imported into Nunavut. The following table provides a breakdown of NPC's consumption by Region—actual for fiscal 2000/2001 and forecast through fiscal 2004-05. A detailed community breakdown is attached as Appendix C. The Table shows the Baffin Region as the largest consumer by far. About half of the consumption in the Baffin Region is in Iqaluit. By the end of the forecast period it is estimated that 35% of the fuel

NPC FUEL USE FORECASTS
(000's Litres)

Region	2000/01	2001/02	2002/03	2003/04	2004/05
Kitikmeot Region	5,225	5,171	5,121	5,209	5,299
Kivalliq Region	8,914	8,992	8,927	9,118	9,311
Baffin Region	21,771	23,746	24,621	25,117	25,611
Total Nunavut	35,910	37,909	38,669	39,444	40,221

Table 2 NPC Fuel Use Forecasts

consumed by NPC will be burned in Iqaluit. That means efforts to reduce consumption or find alternate energy sources in Iqaluit could have a significant impact on fuel consumption in Nunavut generally. Projects such as small-scale hydro and refuse burning have been considered for Iqaluit and, if viable, could contribute to an overall Nunavut energy strategy.

(3) Pricing Electricity

How costs are determined—How rates are set—Recognition of all costs, including cost of capital.

Knowing energy costs is crucial to energy management

A central theme running through this report is the need to know the true cost of energy. NPC provides a model of how this can be done—the regulated utility. This model has been used for many years throughout North America to ensure that monopoly suppliers of essential services can recover the cost of providing those services, but not much more. By careful cost tracking it also makes it possible to know what it costs to serve different types of customers and set prices accordingly. We will look at the model in some detail, since it is equally applicable to fuel.

How NPC determines costs

NPC's rates are set so that, with good management, it should receive enough from power bill payments each year to cover its costs. The costs and rates are based on forecasts—what the company expects will happen in the next year or two. An independent body, the Utility Rates Review Council, reviews those forecasts to see if they make sense.

NPC must show all its costs to the URRC to support rate proposals

The starting point in determining future costs is the "load forecast". This is an educated guess, for some year in the future, of how many new customers there will be, what kind of customers they will be, how much electricity they will use, and when they will use it. This information is used to prepare a sales forecast. It is also used, along with information on the condition of NPC's existing generators and other facilities, to forecast how much money NPC will need to upgrade its system so that it can meet the need.

In determining the total amount of money it needs to provide the service, NPC includes all costs—fuel, operations and maintenance, management and administration, depreciation, and the cost of capital. We will describe each of these briefly, but it is the last two that really need explanation.

- ***Fuel***

A "shock absorber" softens the effect of fuel price changes on rates

Fuel accounts for roughly 51% of NPC's total cost of providing electricity. NPC forecasts fuel requirements by starting with the forecast of how much electricity will be used and translating that into fuel needs based on the efficiency of its generators in turning fuel into electricity. The total fuel cost is determined by applying forecast diesel prices to this amount. Unfortunately, diesel prices vary with world oil prices so the actual cost of diesel fuel will depend on the price of crude oil when it is shipped. Because fuel accounts for such a large part of NPC costs, the company and the public have to be protected from large swings in the price of oil—NPC would be charging less or more than its costs if fuel prices were much higher or lower than expected. This overcharge/undercharge problem is solved by a true-up mechanism called the "Fuel Stabilization Rider", which kicks in when the accumulated difference between actual fuel costs and forecast fuel costs exceeds $2 million.

- ***O&M, Management, Administration***

Distribution O&M expenses include the cost of labour, contractors, supplies, travel and accommodations, etc. General and Administration includes utilities, rental, taxes other than income, head office expense, etc. The forecast of these items is based largely on an assessment of the prior year's actual costs, adjusted to reflect known or anticipated changes for the forecast year(s).

- ***Depreciation***

NPC shows all costs—including the cost of money and reduced value of used plant and equipment

Depreciation reflects the cost of wearing out the generators, lines, and other facilities used to provide power to customers. The idea is to recover the cost of the item over its useful life. So, for example, the cost of a personal computer might have to be recovered in three years while the cost of a diesel generator could be spread over 30 years. The shorter the recovery period, the higher the rates have to be for that period to recover the cost. Consequently, the URRC has to review proposed depreciation rates to ensure they are reasonable and the company isn't trying to recover costs too quickly or slowly.

- ***Cost of Capital***

This is a difficult cost to explain. Essentially it is the cost of getting the money needed to fund operations (working capital) and to repair and upgrade the system. The money may come from lenders (debt) or from shareholders (equity). To get money from them, the lenders have to be paid interest and the shareholders have to be paid a reasonable return on their investment. That cost is the cost of capital.

As mentioned earlier, the assets NPC used to supply power last year were valued at roughly $86 million. That represents $86 million of capital invested in NPC. In determining the cost of that capital the most common approach is to consider the total amount to be financed 60% by debt and 40% by equity. The cost of capital for debt is whatever the lender required—today it might be in the range of 7%. The cost for equity is whatever is reasonable considering the risk of the investment—for NPC today probably something in the range of 10%. While the debt cost is determined by the open market, deciding what is a fair return on equity is usually left to the regulator. To decide what is fair, the regulator looks at the earnings the shareholder would expect to receive for investing in something of comparable risk.

Once the total cost of providing service for the year is determined, the next step is to design rates that can be expected to recover that amount over the year.

How power rates are set

The URRC decides if proposed rates fairly recover the total cost of the service

Rates are designed so that they will recover the total cost of providing the service, they will allocate costs fairly between different types of customers, and they will encourage wise use of an expensive product. To accomplish these goals the utility has to know what it costs to serve each type of customer. It gets this information through a detailed cost of service study. The study allocates costs to each customer class and rates are then designed so that the amount recovered from each class will be roughly what it costs to provide service to that class. The company then prepares a comprehensive rates proposal setting out in detail why the proposed rates are fair and why they are needed to recover the company's forecast costs.

The rates proposal goes to the Minister responsible for NPC for approval. Before granting approval, the Minister sends the proposal to the Utility Rates Review

Council (URRC) for review. The URRC reviews the evidence supporting the proposed rates, considers the views of independent experts and consumers, and provides a recommendation to the Minister as to whether the proposal should be accepted, rejected or modified. It is up to the Minister to decide what to do with the advice, but if no decision is made with a specified time limit the URRC's recommendation takes effect as if it were a Ministerial decision. A similar procedure applies for approval of projects costing more than $5 million. The diagram below shows graphically how the process works. The circled numbers show the flow of the process.

Overview of NPC Rate Setting Process

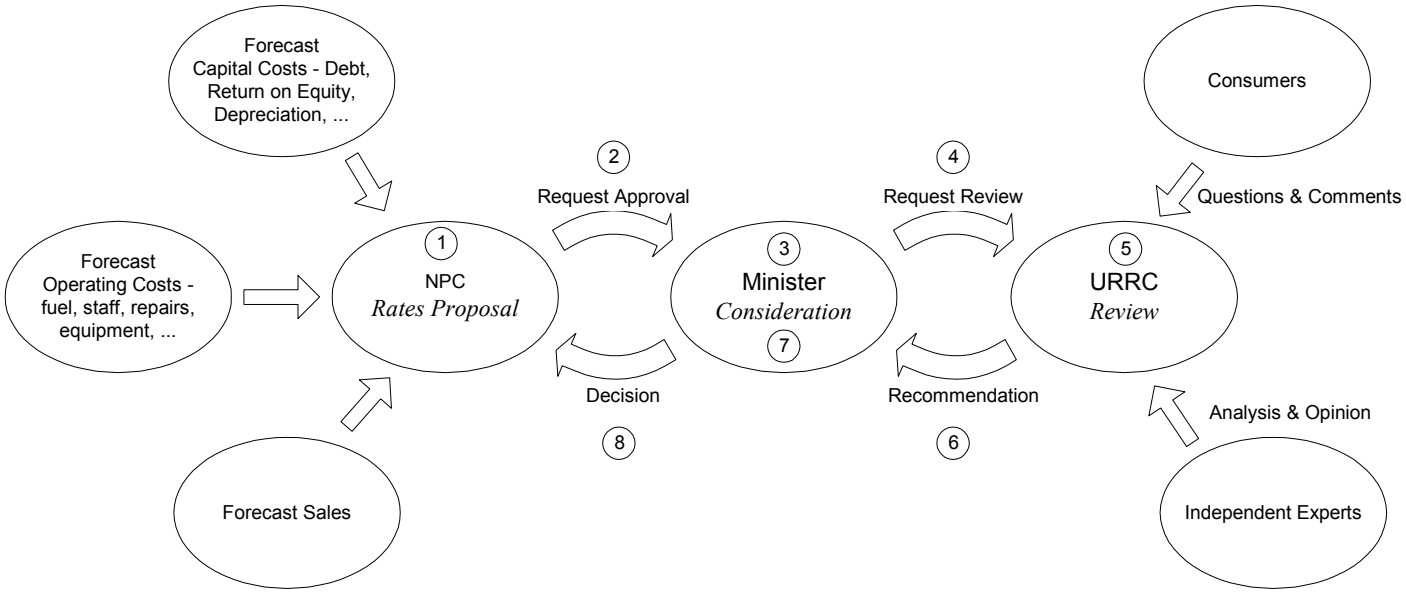


Figure 2 NPC Rate Setting Process

2.3 Petroleum Products Supply

(1) Introduction

NPC is a GN owned company; PPD is part of a GN Department

Fuel products are imported into Nunavut by the Petroleum Products Division (PPD) of the Department of Public Works and Services (Public Works) and the Nunavut Power Corporation (NPC). The PPD supplies heating, diesel, aviation fuel products and gasoline to all Nunavut consumers, including NPC. However, NPC also imports bulk fuel for diesel generation into selected communities. In this section we will review how these two agencies acquire, price, store and distribute fuel in Nunavut and the various issues associated with these tasks. We end the section with a summary of similarities and differences in how the PPD and NPC manage their fuel and in the structures, policies and legislation under which they operate. Appendix D contains a detailed discussion of PPD operations and issues.

(2) Petroleum Products Division (PPD)

Overview

The PPD supplies petroleum products to all of Nunavut

The PPD has the mandate to supply and deliver petroleum products in all Nunavut communities not served by the private sector. Products may include heating fuel, motive gasoline and diesel fuel and may also include aviation fuel products. In Cambridge Bay and Iqaluit, the fuel services have been highly privatized, but the PPD still retains a key role in these locations. In many communities, the PPD also sells naphtha gas in containers, used primarily for hunting and trapping. In six communities NPC arranges for all or part of its own supply of diesel fuel. However, in most locations NPC purchases the fuel it needs for the generation of power from the PPD.

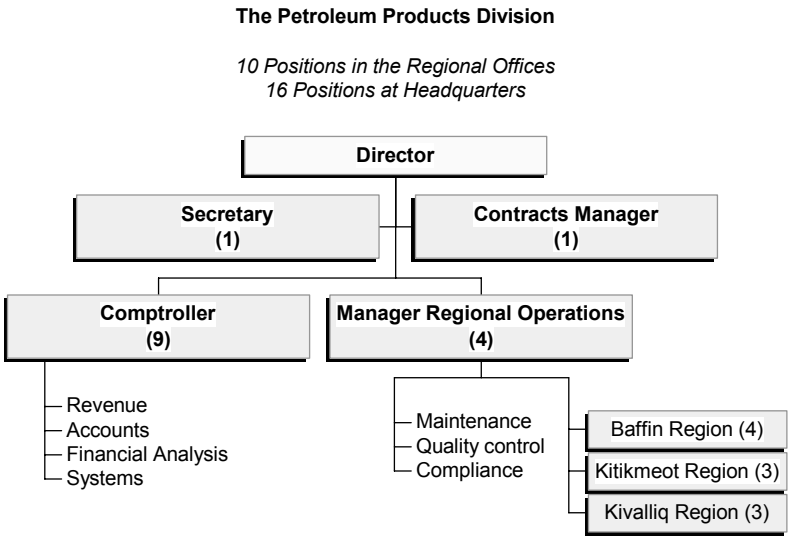


Figure 3 PPD Organization Chart

A Department With a Difference

The PPD operates in a manner similar to all other government departments, responsible to a Minister and the Legislative Assembly. The PPD is headquartered in Rankin Inlet with additional staff in each of the three Public Works regional

offices. Regional offices are located in Cambridge Bay, Pond Inlet and Rankin Inlet. The Director of the PPD reports to the Deputy Minister of Public Works.

Normal GN funding doesn't apply to the PPD—it has its own revolving fund

The difference between the PPD and other Government departments is in how they budget and finance. Whereas most GN departments have an appropriated budget approved during the legislative assembly budget process, the PPD operates with a Revolving Fund. Only PPD Capital Expenditures are voted as part of the GN Main Estimates, the same as done for other Departments. We will discuss the Revolving Fund in more detail later in this section.

Previous Studies and Reports

There have been several studies done on the PPD by both the GNWT and the GN. There were studies of various privatization and corporate options for the PPD including options to combine with the NTPC/NPC and studies of PPD operations. Two of these most recent studies were used as a source of key information for this report. In 1997, the GNWT completed a comprehensive study intended to result in privatization of the PPD[2]. The study concluded that total privatization was not in the best interests of the consumers of the GNWT, but that a certain level of increased "Commercialism" was desirable where increased commercialism meant lower government involvement and higher involvement by the private sector. Continuing government involvement in the PPD was considered essential for the long-term security and price protection.

There have been several studies & Reports on PPD operations

In August 2000 the GN Financial Management Board requested a Financial Operations Review[3] of the PPD. The review determined that a number of changes were required in the business practices of the PPD if significant price increases were to be avoided and the supply secured. In 2000 the Ikuma Report[4] recommended the establishment of the Nunavut Power Corporation and for future consideration, the combining of the power and fuel service providers.

PPD Operations

Annual Re-supply

PPD has a different re-supply strategy for each of the 3 regions

Throughout Nunavut, the fuel needed for all services must be delivered to the communities during the summer months. The PPD arranges for this re-supply with multi-year contracts for the supply and transportation of the fuel to each community. There are three main re-supply strategies with Kugaaruk having a unique arrangement:

- ***Eastern Arctic (Baffin) Re-supply***

The PPD currently contracts with Northern Transportation Company Ltd. (NTCL) for deliveries by deep draft tankers. Fuel is loaded at any number of ports in North America or offshore and delivered directly to each community. Fuel for Sanikiluaq is first delivered to Churchill, Manitoba for barging to the community. Repulse Bay is served through the eastern arctic re-supply, even though it is a Kivalliq community.

[2] "Privatization of the Petroleum Products Division of the Government of the Northwest Territories", Roland C. Bailey and Associates, November 1997

[3] "Financial Operations Review of the PPD", August 31, 2000

[4] "Ikuma Report", January 2000

- ***Kitikmeot Re-supply***

Fuel is railed to Hay River from southern Alberta and then barged down the Mackenzie River by NTCL to the Arctic Coast and the Kitikmeot Region. Tugs and shallow draft barges are used to carry the fuel, and dry cargo is usually carried on the same barges. As only NTCL has the required equipment on the Mackenzie River, prices are usually negotiated and do not have the benefit of competitive bidding. With the current contract NTCL supplies the fuel FOB community; that is, the NTCL assumes all responsibility for purchasing the product, temporary storage if required, and rail and barge transportation to the community.

Re-supply Region	Total Volumes - All Products (millions litres	Transportation Costs (cents/litre)
Eastern Arctic (Baffin)	31.9	7.41
Kitikmeot	12.0	35.3
Kivalliq	27.7	12.1
Total/Average	71.6	13.9

Table 3 Regional Re-supply Transportation Costs

- ***Kivalliq Re-supply***

Fuel may be either railed to the port at Churchill, Manitoba or delivered to Churchill by deep draft tanker. Under the current contract for the eastern arctic, NTCL delivers the Kivalliq fuel to Churchill. At Churchill, the fuel is temporarily stored in privately owned fuel storage facilities before shipment by NTCL barge up the Hudson Bay coast to the Kivalliq communities. Fuel is also delivered to Sanikiluaq in this way.

- ***Kugaaruk***

Kugaaruk, being a difficult, ice-bound port for normal cargo and tanker ships, has a unique re-supply arrangement. The GN contracts with Canada Coast Guard to shuttle fuel and dry cargo to the community by ice breaker, from locations accessible by conventional ships. About 75% of the community's diesel/heating fuel is delivered this way. The fuel is delivered to the high arctic through the eastern arctic re-supply and transferred to the Coast Guard icebreakers near Nanisivik. Dry cargo is delivered directly to the docks at Nanisvik by the "Sealift" and transferred to the icebreakers for the trip into Kugaaruk. The icebreakers have limited capacity for diesel fuel, and gasoline cannot be carried at all, so 25% of the diesel and 100% of the gasoline supply is airlifted to Kugaaruk from the PPD storage facility at Hall Beach. As the table shows, there are significant differences in the costs of fuel delivered to the three regions.

Community Delivery

The PPD uses local contractors to deliver fuel in the communities

In each community the PPD has a contract in place for the delivery of fuels. These contracts provide for the trucked delivery of heating fuel to each building, trucked delivery of jet fuel to the airport, or delivery of diesel fuel to NPC. Delivery to NPC may be using a delivery truck or by permanent pipeline. In Iqaluit and Cambridge Bay, the contractors have assumed more responsibility than in the others. However, with the above exceptions, the PPD still retains considerable responsibility in the day-to-day community operations. In particular, the PPD owns, insures and finances the bulk fuel inventory as well as handling the billing and accounts receivables for all local deliveries. In Cambridge Bay, the contractor owns the bulk fuel facilities. In all other communities, the GN owns the facilities, including Iqaluit where the GN facilities are leased to the local operator. The operator is responsible for all

maintenance and repairs whereas in all other communities, the GN facilities are maintained by Public Works on behalf of the PPD. In all communities, tank trucks are required to take fuel from the bulk storage tanks to each customer. In most cases, the trucks are owned by the PPD and leased to the local agent as part of the agency contract. Under the lease, the agent is responsible for all maintenance and repairs, but the PPD retains responsibility for replacement of the vehicles as required.

Community Infrastructure

PPD has $87 million worth of tanks, pipes and distribution facilities

The PPD assets include fuel storage and distribution facilities, airport fuelling installations and delivery trucks. The book value of the petroleum products infrastructure is $87.2 million. Not included in the value of the assets is the land occupied by this infrastructure. Lands occupied by fuel facilities has been reserved for this purpose and are exempt from the provisions of the Nunavut Final Agreement (NFA) which require a transfer of GN lands to the municipalities. The PPD plans new and replacement infrastructure and upgrades to existing infrastructure through the GN capital planning process.

The operation and maintenance (O&M) of community infrastructure is shared between the local PPD agent and Public Works O&M forces. Generally, the local PPD agent is responsible for the routine operation and security of the facilities whereas Public Works is responsible for maintenance and repairs. Public Works may contract for such repair services either locally or regionally, or use its own forces.

Privatization

Delivery is more privatized in some communities than in others

The GN fuel services are highly privatized. Contracts are let for the supply and transportation of bulk fuel to each community, and delivery services in the communities are all achieved through contracts and leases with private businesses. The planning, design and construction of major works is done through various contracts with a GN Project Officer overseeing the projects. Public Works O&M forces contract for much of the maintenance and repair of community infrastructure. The PPD retains responsibility for ownership of the bulk fuel, ownership of the infrastructure and managing the billing and accounts receivable. In two communities (Iqaluit and Cambridge Bay), the ownership, operation and maintenance of the infrastructure are handled differently than in the other communities. In these two communities, the level of privatization is much greater, and the infrastructure is treated differently in each case.

- ***Cambridge Bay***

  The infrastructure is privately owned, operated and maintained by Kitnuna, and the PPD role is limited to selling bulk fuel to the owner at re-supply and "regulating" the fuel selling prices. Actually, the PPD has no official mandate in Cambridge Bay and the current agreement serves only as a means to subsidize the Cambridge Bay consumers.

- ***Iqaluit***

  The GN retains ownership of the land and infrastructure, but has leased the properties to Uqsuq Petroleum. In addition to about 65 million litres of bulk storage, there is also an extensive airport distribution and dispensing system included in the assets. The lessee owns all mobile equipment.

Operational Issues

There are a number of operational issues that have been identified and discussed in the various studies and reports of the PPD. The Ikuma II Working Group has considered each of these issues in preparing recommendations for the future of the PPD. A detailed assessment of these issues is included in Appendix D. We will, however, briefly highlight some of the key issues to illustrate why tracking all costs is essential if the GN is to manage its energy costs.

Environment

- ***Soil Remediation***

Cleaning up fuel storage sites will be expensive

Many of the PPD fuel facilities are over 30 years of age and the possibility of environmental damage from leaks and spills over the years is considerable. In 1995 the GNWT initiated comprehensive environmental assessments at all the PPD facilities. The intent was to determine the scope of environmental damage and estimate the cost to correct these damages. Assessments have been completed for all of the PPD's fuel storage sites in Nunavut. A total of 17 sites have been identified as requiring soil remediation for a total estimated cost of $4.22 million over 10 years. The current PPD Capital Plan includes $545,000 for remediation in fiscal year 2002-2003. Although the capital plan does include these projects, Public Works is reviewing the source of funding for all environmental remediation. If the costs are included in the capital plan and funded by the GN, this would be a subsidy to the fuel services. If funded from the Revolving Fund, the costs would be added to the price of fuel.

- ***Canada Shipping Act***

Changes in the Shipping Act will create significant new fuel shipping costs

In 1995, amendments to the *Canada Shipping Act* required increased levels of training, qualifications and experience for the operators of shore-based fuel facilities and apply minimum standards for the design and construction of new facilities. As well, the Act now requires the implementation of enhanced spill prevention and containment measures. That will require a significant expenditure in new equipment at each community. Note 12 of the PPRF's 2001 financial statements states:

> The Canada Shipping Act requires owners of oil handling facilities to develop polices and procedures and to provide resources to cope with potential oil spoils resulting from offloading of petroleum products from a marine vessel. The Government is exempt from this legislation but has agreed to voluntarily comply with it. Management is jointly developing a compliance plan in partnership with the Northwest Territories Power Corporation (sic NPC) and the Canadian Coast Guard. The costs to implement the compliance plan are not available at this time.

The current PPD capital plan includes $545,000 over the next five years for spill prevention and containment equipment and training. However, this is a preliminary budget only. Consultation with NPC and the transportation companies is required to establish a cost-sharing plan.

Product Pricing and Subsidies

In analyzing the pricing of petroleum products, three key issues need to be addressed—price structure, hidden subsidies and rate regulation.

Pricing issues: price structure, hidden subsidies, price setting

- ***Price Structure***

The prices charged do not reflect the actual cost of service in each location, nor do they reflect a deliberate policy to cross-subsidize according to specified criteria. The prices have not been rationalized for several years.

- ***Hidden Subsidies***

The GN is subsidizing all consumers for all products sold. However, the subsidies are neither budgeted nor disclosed and neither the GN nor its customers are aware of the value of these subsidies. To be able to make informed decisions regarding fuel and energy policies the true costs must be known. Subsidies normally target certain customer groups only.

- ***Rate Regulation***

The rate setting and adjustment process must be able to respond to the fluctuating cost of fuel on the international market. Rates must be set to recover the full cost of service to avoid exceeding the limits of the Stabilization Fund and putting the PPD in financial difficulty.

Re-Supply Strategies

The geography creates high re-supply costs—consolidation may reduce costs

The cost of transporting fuel to most of the Kitikmeot and Kivalliq regions is extremely high. This is partly due to the natural difficulty in servicing these areas and partly due to the lack of competition in the transportation sector. It has long been accepted that because of the comparatively small volumes of fuel and dry cargo being imported into Nunavut, economies of scale could only be achieved through a consolidation of efforts of all major participants. A plan of action may be to:

- ***Investigate alternative re-supply strategies***

  This may involve the charting of new navigation routes and investigating the feasibility of re-supply hubs or terminals.

- ***Consolidate Volumes***

  NPC and PPD both import fuel into Nunavut, quite often to the same locations. Consolidating the volumes of these agencies for the letting of contracts may achieve more favorable pricing and delivery services.

- ***Consider Dry Cargo and Fuel Together***

  In the Kitikmeot and Kivalliq, fuel and dry cargo share the same transportation infrastructure to most locations. The rates for these commodities are interdependent such that removing the fuel from this traditional re-supply may very well impact on the costs to deliver the dry cargo. Dry cargo includes construction and maintenance materials, household furniture and appliances, vehicles and heavy equipment and certain foods. Therefore the GN has an interest in keeping the dry cargo rates affordable as well as the transportation costs of fuel.

Land

Restructuring fuel delivery will raise land issues

There are some legal issues associated with the lands used for fuel storage and dispensing. These issues need to be addressed before the PPD Lands can be legally surveyed for registration with Land Titles.

- ***Easements***

  Pipelines run from the shore to the fuel storage tanks and are used for filling the tanks each year. There may also be pipelines connecting the fuel tanks to NPC storage tanks. Some of these pipelines cross private land without permission.

- ***Encroachments***

  Some tank facilities may be encroaching on private and perhaps Settlement Lands.

- ***Shared Facilities***

  In some communities, NPC owned storage tanks are located within the PPD fuel facility. These occupancy arrangements need to be defined and documented.

- ***Nunavut Final Agreement (NFA)***

  The NFA requires all GN lands be transferred to the municipalities. PPD lands have been excluded from this transfer. However, not all lands occupied by PPD facilities have been registered for exclusion.

Fuel Pricing and Subsidies

The Revolving Fund

PPD operations are funded through the Revolving Fund

Nunavut inherited the Petroleum Products Revolving Fund (PPRF) from the NWT. The NWT legislation establishing the Fund was later amended to include the Petroleum Products Stabilization Fund (PPSF). The *Revolving Funds Act* in force in Nunavut today specifies:

- PPD must operate on a "break-even" basis,
- The Revolving Fund must not exceed $55 million,
- The Stabilization Fund permits a difference between costs and revenues of plus or minus $5 million to accommodate fluctuations in costs and preclude the need for frequent price adjustments.

Consequently, the prices for the fuel sold must be set to earn sufficient revenue to cover all PPD costs. Fuel prices are generally recommended by the PPD and approved by the GN Financial Management Board (FMB). The table on the right shows the usual elements included in the calculation of the cost of each product at each location. The "average cost per litre" is an average of all products in all communities provided here for illustration purposes only. For the highly privatized

Cost Elements	Community Actual or Average	Nunavut Ave. Cost ¢ per Litre
Product Price	Actual	31.0
Transportation	Actual	13.9
Delivery Commissions	Actual	5.3
O&M (PPD & Facilities)	Average	2.7
Shrinkage	Average	0.5
Total Average price		53.4

Table 4 Community Fuel Pricing

communities of Iqaluit and Cambridge Bay, the price structure and means for adjustment is set by the services agreement in place. Adjustments to the prices are usually addressed separately from price adjustments at the other Nunavut communities.

Matching Prices and Costs

PPD prices may not reflect the cost of supplying the product

Although the actual PPD costs include all the various components itemized here, the prices for each community are not calculated individually. In most cases, the costs are averaged, or over time have been simply adjusted repeatedly with "across the board" increases such that community prices charged do not reflect the actual costs for that community. Because there are substantial differences in the transportation costs between regions, the fuel prices may include "cross subsidies" between communities. In other words, communities where the actual costs are higher, may be subsidized by communities where the costs are lower. These subsidies have been allowed to develop over time and are not clearly stated in the price tables.

From a cost recovery perspective, there are problems with the present system of setting prices. There is a general reluctance to increase prices, even under the pressure of rising world prices of fuel. This reluctance to promptly raise prices to match costs has caused considerable financial problems for the PPD as reported in the Financial Operational Review. There is no formal pricing policy and as a result, the prices have not been rationalized for several years. Using the FMB as a price regulator is a cost effective approach, but the rate setting and rate review process needs to be better defined and streamlined to respond to the fluctuating nature of fuel costs.

The Auditor General's Report

The Auditor General has noted hidden subsidies—the difference between prices and costs

While the PPD prices are intended to recover all of the expenditures charged to the Revolving Fund, there are a number of expenditures, which are a true cost of doing business, but are not charged to the Revolving Fund and therefore not included in the fuel prices. This problem was noted in the Auditor General's recent *2001 Report to the Legislative Assembly of Nunavut*. With regard to the reporting on the Revolving Fund, the Report commented:

> 29. **Revolving fund financial statements leave out significant costs.** This is true of all revolving funds. However, it is most important in this case of the Petroleum Products Revolving Fund because:
>
> - it is the largest revolving fund in Nunavut
> - it delivers an essential service to Nunavut residents
> - its tank farms are worth a lot of money
>
> 30. The PPRF's tank farms consist of equipment and tanks that store fuel for sale to residents. The tanks can last for many years, but each year they get older they will lose some value. This is called *amortization*. The value the tank farms lose each year is part of the real cost of providing fuel, but PPRF does not include these amortization costs in its financial statements.
>
> 31. If it costs the government more to provide fuel than its fuel revenue, it loses money. It then has to use other government money to subsidize the loss. This money could be used for other purposes.

> 32. Fuel prices are vitally important to Nunavut residents. The size of the government's subsidy of the PPRF prices is important to the public. PPRF's March 31, 2000 financial statements show that in 1999-2000 the Fund lost about $300,000. This means that general government revenues subsidized fuel prices by $300,000. However, the cost of tank farms and the cost of financing inventory and tank farms (the interest costs) are paid by other government departments, and they are not shown as PPRF costs. These costs bring the actual subsidy to over $3 million and this should be shown in PPRF's own financial statements.
>
> 33. In the fall of 2000, rising fuel prices world wide led the government to raise PPRD prices. We are not suggesting that the government increase fuel prices further. That decision is up to the government. What we do suggest is that the PPRF accounting be changed to include all costs—including amortization—associated with the government's sale of fuel. This will show the Legislative Assembly the total cost of the fuel program.

We believe the model discussed later in this Report—creating a sister fuel corporation to NPC—would enable the GN to address the problems identified by the Auditor General.

Quantifying Hidden Subsidies

Product prices don't recover fuel supply costs such as capital, environment, and insurance

The Auditor General commented that actual subsidies for fuel would likely exceed $3 million based on two hidden subsidy components alone—amortization and inventory[5]. Our calculation is that the total actual subsidy when all components are considered is closer to $10 million. These details of these "hidden subsidies" are discussed in Appendix D. They include the following:

- ***Capital Amortization***

The PPD has assets that cost $87 million, but have been amortized over their useful lives to a current net book value of about $60 million. The amortization is an expense to the GN.

- ***Cost of Debt and Equity***

The GN is entitled to a return of the cost of financing the capital plan and a fair return on its investment in capital assets and working capital. The PPD purchases the total annual fuel supply in the summer for sales throughout the year. There is a cost to the GN to finance the inventory through the Revolving Fund.

- ***Environmental***

Site assessments have determined that the GN must spend approximately $4.2 million over the next 10 years to remediate soil contaminated by fuel spills and leaks. If these projects are included in the GN Capital Plan or some other appropriated budget and not charged to the Revolving Fund, the project expenditures will be a subsidy to the fuel rates.

- ***Insurance***

The GN self-insures for environmental contamination and certain other coverages. As discussed above in "environmental", the source of funding needed for any damages would determine if there was a subsidy nor not. The GN also purchases general insurance for all GN assets. This is "blanket coverage" and applies to all GN assets; premiums cannot be easily attached to individual assets. The PPD is charged

[5] For utilities, the terms "depreciation" and "working capital" are more commonly used.

about $57,600 per annum for general insurance coverage, but the full value of this coverage is estimated to be much higher.[6]

- ***GN Support Services***

Being a Division within a GN department, the PPD receives support services at no cost from several GN departments and the Auditor General for Canada (AG). These services may include legal, finance, audit, human resources, project management and facility maintenance management.

Combined Subsidies

The GN provides over $10 million in services not recovered in PPD prices

The table on the right shows the estimated cost to the GN of each of the subsidies discussed above. These are not "hard" numbers, but they are reasonable estimates. They show that removing hidden subsidies could increase the average price of fuel by 14 cents/litre.

Subsidy	Estimated Value	
	(Millions)	(¢/Litre)
Capital Amortization	$1.58	2.2
Cost of Debt & Equity	7.20	10.0
Environmental	0.42	0.5
Insurance	0.32	0.4
GN Support Services	0.64	0.9
Totals	$10.16	14.0

Table 5 Hidden Subsidies

(3) NPC

Procurement

NPC buys 36 million litres of fuel from 3 suppliers—55% from PPD

NPC uses about 36 million litres of diesel fuel annually. This fuel is acquired in three ways:

- About 12.0 million litres (34%) is purchased directly from Woodward's Oil Limited for plants in the Baffin and Kivalliq Regions and delivered to Iqaluit, Igloolik, Rankin Inlet, Chesterfield Inlet, and Arviat. The direct re-supply of the Kivalliq Region from the east coast avoids the complex and expensive method of the traditional Kivalliq re-supply with considerable cost savings for NPC. The balance of the fuel needed in these regions is purchased from the PPD.
- About 3.8 million litres (11%) is purchased directly from NTCL for Kitikmeot Region plants and delivered to Kugluktuk, Cambridge Bay, and Taloyoak.. The remainder of the requirement is purchased from the PPD.
- About 20.1 million litres (55%) is acquired from the PPD or PPD agent in all remaining communities. The PPD also supplies NPC fuel in some of the communities listed above where NPC does not have sufficient storage capacity. The PPD delivers fuel to NPC by truck or pipeline. Each year, NPC will advise the PPD of its fuel requirements to enable the PPD to establish its re-supply volumes for each community. This amount of fuel is then "nominated" for purchase by NPC "as and when" required.

[6] The Privatization Study estimated the probable value of general insurance for Nunavut operations to be at least $382,000.

Fuel Costs and Consumption

Rough numbers—1/4 of imported fuel is for power; 1/2 price of power is for fuel; 1/3 NPC fuel is burned in Iqaluit

In discussing NPC earlier in this Report we dealt with the amount of fuel it used, what it cost, and how those costs were passed on to consumers. To recap: NPC uses 23% of the diesel fuel imported into Nunavut[7]; this fuel accounts for 51% of the cost of electricity; and although fuel cost is such a large component, a Fuel Stabilization Fund keeps oil price changes from causing immediate changes in electricity rates. The other major component of fuel costs for NPC is transportation. The cost of fuel supplied by the PPD varies depending on location and the method[8] and timing of delivery as illustrated in the table below.

From an energy planning perspective, the other point worth repeating is that over 1/3 of the fuel used by NPC is used to provide power for Iqaluit. Consequently the search for energy savings and alternate energy sources should start there.

Cost Components	Direct Re-supply by NPC	Supplied by PPD		
		Pipeline at Re-supply	Pipeline At Year	Truck Delivery
Fuel Cost	X	X	X	X
Transportation	X	X	X	X
Commissions			X	X
O&M			X	X
Shrinkage			X	X

Table 6 PPD Delivery Cost Components

[7] Excluding fuel used by the mines. We have no information on those quantities.

[8] Note that commissions for pipeline deliveries are different than for truck deliveries.

2.4 Comparing NPC and PPD

NPC and PPD provide some similar services, but differ in structure, financing and rate setting

Both NPC and the PPD handle a significant volume of fuel. The PPD is in the business of supplying fuel to all Nunavut consumers, including NPC. Last year, the cost to purchase fuel and transport it to the communities accounted for about 84% of PPD operating expense. NPC, however, acquires fuel primarily for the generation of electrical energy for resale to the same Nunavut consumers. The cost of fuel for NPC accounts for about 51% of the cost of electricity[9] and therefore NPC is acutely aware of fuel costs and fluctuations in these costs and is extremely sensitive to reliability and security of supply. Both NPC and the PPD import bulk fuel into Nunavut and both agencies own, operate and maintain bulk fuel storage facilities in all Nunavut communities. The two agencies operate in parallel in providing customer support, invoicing their customers and receiving revenues from sales. In this section we will review the various aspects of the fuel business with respect to both NPC and PPD.

(1) Structure

The PPD is a Division within the GN Department of Public Works and Services (Public Works) and operates within the policies and procedures of the GN. The operating budget is established within the PPRF and the capital budget is approved by the Legislative Assembly. The PPD acquires support services from several GN departments and other Divisions within Public Works. NPC is a Crown corporation owned by the GN with a Board of Directors to set policy and to direct operations. The Board is appointed by the GN Minister responsible. NPC supplies most support services from within and contracts the balance. The PPD is headquartered in Rankin Inlet with additional staff in regional offices responsible for field operations. NPC is headquartered in Baker Lake, also with staff in the NPC "Area" offices.

(2) How They Get Their Fuel

NPC and PPD have some similarities in fuel purchasing, storage, and delivery

NPC acquires 55% of its fuel from the PPD through its community agents or private operators. It acquires the remainder of its fuel through an annual re-supply in a manner almost identical to that used by the PPD. Both have contracts for the supply and transportation of fuel to Nunavut communities. In the Kitikmeot, NPC and PPD use the same company for supply and transportation, the NTCL. Whereas NPC purchases only bulk diesel fuel, the PPD purchases diesel, turbo fuel and gasoline in bulk.

(3) How They Store and Dispense Their Fuel

NPC

NPC bulk storage tanks for diesel fuel may be located adjacent to the powerhouse or at some distance within a separate fuel facility. In some cases, the NPC tanks may be located within the perimeter of the PPD storage facilities. The construction of many of the existing storage facilities was managed by Public Works on behalf of

[9] Based on NTPC's 1997/98 General Rate Application as approved by the NWT Public Utilities Board in Decision 1-97 dated January 14, 1997. Current data for NPC should be similar, but will not be available until NPC files a rate application.

the NTPC/NPC and therefore the standards and specifications for these are identical to PPD tanks. Where the main storage is some distance away, NPC will also have short-term storage capacity adjacent to the powerhouse. These smaller tanks will be filled from the main storage by pipeline or by truck delivery, depending on the community. NPC requires sufficient fuel capacity on-site to last through any interruptions in delivery that may be caused by weather or equipment failures. All on-site storage is piped directly to "day-tanks" located inside the powerhouse. NPC will use its own forces or contractors for maintenance and repair.

PPD

NPC and PPD may use same land for tanks but have different delivery

The location of the PPD storage facility is dictated by availability of suitable land zoned for this purpose. Many fuel facilities that were originally located in central residential or commercial areas have been relocated to newly developed industrial areas. Access by pipeline for the annual re-supply, power for lighting and pumps, road access for truck deliveries and the safety and security of the community are important considerations. In some communities, there are privately owned "in-town" gas stations supplied by truck from bulk storage. With the exception of direct fill pipelines to NPC, all PPD deliveries are done by truck. Fuel is metered into the trucks at the storage facility and is metered again when dispensed into the customer's storage tank. The PPD acquires all maintenance and repair services from Public Works. Public Works may use own forces or contract for these services and all costs are charged to the PPRF.

(4) Fuel Pricing Policies

NPC uses an "all-costs" utility model for pricing—PPD uses government services model

The PPD and NPC each have different purposes when calculating a price or cost for fuel. The PPD is only in the business of supplying fuel products and is bound by GN legislation[10] to recover all Revolving Fund costs in the prices charged. NPC's main business is the production and sale of electricity. Under the *Utility Rates Review Council Act*, the URRC decides whether NPC's proposed rates are fair and reasonable taking into account "the cost of providing service, including related financing costs".[11] Consequently NPC must track all costs of providing the service—fuel, financing, operations and maintenance, etc. However, unlike the PPD, fuel costs for this purpose include only the purchase and transportation costs of product.

Costs Included - PPD

In calculating the cost of providing fuel service, and setting fuel prices, the PPD includes all costs incurred by the Revolving Fund. This includes the invoice cost of supply and transportation of product, O&M, administration costs, shrinkage and commissions paid to local agents. There are a number of other real costs of providing the service that are not included in the rates. These costs are generally referred to as "hidden subsidies" and may include the cost of working capital, insurance, debt financing and capital investment costs. These subsidies apply to all fuel sold and do not target any particular customer class. The hidden subsidies are usually not calculated nor disclosed in any PPD or GN budget, except that PPD

[10] The *Petroleum Products Revolving Fund Act (Nunavut)*.

[11] Under s.13.1 of the *Utility Rates Review Council Act* the URRC must also consider any factors set out in guidelines issued by Cabinet.

capital expenditures are subject to review and approval of the legislature. These capital expenditures, however, are not reflected in the fuel price structure. In selling fuel to NPC, the method of delivery dictates which costs are included in the selling price. Fuel may be delivered in bulk at re-supply, by pipeline during the year or by truck delivery as and when required.

Costs Included - NPC

NPC's approach includes costs not included in PPD's approach

NPC includes all costs of providing the electrical service in its rates. In addition to the cost components included in PPD prices, NPC also includes capital related costs (amortization on capital assets and capital financing costs) as well as a cost that represents a return to shareholders. However, in determining a cost of fuel for rate setting purposes, it is standard practice to use only the actual cost of purchasing the product and transporting it to the community.

(5) Rates Policies

There is a significant difference in the rates policies of the PPD and NPC. The PPD rates are different for each community and are based on a mixture of community specific actual costs and components that have been averaged for all Nunavut communities. Even with this structure the actual fuel prices charged do not agree with the structured price. For nearly every community, the price charged is either higher or lower than actual costs, because of cross-subsidies. The PPD has adjusted prices up or down in an effort to achieve social equity by setting prices to ensure that rates in smaller and less accessible communities remain affordable.

In Cambridge Bay and Iqaluit where the fuel services are highly privatized, the fuel rates are set within the terms of the agreements with the PPD, whether this be a lease or delivery contract. Even though there is a rate table specified in the agreement at Cambridge Bay, the contracts essentially require the GN to subsidize the prices there with frequent payments to the contractor from the PPRF.

NPC's rates reflect specific community costs—PPD's include less and average more

NPC rates are community specific; the electrical rate in each community is based on the forecast cost of service for that community. In determining "actual cost of service", however, NPC simply passes along what it pays PPD for fuel. Since fuel accounts for about 51% of the cost of electricity, and NPC buys over 55% of its fuel from PPD, the various hidden subsidies and cross-subsidies in the PPD rates affect the electrical rates. While the fuel component of NPC's rates is initially set to recover the community-specific fuel costs, NPC's fuel rate rider discussed below is applied uniformly to all communities, even though the increase or decrease in fuel costs may occur at selected communities. In effect, this creates some cross-subsidy in power rates until NPC's next rate adjustment.

For its next rates proposal, NPC may consider changing to a common or "postage stamp" rate, where the rate applied to a particular class of customer would be the same no matter where the customer is located in Nunavut. Changes would be subject to the rate setting process described below. NPC rates reflect the Territorial Power Support Program (TPSP) subsidies for certain private and commercial customers. The TPSP is funded by the GN. However, unlike the PPD fuel price subsidies, the TPSP is well documented. It targets selected customer classes, these customers are aware of the subsidy, and the costs are disclosed by the GN.

(6) Rate Setting and Regulation

PPD rates are not subject to independent review

NPC rates are subject to a detailed review by the Utility Rates Review Council (URRC) and are set to be compensatory so that the utility recovers its costs from customers who gave rise to these costs. In addition, for NPC, the fuel component in the revenue requirement is set for each community based on the costs of procuring and delivering fuel to that community (under the community-based rate making concept currently in place). NPC rates are protected from excessive fluctuations in the cost of fuel by the Fuel Stabilization Rate Rider. Any changes to fuel costs exceeding a plus or minus $2 million threshold, are distributed on an "across-the-board" basis to the rates in all communities.

The PPD rates are subject to review and approval by the Financial Management Board (FMB). The PPD may request an adjustment in the rates at any time provided the request is done in the context of the PPD Revolving Fund and PPD Stabilization Fund. Generally, rate adjustments will not be requested by the PPD unless the stabilization fund is nearing the threshold limit of plus or minus $5 million. At that point, the FMB must either approve the rate adjustment or initiate changes in the legislation to increase the limit of the Stabilization Fund. The FMB may also direct financial reviews of the PPD with a view to reducing costs, but these are usually considered longer-term objectives and not a short-term solution to the immediate financial problem.

(7) Their Customers

NPC and PPD have similar customer costs—like billing

Nearly every customer of NPC also has an account for heating fuel with the PPD. Both agencies bill their customers for services provided and employ a system of accounts receivable. The PPD staff in Public Works regional offices receive the fuel delivery tickets from the delivery contractors for inventory reconciliation and batching. The tickets are then sent to the PPD headquarters in Rankin Inlet for data entry and generation of invoices. Approximately 1400 invoices are issued monthly. In the Kitikmeot region, data entry is done at the Regional office in Cambridge Bay. NPC has a similar system. A local NPC employee reads the electricity meters on each building and sends the readings to the Regional office for processing to create monthly statements and invoices. Both the PPD and NPC have dedicated computer systems for managing accounts.

In addition to those customers who purchase heating fuel for their buildings, the PPD also sells other fuels on account. Customers may include municipal, territorial and federal governments, airlines, NPC and contractors. Most purchases of gasoline or naptha by individuals are cash purchases.

(8) Conclusions

Are Fuel and Electrical Services Compatible?

To recap, the PPD and NPC have a number of key similarities:

- **Procuring and managing fuel is vital to both**—Pricing, security of supply and environmental risks are key areas of concern for both and in several situations they operate side by side in procuring fuel.
- **Both have facilities to store and distribute fuel**—Both operate and maintain bulk fuel storage and distribution facilities.

- **They share a customer base**—A large portion of the PPD customer base is the same as the NPC customer base. Both agencies provide utility services, issue invoices and collect receivables from the same customers.
- **The GN subsidizes the rates of both**—Although the subsidy programs are different, the GN subsidizes the rates of both fuel and electricity.
- **Both have a price stabilization mechanism**—Both operate with price stabilization mechanisms that help to avoid frequent rate changes.

NPC and PPD have similarities, but differ in structure, price setting, and subsidies

They also differ in several areas:

- **Legal structure**—The PPD is within a GN department whereas NPC is a GN Crown corporation. Financing of operations, financing of capital investment, accountability, policy development and overall direction differ substantially.
- **Price setting**—NPC electrical rates are subject to review and approval by an independent URRC. Currently, NPC rates are set separately for each community based on the actual costs of providing the service. The PPD rates are subject to review and approval by the FMB of the GN. There is no specific rate policy in place other than an intent to avoid excessively high costs in any particular location.
- **Subsidy funding**—The NPC subsidy program is a formally approved and funded program for which all costs are disclosed for approval by the Legislative Assembly. The NPC program targets certain customers for rate subsidies and these customers are aware of the value of the subsidy on each electrical invoice. The PPD subsidy is funded from a number of different sources within the GN and actual costs are neither disclosed nor calculated. These subsidies are applied to all customers, but the customers have no idea what the true cost of fuel is and the value of the GN subsidy.
- **Rate stabilization**—The NPC Fuel Stabilization Fund allows swings in fuel costs of plus or minus $2 million before temporary rate changes are applied in the form of a rate rider; further URRC approval is not required. The PPD Stabilization Fund has limits of plus or minus $5 million which applies to all costs of operations including the price of fuel. When the limit is reached, the PPD must request FMB approval of any rate changes or other initiatives that may be required to correct the problem.

Is the NPC Model Suitable for the PPD?

The Crown corporation utility model helps address management and hidden subsidy issues

The GN established NPC in its present form after a careful study of its options. It was determined that a GN Crown corporation with an independent rate review body (URRC) would best fulfill the GN objectives for an electrical service provider. The price subsidy program used for NPC (TPSP) tracks subsidies in a way that avoids the PPD's problems with hidden subsidies. The approach would work for fuel, but it needs changes so that the GN can control the amount of the budgetary impact of the subsidy. In our view, both energy suppliers should have the same subsidy system. We believe the GN can achieve economies and improve its ability to manage energy issues by restructuring the PPD as a sister corporation of NPC. The question of how this can be done is addressed in the Recommendations section.

3 ENERGY ALTERNATIVES

3.1 Overview of Problem

Uncontrolled dependency on imported oil will create environmental and financial problems

Nunavut is almost 100% dependent on imported fossil fuels for its energy needs. Fuels are used to generate electricity, to heat homes and other buildings and provide transportation services for goods and people. The cost of fuels imported into Nunavut is dependent on the world price of crude oil and there are indications these costs will continue to climb such that an increasingly large proportion of the Nunavut economy will be spent on energy. Later in this report we will see where over 20% of the GN budget is spent on fuel and electricity, directly and indirectly. In addition to the economic implications associated with fossil fuels as an energy source, there are also significant environmental implications. Transporting bulk fuel through icy Arctic waters and then discharging it at communities through floating hoses creates a risk of damaging spills. Storing a year or more supply of fuel within a community offers considerable potential for spills and leaks through equipment failure, accidents or human error. Loss of the supply could result in enormous environmental damages as well as damages resulting from loss of heat and electricity. While insignificant on a global basis, the burning of fossil fuels in Nunavut does contribute to the generation of greenhouse gases and global warming. This problem, known as climate change, is a very serious global issue and its impacts are already being experienced across the Arctic.

Addressing the oil dependency problem will take a total energy strategy

Efforts to date to reduce the consumption of energy and to reduce the dependency on imported fuel have been sporadic. The GN energy subsidy and payment policies are not always designed to encourage consumers to reduce consumption and consumers are not informed of the true costs of the energy they consume nor how to reduce their usage. Significant long-term research funding will be required to develop alternative energy sources. Also, GN energy policies must be designed to encourage conservation. In the meantime, the GN needs to streamline the procurement process for importing fuels to ensure stability of supply and keep costs affordable.

3.2 Use of Electricity

As indicated earlier in this report, 75% of NPC's customers are classed as Domestic (households) and the rest as Commercial (business and government entities). NPC has no industrial customers. Although they make up only 25% of the customers, the Commercial class uses 60% of the energy produced. Domestic customers use the remaining 40%. Commercial customers include schools, recreation

Table 7 Uses of Electricity

Domestic Uses
◦ Household Appliances—electric ranges, refrigerators, freezers, washers and driers, microwave ovens, toasters, televisions, computers, etc.
◦ Lighting—interior and exterior
◦ Vehicles—block heaters and interior warmers
◦ Small Motors—Forced air heating and water pressure systems
◦ Water pipe heat trace
Commercial Uses
◦ Lighting—interior, street and area lighting
◦ Motors—air change/make- up, refrigeration, pumps, compressors, and forced air/boiler heating systems, elevators
◦ Humidifiers
◦ Office Equipment—computers, communications systems, photo-copiers
◦ Cooking—restaurants and cafeterias, ranges, ventilation

centers, health centers, offices and garages. These facilities are heavy users of electricity. The table shows the main uses.

3.3 Energy Conversion

Almost 2/3 of the energy in imported oil is lost when converted to electricity—costing GN $12 million

Converting diesel fuel to electricity wastes a lot of energy. To understand the problem it is useful to consider the whole cycle from an energy perspective. The term "heat content" is commonly used to refer to the energy content of fuels and electricity, and, despite metrification, the common unit for heat content in North America is the "BTU", or "British Thermal Unit". The heat content of a litre of diesel fuel oil varies, but for the sake of an example we will take it as 33,000 BTUs. The heat content of a kilowatt hour (kWh) of electricity is 3,410 BTUs. The efficiency of a diesel generator is called the "heat rate"—it measures how efficiently a generator converts the energy in the fuel into electric energy. NPC's generators have an average heat rate of about 3.5 kWh/L. In other words, each litre of fuel fed into the generator produces 3.5 kWh's of electricity. From an energy perspective, 33,000 BTUs of energy[12] have gone into the generator and roughly 12,000 BTUs of energy has come out. In short 64%, almost 2/3, of the energy is lost. Put another way, most of the energy imported into Nunavut to produce electricity is wasted as heat escaping in the exhaust and engine cooling systems. The diagram illustrates the problem.

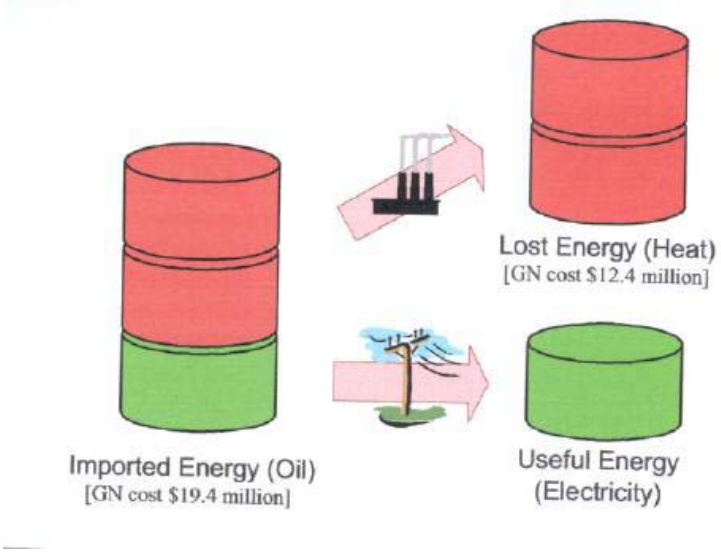


Figure 4 Diesel Generation Efficiency Problem

We estimate that last year the cost of this lost energy to the GN was over $12 million. That is $12 million literally "going up in smoke". The estimate is based on the following calculation. Last year NPC spent roughly $22 million on fuel. Assuming the GN ultimately pays about 88% of the cost of all power generated in Nunavut,[13] that fuel cost the GN about $19.4 million. If 64% of the energy in the fuel was lost in the conversion to electricity, the loss cost the GN about $12.4 million. This annual loss can never be eliminated—100% efficiency is impossible.

[12] The litre of diesel going in contains 33,000 BTU's of energy. What comes out is 3.5 kWh of electricity, each kWh containing 3,410 BTU's of energy. So the total energy out is 3.5 X 3,410 = 11,935 BTU's.

[13] See Appendix F, Schedule 4.

These losses can be reduced somewhat, by recovering and using waste heat for space and water heating.

3.4 Comprehensive Energy Strategy

Energy strategy—lower consumption, increase efficiency, use local sources, and tap Nunavut oil and gas

It is hoped this Report will provide a starting point for GN efforts to develop a comprehensive energy strategy. To be effective it will need to reduce annual energy and utility expenditures, reduce the dependency on imported fossil fuels and begin controlling greenhouse gas emissions. That will take a four-part strategy to

- reduce consumption,
- increase energy efficiency,
- develop local alternatives to imported fuel, and
- develop Nunavut's oil and gas resources.

These long-term efforts are part of the comprehensive energy strategy we discuss in the last section of this Report. There is a fifth component of the overall strategy, however, that the GN can act on immediately and that is central to this Report—reducing fuel costs by streamlining fuel procurement and distribution. We will look at each of these components briefly to see what role they can play in an overall strategy.

(1) Reduce Consumption

By far, the quickest reductions in energy can be achieved with the least expenditures through a basic energy management program. Such a program concentrates on those initiatives that require minimal investment in technology and infrastructure upgrades and can achieve significant, early results. Long-term funding support for a program aimed at all energy consumers is key.

Awareness and Education

Reducing use takes a coordinated pricing, subsidy and education strategy

It is important that the consumers know what it costs for the energy they consume, the financial and environmental implications of wasting energy and what they can do to help reduce consumption. There are a number of ways of communicating these costs to consumers.

Subsidy Programs

Subsidies for electricity and fuel consumers need to be highly visible such that the consumer knows what the services really cost and just how much the GN is contributing. Subsidy programs should be designed to encourage conservation, such that if the consumer reduces energy use the costs will go down for both the consumer and the GN.

Education

Including energy conservation in the elementary school curriculum introduces the concepts early. These lessons can be carried over to the home situation. The invoices for electricity and fuel, issued to the consumers by the utilities, can include subsidy information along with simple tips on reducing energy. Similar information presented on television and in the newspapers will help gain broad exposure.

User Pay

Consumers need incentives to use energy wisely

Where the consumers of energy have a responsibility to pay for all or part of the energy they use, they will be more likely to conserve. This applies to residents of privately or GN owned homes as well as to the program departments occupying GN commercial buildings. Subsidy policies and policies for the budgeting of O&M for public buildings can include user pay initiatives. Building designs, especially multi-family housing units, can help initiate the user pay concept. Common utility systems where costs are pooled can be avoided in favour of each housing unit being metered separately for electricity and water and containing their own heating plants for space heat and domestic hot water,

Training

Public buildings must be designed and run for maximum energy efficiency

It is important that building operators, custodians and maintenance people are familiar with energy conservation techniques and apply these in their work. Large facilities such as schools, health centers and recreation centers are huge consumers of energy and these facilities generally include complex heating, ventilation and lighting systems. These systems must be set and maintained correctly to minimize energy use. To be most effective, the building users must also be aware of how scheduling and use of the facilities effects energy usage and costs.

Financial Assistance

Grants to aid purchase of energy efficient products may save money

Small businesses and private homeowners or renters may be receptive to offers of financial assistance to implement energy conservation measures in their homes and businesses. Assistance in the purchasing of energy efficient light bulbs, weatherstripping and programmable thermostats represent minor expenditures that achieve positive economic returns. Replacing electric hot water heaters with fuel-fired heaters and replacing inefficient oil furnace burners with high efficiency units are more costly investments in which the GN might make a contribution.

Conservation Measures

Energy initiative should consider successful strategies used elsewhere

There are a number of strategies to reduce energy consumption that have proven effective elsewhere. They would require communication with consumers through various education and awareness programs, as well as direct involvement by the GN. Some basic initiatives are listed below.

Energy Audits

Through an energy audit program, the GN or utility provider may offer audit services to homeowners, businesses and to all levels of government. The purpose of an energy audit is to identify how energy use can be reduced in a particular building or facility. Usually there are three levels of audit. These are intended to recommend:

- Measures that can be implemented immediately through building operations and maintenance. These may include improved maintenance, equipment adjustments, turning off lights in unused areas, scheduling ventilation systems to run during occupied hours only, reducing lighting levels by removing bulbs, lowering domestic hot water temperatures and turning down temperatures after hours.

Energy audits can identify cost effective ways to reduce consumption

- Measures requiring a minor financial investment to achieve savings; savings can be realized immediately. Replacing lighting with high efficient units, programmable thermostats and equipment timers, low-flow shower heads and weatherstripping are common items recommended.
- Measures requiring significant financial investment in renovations and/or equipment replacement. These are long-term investment decisions with payback extended over the life of the facility. Replacing doors and windows, upgrading insulation and replacing heating and ventilating units are very costly projects that may result in a payback if extended over many years.

To fund audit and similar assistance programs, utilities in some jurisdictions provide finance plans that are repaid to the utility at an appropriate interest rate on the customer's monthly utility bill. If these programs are successful it can result in savings for both the customer and the subsidizer. In addition, savings are achieved through the deferral of capital expenditures for fuel oil storage facilities and increased generation capacity.

Good Building Practice

The *National Building Code*, which governs new construction in Nunavut, sets standards for structural integrity, fire safety and public health, but does not address energy efficiency. *Good Building Practices Guidelines* are used in conjunction with the Building Code and include provisions to improve energy efficiency. Public Works has been working on developing a version of these Guidelines for Nunavut.

There are some key elements of the planning, design and construction of new facilities that are important to minimizing energy consumption:

Life Cycle Costing (LCC)

Energy strategy should include guide for new building design

During the design process, the total lifetime costs of a new facility are calculated, including the initial capital, operations and maintenance. This permits the evaluation of various, sometimes expensive, energy conserving features as investments, i.e., will they pay for themselves over the life of the facility in reduced energy costs? It is important that the true cost of energy be used in these calculations and, when energy is concerned, forecasted increases in costs be recognized.

Operations

It must be remembered that facility operators may not have the specialized training, test equipment and other resources needed to operate and maintain sophisticated control systems. One of the byproducts of energy awareness in building design has been sophisticated technology. However, a complex energy conservation system can be worse than none at all if it does not work properly. Heating, ventilation and control systems must be designed with the operating environment in mind.

Manuals

Further to the operations concerns above, new facilities should include well documented operation and maintenance manuals supplemented with systems' familiarization and training for the operators. These manuals will include the procedures necessary to keep all systems operating in top condition as designed. The manuals are also useful to help identify the training and upgrading needs for operation and maintenance personnel.

Fleet Vehicle Management

On behalf of the GN, Public Works continues to develop, update and implement Vehicle *Use Guidelines* that concern the use of government vehicles. These measures include guidelines for operation and maintenance to improve energy efficiency. Trucks are used in all communities for the delivery of fuel, waste collection and for water and sewage services. Optimizing service schedules and delivery routes will reduce the distances traveled, the corresponding fuel consumption and costs. Training of maintenance personnel to keep abreast of the technology in newly purchased vehicles will improve fuel efficiency and overall performance.

(2) Increase Energy Efficiency

Need to use more of the energy in each litre of imported oil

How can we get more useable energy out of a litre of oil? We saw in section 3.2 "Energy Conversion" above, that about 2/3 of the energy in diesel fuel oil is wasted and that there is not much we can do to improve on this conversion efficiency. However, there are some actions available to assist in extracting more energy out of fuel used for diesel generation and space heating.

Diesel Efficiency

The efficiency of diesel-powered generators has improved over the years and further improvements will likely be achieved as manufacturers continue with research and development. NPC diesels vary in conversion efficiency between 3.2 and 3.8 kWh produced per litre of fuel burned. This represents potential fuel savings of up to 15% if the low efficient units can be upgraded. That is a factor NPC would take into consideration in the economic analysis supporting a proposal to upgrade older units or install new ones.

Heating Plant Efficiency

Maintaining heating furnaces and boilers at peak operating efficiency can reduce fuel consumption as much as 10%. This requires regular scheduled maintenance by certified technicians.

Residual Heat Recovery

Waste heat from generators can supply heat for buildings—at large savings

In diesel generators, up to one third of the energy content of the fuel is converted to electricity and the remainder is lost as heat through the exhaust stacks and water jackets. Heat recovery systems can capture much of this waste heat and use it to heat nearby buildings. There are two types of systems in use. The first recovers heat from the diesel water jackets only; the second type recovers heat from both the water jackets and the exhaust systems. The latter are far more costly and maintenance intensive, but double the amount of heat recovered. The GNWT installed the first significant heat recovery system in 1978 at Cambridge Bay. Subsequently, systems were installed in several other communities where schools, garages, offices and water storage and treatment plants are heated with heat recovered from the community power plant and piped to the buildings. Although such systems can be "retrofitted" to existing diesel generators and building heating systems, the experience gained from the earliest systems has clearly demonstrated that to be practical and cost effective the following conditions must be satisfied.

- The power plant, heat distribution system and the building heating systems must be planned from the outset with heat recovery in mind.

- Large buildings constructed close to a power plant are essential to the success of heat recovery projects. Long pipe runs to small buildings must be avoided.
- Heat recovery and distribution should be considered in town planning and in the planning of major new infrastructure.
- The ownership, operation and maintenance of heat recovery and distribution systems should rest with the power utility.

(3) Develop Local Alternatives to Imported Fuel

Alternate Energy Sources

Solar

Solar energy has some potential for special purposes

Renewable energy sources currently being tested and/or used in Nunavut include:

- ***Solarwall®***

  This is an example of passive solar technology, meaning that it uses energy from the sun to pre-heat either water or air. In Nunavut there is the potential to use passive solar technology that pre-heats air as it is drawn into a building's ventilation system. This pre-heating reduces the amount of energy needed to heat the air in the building thus reducing fuel use and costs. The GN—Department of Sustainable Development, with Education and Public Works and Services and Natural Resources Canada have supported the installation of this type of technology, referred to as Solarwall®, on an existing school in Rankin Inlet, in order to assess its application in Arctic conditions.

- ***Photovoltaic Panels***

  Photovoltaic (PV) systems convert sunlight into electricity through the use of semi-conductor materials. Photovoltaic affect occurs when light falls on cells made up of two or more semiconductor materials, creating a voltage. The PV cells are assembled into modules or panels that produce direct current power. From a cost perspective, PV systems are expensive and are not economic for use during the winter when sunlight is in short supply. PV systems are ideally suited for summer use in remote applications where there is no electrical grid.

  In Iqaluit, a 25 sq. metre PV system was installed on the south facing wall of Nunavut Arctic College. This was a research installation to provide data on the long-term operation of a system connected to the community power grid. It operates in limited light conditions for part of the year and the system produces approximately 2,000 kilowatt hours annually.

Wind Power Generation

Wind power generation systems have been in service in Nunavut for some time (since the 1980s) with varied success in operating performance. The units installed are small by industry standards, 80 to 100 kilowatts output, and there are a very

Wind power potential is being explored, but is unproven

limited number of manufacturers (one or two) that make units in this size range. NPC is currently involved with three projects that supply electricity into local distribution systems to supplement diesel generation. These projects allow NPC to gather valuable data and experience for future potential wind generation installation opportunities in their service area. The key considerations are favorable wind velocity, siting approvals, access to competent maintenance personnel and the ability to overcome technical and operating problems inherent in running wind generation systems in parallel with diesel generators. The high initial costs, high maintenance costs and the technical difficulties associated with wind generators preclude wider use of this alternative energy source in Nunavut in the near term. However, there are continuing advances in this field and as fuel prices rise wind generation will eventually become viable. Current projects are listed in the table below.

Location	Owner	Turbine(s)	Rated Output	In-Service	Ave. Annual Generation	Comments
Cambridge Bay	Dutch Ind.	1 Lagerway LW 18/80	80 KW	Sept/99	111,528 Kwh to 1999	Problems with low temperature
Kugluktuk	NPC	2 Lagerway LW18/80	80 kW (each)	Apr 1997	127,040 kWh to 1999	One turbine not operating – damage from structural failure.
Rankin Inlet	NPC	1 Atlantic Orient 15/50	66 kW	Nov 2000	152,000 kWh (estimated)	Difficulties in obtaining turbine site approvals.

Table 8 Nunavut Wind Generation

Manitoba to Kivalliq Transmission Line

Major funding is needed to determine the feasibility of the southern tie line

In 1999 the Federal Government and Manitoba Hydro conducted a pre-feasibility study of a power transmission line to import hydro-electricity from Manitoba into the Kivalliq Region[14]. The line would run from Churchill to Arviat, Rankin Inlet and Whale Cove. Although the economics of such a project would not justify proceeding at the time, mainly because of the current price of fuel and limited market in the Kivalliq, the project was considered worthy of further study. As oil prices rise and additional electrical loads develop in this region, particularly as a result of resource development, a transmission line may prove economical.

Hydro-electric Generation

Developing local hydro sources may help local areas and improve tie line viability

The Manitoba Hydro study referenced above included an assessment of hydro-electric generation at two sites in the Kivalliq. Both of these sites had potential to supply all of the power needs of the three communities served by the transmission line proposed above. However, the cost of construction at such remote locations and the cost of the transmission lines needed to connect to the communities, put such projects out of reach economically until there was a significant growth in load. The report concluded that for hydro to be economical "the cost of fuel would need

[14] Churchill to Kivalliq Region, Transmission Pre-Feasibility Study, May 1999

to escalate at rates far greater than that which has occurred". Resource development in the area could very well make such developments feasible. In Iqaluit, NPC has done preliminary investigation into small-scale hydro on the Apex River. The economics appear promising.

Other Renewable Sources

Other potential renewable energy sources include biomass, fuel cells and tidal power technologies. These technologies have been identified as having potential in Nunavut, but will require considerable research and testing.

(4) Develop Nunavut's Oil and Gas Resources

In order to reduce Nunavut's dependency on imported fossil fuels, there is the potential of developing oil and gas reserves within the territory.

Nunavut has huge proven oil and gas reserves with long development lead times

Oil and gas showings occur naturally in several locations in Nunavut and the Geological Survey of Canada completed mapping of prospective areas in the 1950s. Exploration started in the early 1960s with the first well drilled at Winter Harbour on Melville Island in 1961. A total of 172 exploration and delineation wells were drilled in Nunavut from 1969 to 1989 identifying 19 separate discoveries. There has been very little oil and gas exploration activity in Nunavut during the last 12 years.

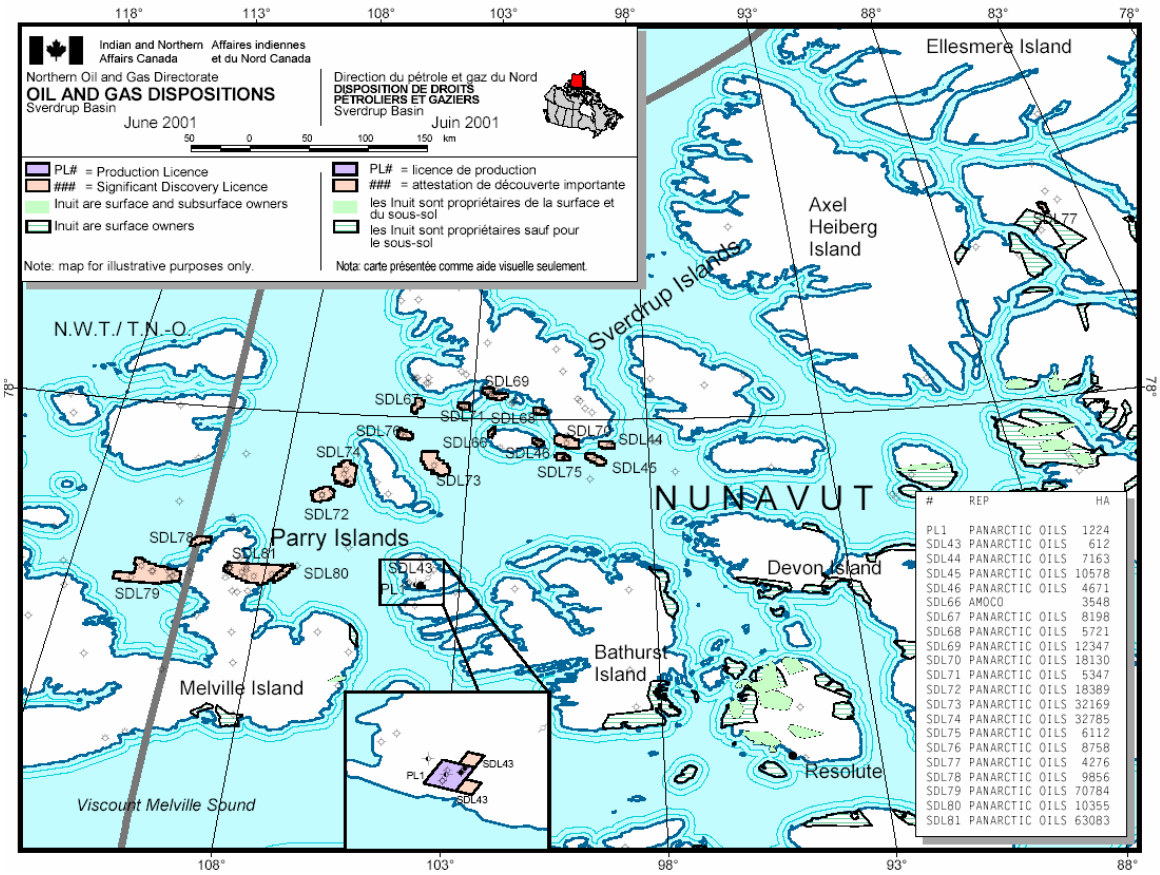
The on-shore and off-shore oil and gas potential of Nunavut is contained in fourteen sedimentary basins across the territory. The northwestern basin, including Banks, Arctic Coastal Plain, Sverdrup, Arctic Fold Belt and the Arctic Platform, has undergone the most exploration.

The Sverdrup Basin represents the largest and most significant petroleum basin to date with 18 discoveries of gas, gas and oil and oil fields. This basin represents 11-22% of the remaining discovered and undiscovered potential of Canada. The nineteenth discovery is an oil field at Bent Horn that was in production from 1985 to 1996.

A comprehensive framework for oil and gas development is needed

Further exploration activity may be triggered by sustained high oil and gas prices or a supply shortage in North America. An oil and gas regime for Nunavut must be designed to manage and benefit from large-scale activity resulting from external forces. In a proactive sense, a resource policy will be needed to support long-term development, encourage exploration and ensure Nunavummiut benefit from offshore development. The GN's Department of Sustainable Development is working toward these objectives by developing a Land Resource Management Plan for Nunavut. The background reports so far completed identify the history and potential of resource use in Nunavut with the factors, issues and potential impediments to their development.

Major factors and potential impediments identified for oil and gas development in Nunavut include the high capital costs and highly technical facilities required due to



the remote location, distance to market, extreme climate and lack of infrastructure. There is also the potential of significant environmental consequence with the production and transportation. Exploration risk in the Sverdrup Basin is moderate, however, in areas outside this Basin where there have been no discoveries made, exploration will be a high risk.

Any oil and gas development plan has to start with control - devolution is key

A final factor is the access to the reserves and regulatory authority management. Currently, access and management of oil and gas is by Indian and Northern Affairs Canada (INAC). Negotiations are underway to transfer the management and regulatory authority of natural resources to the Government of Nunavut. Devolution of this authority is key to the development of oil and gas reserves since industry cannot be expected to invest the billions of dollars required without a clear regulatory framework. It is also critical to the GN if it is to manage the development of the resource in a way that meets the needs of Nunavut's people and environment.

(5) Streamline Fuel Procurement and Distribution

The need for imported oil will continue, and so should efforts to reduce transportation, storage and delivery costs

Even the most heroic efforts to reduce consumption and develop alternate energy sources are not likely to change the fundamental fact that imported oil will continue to be the major energy source in Nunavut for the next 20 years. Given that hard reality, every effort must be made to minimize the associated costs of purchasing, transporting and distributing fuel products. A combination of restructuring and GN policies should be considered to:

Remove Duplication

Both the PPD and NPC import and store bulk fuel, in many cases in the same communities. This involves the construction, operation and maintenance of fuel storage facilities and distribution systems as well as procurement contracts and personnel to manage these contracts. Duplication not only adds extra administration costs, it also reduces the benefits achievable through economies of scale discussed below.

Consolidate Volumes

The lowest cost and best service for the purchase and transportation of fuel can be achieved with the largest volumes. Consolidating the volumes of the PPD and NPC will improve "buying power" and attract transportation companies with the most modern of ice-capable ships.

Investigate alternative re-supply strategies for fuel and dry cargo

In both the Kitikmeot and Kivalliq Regions, there is only one transportation company operating, and it operates over extremely expensive routes. Preliminary feasibility studies by the GNWT have shown that alternative re-supply routes and strategies for these regions can be developed for significant savings. Charting of new navigational routes and the construction of specialized ships may be required. The GN must take the lead role in this planning in partnership with the transportation industry and not expect private enterprise to develop these complex solutions. Combining the fuel with the dry cargo will increase total volumes and may help improve the feasibility of alternatives.

Business Planning

The various reviews and reports done on the PPD have all concluded there is potential to improve the business practices of the PPD and reduce costs. These changes may require changes in the PPD structure to permit the PPD to operate in a more businesslike manner. Certainly, the matter of subsidies and rate setting must be addressed.

4 ISSUES AND OPTIONS

Review of cost and policy issues—Look at models from elsewhere as options

4.1 Cost Issues for GN

Analysis of energy costs and implications—What GN spends directly or indirectly on energy (power, heat, other)—Trends and forecasts—Implications for GN budgets

GN needs to be able to know and control its energy costs

The GN has two basic financial problems when it comes to energy—knowing the cost and controlling it. With so many subsidies and no central tracking mechanism, it is very difficult to know what energy really costs. In addition, with no budgetary mechanism to set a level on subsidies in advance, it is very difficult to control them. In this section we look at the financial consequences for the GN.

(1) Knowing Costs

We looked at the hidden subsidies problem when discussing fuel supply and noted the Auditor General's suggestion that accounting practices be changed so that the Legislative Assembly would know the total cost of supplying fuel. In this section we try to quantify the costs for both fuel and electricity. In our view, it is vital that those costs be identified because:

- Energy (fuel or electricity) cannot be priced in a way that recovers costs and allocates them fairly if the costs are not known.
- Consumers are more likely to make wise energy use decisions if they know the consequences of their decisions and help bear the resulting costs.
- To make sound budget and policy decisions, the GN must know the cost implications of an item that may make up 20% of its total expenditures.

Costs need to be known to set proper prices

It must be pointed out that the role of the utility and the regulator must be to set the "correct" rates that are both just and reasonable as well as fully compensatory. However, this role does not involve any considerations related to subsidies or affordability. The utility must be provided with an opportunity to recover its costs and earn a reasonable rate of return on its investment. The business of ensuring that PPD product prices remain "reasonable" or "affordable", and how to deliver such a program, must be left in the hands of the Government of Nunavut, so that it can make prudent decisions concerning social impacts on a global basis.

(2) Total Cost To The GN

Components of "Total Cost"

GN payments for energy may be buried in program costs

Before discussing the total cost to the GN of fuel and power, we need to be clear on what we mean by "total cost". There is a spectrum of costs from direct and clear to hidden and uncertain. The hierarchy of directness is roughly as follows:

1. direct purchases—the GN buys electricity and fuel for government institutions;
2. direct subsidies—the electricity and fuel price subsidy programs described earlier;

3. municipal grants—to help communities pay for electricity and fuel for community services;
4. hidden subsidies—costs incurred in supplying energy but not identifiable as an energy cost in the GN's accounts;
5. hidden operating costs—the unidentified energy component of GN costs for things like travel and purchased services.

When we refer to the "total cost to the GN" we are referring to the combined cost of the first four items.

Forecast Cost Increases

Energy costs are a significant part of federal transfer payments—and growing

The total cost of supplying fuel and generating electrical power is a significant part of the total annual transfer payments received from the federal government. If present trends continue, it can be expected to take a significantly larger bite out of future transfer payments. In order to gauge the cost of supplying power and generating electricity, the Working Group undertook a detailed assessment of current and anticipated costs of supplying various fuel products as well as the costs of generating electricity. Appendix F, Schedules 1 and 3, provide the detailed cost calculations and assumptions.

The last independent review of the costs and rates of what is now NPC was done by the NWT Public Utilities Board for the year ended March 31, 1998. At that time the total cost of service was $44 million. While it has not had an increase in rates (other than the automatic flow through of diesel costs under the provisions of the Fuel Stabilization Rider), it has experienced additional costs that have been met in large part through increased revenues from the strong load growth and energy consumption.

We do not have any forecasts for NPC costs[15] beyond those approved by the NWT Public Utilities Board for 1997/98. However, for purposes of determining the total cost burden on Nunavummiut of generating and distributing electricity, the Working Group has attempted to estimate these costs (see Appendix F, Schedule 1) using some broad simplifying assumptions.

Increases in electricity demand and use will drive need for money for plant additions

Appendix F, Schedule 2 indicates that both the electricity load growth and energy growth in Nunavut over the next four years is expected to experience a significant increase. The increase in demand suggests that existing capacity and infrastructure may not be sufficient to handle the anticipated load growth and therefore, significant new capital additions may be necessary. The increase in energy requirements suggests increased volume of diesel fuel will be required to satisfy increased consumption. Both of the factors point toward a potential for significantly increased costs in the future.

The costs of supplying fuel by the PPD, as shown in Schedule 3 of Appendix F, have been computed using methods similar to those employed by the NWT Public Utilities Board in determining costs of service and setting just and reasonable rates.

[15] Estimates of future power and fuel costs in this Report are for illustration only and should not be viewed as signaling an increase in rates. No change in rates can happen until NPC files a General Rate Application. It may do that this year. When it does, it is possible that little or no change is needed as a result of increased sales and good management. That has been NPC's experience since its start up on April 1, 2001.

Implicit in this approach is an assumption that the cost of service should reflect all cost components, including those that have for the PPD previously been identified as "hidden subsidies", which have been discussed and quantified in Section 2.3(5) of this Report.

Forecast Cost of Providing Fuel and Electricity in Nunavut
($000's)

	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Fuel	68,847	86,139	89,848	92,763	95,888	99,359
Electricity	47,115	50,762	54,856	59,222	65,953	68,326
Total	115,962	136,901	144,704	151,985	161,941	167,685
Increase over 2000 ($)		20,939	28,742	36,023	45,979	51,723
Increase over 2000 (%)		18%	25%	31%	40%	45%

Table 9 Forecast Cost of Energy in Nunavut

Expect the total cost of power and fuel to increase by 45% from fiscal 2000 to fiscal 2005

The table above condenses the information in Schedules 1 and 3 of Appendix F. It shows the total usage of both electrical power and PPD-supplied fuel is expected to increase at a significant rate over the next few years. Based on these calculations, it appears that for the fiscal year ending March 31, 2002, the forecast cost to supply fuel and electricity will have increased by about $28.7 million, or 25% in just two years (from 1999/2000). When projections out five years are considered, it looks like total power and fuel costs will have increased significantly, by about $51.7 million, or 45%, from 2000 to 2005.

As noted earlier, the GN pays power costs both as a direct customer as well as through various indirect means. While we do not have specific information about the total of these direct and indirect costs, we have attempted in Schedule 4 of Appendix F to identify both the total costs paid by the GN as well as how much of the total fuel used in Nunavut is consumed by the GN in one fashion or another. It must be emphasized that this is a very broad look at the total costs to the GN of purchasing power and fuel. Our analysis does not take into account indirect costs (funding/grants to communities for their power and fuel heating costs, and power and fuel costs included in its purchase of goods and services) since quantification of these costs is beyond the scope of this Report. Nevertheless, it does provide us with an order-of-magnitude feel of the extent to which the GN pays for power and fuel. Schedule 4 suggests that of the total of about 147 million litres of fuel, the GN is responsible for consuming about 98 million, or two-thirds.

This year GN will pay $121 million towards energy costs—over 84% of the total

In terms of cost, the GN is paying for at least 84%, or $121 million, of the total cost of $144.7 million in 2001/02. Offsetting this cost is the revenues GN receives from fuel tax of about $2 million, for a net cost of about $119 million. Since the total transfer payments from the federal government to the GN are $670 million, the cost of fuel and electricity comprise about 18% of its total annual budget. That is, approximately one out of every six dollars received by the GN is used to purchase power and fuel. However, as noted previously, the fuel and electricity costs are expected to increase considerably over the next few years and unless the level of the federal transfer payments increase to offset these increased costs, there may be an

adverse impact on the ability of the GN to maintain its current levels of program delivery. It should be also be noted that the cost of fuel is also entirely dependent on the world oil prices and therefore, even if Nunavut is able to curtail consumption, it has no control on the cost of the product.

Impact of Demographics

Population growth will mean increased energy use

We have also examined the trend and projections of population growth in Nunavut over the next 4 years (Appendix F). While the data suggests that Nunavut's total population is expected to increase on an annual basis by about 2.5% per annum, the growth in the population between the 20 + age group is also about 2–2.5% per annum. This segment of the population will require housing and bear additional pressures on the demand for fuel and power. Further, the proportion of the elderly (over 55 years old) is expected to experience much higher growth rate (about 7–9%) compared to other age groups. We should also note that this age group, as a percent of total population, is increasing, but whether that will translate into increased per capita consumption of energy is unclear. The Table below summarizes this demographic data.

All of the foregoing suggests that the GN should be very concerned about the total cost of fuel/energy costs today and in the future. The fact that Nunavut is entirely dependent on imported fuels makes it crucial that steps be taken to reduce the dependence on fossil fuels and explore other alternate methods of power delivery.

	Population Breakdown				Percent Year over Year Growth			
	Ages 1-19	Ages 20-54	Age 55 plus	Total Pop	Ages1-19	Ages 20-54	Age 55 plus	Total Pop
2000/01	13,098	13,124	1,888	28,110				
% of total	*46.60%*	*46.69%*	*6.72%*	*100.00%*				
2001/02	13,407	13,427	2,052	28,886	2.36%	2.31%	8.69%	2.76%
% of total	*46.41%*	*46.48%*	*7.10%*	*100.00%*				
2002/03	13,634	13,758	2,228	29,620	1.69%	2.47%	8.58%	2.54%
% of total	*46.03%*	*46.45%*	*7.52%*	*100.00%*				
2003/04	13,900	14,039	2,397	30,336	1.95%	2.04%	7.59%	2.42%
% of total	*45.82%*	*46.28%*	*7.90%*	*100.00%*				
2004/05	14,155	14,326	2,569	31,050	1.83%	2.04%	7.18%	2.35%
% of total	*45.59%*	*46.14%*	*8.27%*	*100.00%*				
5 Yr Incr	1,057	1,202	681	2,940	8.07%	9.16%	36.07%	10.46%

Table 10 Nunavut Population Growth

(3) Conclusions

The implications of the foregoing on GN costs can be summarized as follows:

- A growing population is expected to exert increased demand for heating fuel and electricity.
- The cost of delivering electrical power is expected to increase with the need to build new facilities and undertake major upgrades to plant and delivery systems.
- The cost of heating and other fuels supplied by the PPD can also be expected to increase, partly because of increases in the cost of purchase and delivery of products, but also as a result of a change in pricing policy to eliminate "hidden subsidies" and recover actual costs.
- As the total cost of delivering fuel and electricity increases, there will be increased demands on the GN for fuel and power subsidies to make these essential commodities affordable. This could get out of control unless the GN has the financial policies and procedures in place to manage the subsidy situation.

4.2 Policy and Program Issues

New structures and policies should take into account existing efforts

The design of structures and strategies to meet Nunavut's energy needs should consider the GN's existing efforts and policies. This section will briefly review the GN's energy initiatives and summarize the policy considerations for a "made for Nunavut" solution. These policy considerations fall into two categories: those that consider existing policies, legislation, and agreements; and those that define goals and principles the GN would like the new approach to achieve. We will discuss both categories briefly.

(1) Existing GN Initiatives

Foundation for new energy initiatives—Existing Nunavut agencies, policies, programs, etc.

Since its inception, the GN has known of its energy problems and has taken steps to address them. Several government departments and agencies have launched initiatives aimed at limiting the growth in consumption and increasing efficiency. The following is a brief list of some of these agencies and their initiatives.

Nunavut Power Corp (NPC)

NPC is improving generation efficiency and looking at alternatives

Essentially all of the electricity provided by NPC is generated from imported oil. The company has launched the following initiatives to extract more energy from the fuel and find alternate sources:

- **Improved diesel plant efficiency**. This includes the replacing older gensets with newer and more efficient engines, installing control equipment that matches the engines to the loads, and utilizing heat recovery systems.
- **Wind power**. NPC owns one small wind generator in Kugluktuk and another in Rankin Inlet. It also purchases power from a privately owned wind generator in Cambridge Bay.
- **Alternate energy in Iqaluit**. This initiative includes a small hydro generator in Apex River and a biomass generator fueled by Iqaluit's garbage.

Nunavut Power has one position dedicated to energy management within the Corporation.

Department of Public Works and Services—Technical Services Division

TSD is making government buildings more energy efficient

The Technical Services Division is responsible for the planning, design and construction of buildings and works throughout Nunavut. Regional offices manage the delivery of the facilities with the goal of meeting client needs and minimizing facility lifetime costs. Headquarters provides a range of services including developing and implementing energy conservation initiatives for public buildings. For example, it ensures that new government buildings, such as schools and hospitals, are designed to be as energy efficient as possible. It plays a similar role in finding ways to improve energy efficiency in existing public buildings.

Public Works and Services has one position dedicated to energy management within the GN.

Department of Sustainable Development (DSD)

Environmental Protection Services Division (EPS)

EPD is working on environmental issues related to energy

EPD enforces the *Environmental Protection Act,* represents Nunavut on all inter-jurisdictional environmental matters, and coordinates the prevention, monitoring and clean up of all spills on environmental lands. EPD has taken a lead role in developing Nunavut's Climate Change Strategy and a related business plan to enable Nunavut to begin dealing with global warming issues.

EPS has one position dedicated to deal with climate change and alternate energies.

Minerals, Oil & Gas Division (MOGD)

MOGD is creating framework for developing minerals, oil and gas

The Minerals, Oil and Gas Division is responsible for developing a sustainable mining industry in Nunavut and for delivering programs to communities that may benefit from mineral investments. Nunavut holds substantial known reserves of oil and gas in the high Arctic. Because of the harsh environment and long distances involved, little exploration and few attempts to develop these fields have occurred in the last 20 years.

One of the factors hindering mineral development in Nunavut is a lack of access to cheap electrical power—independent diesel power generation plants must be built at each potential mine site. This is an expense that, combined with the high cost of transportation and construction in Nunavut, may affect the viability of a mining project.

Arctic College—Nunavut Research Institute (NRI)

NRI is becoming a center for energy related research

The Nunavut Research Institute was created under the *Public Colleges Act* as a form of non-government organization (NGO), giving it charitable status and other advantages of an NGO. NRI receives authority under the *Nunavut Scientist Act* to act as a licensing agency for scientific research in Nunavut. This licensing role is shared with the DSD and the Department of Fisheries & Oceans (DFO) depending upon the subject of the research. Climate change and environmental research are two of the categories that fall under NRI's licensing jurisdiction. NRI, DSD and DFO cooperate in maintaining their libraries of the scientific data and research conducted under their jurisdictions.

The NRI has no dedicated positions associated with energy management, climate change or alternate energies.

(2) Existing Policies Affecting Options

Synopsis of internal policies and external factors that affect options

Existing policies frame options for new approaches—like Bathurst and federal funding agreements

In addition to the existing agencies and initiatives, the GN has agreements, laws or policies in place that affect its ability to change the way it manages energy. Four of those factors are particularly relevant to this Report:

- the Bathurst Mandate, which deals with self-reliance;
- administrative laws such as the *Financial Administration Act*;
- funding arrangements with the federal government; and
- federal government policies in energy related areas.

Bathurst Mandate

The Bathurst Mandate provides guiding principles that direct present and future activities of the Government of Nunavut. The principle that applies to the Ikuma II initiative is *Self-Reliance* as it relates to the *responsible development of our resources and to participate actively in the development of our economic resources*. This applies to Nunavut's renewable and non-renewable energy resources, as well as the fiscal and human resources of the Government of Nunavut.

Relevant GN Legislation

Nunavut has several laws that influence the way the GN delivers government services. As well, each department has developed its own set of internal guidelines for service delivery. These include the *Financial Administration Act* and the Financial Administration Manual, as well as the *Public Service Act* and the Human Resource Manual. Prior to finalizing this Report, we consulted the appropriate departments to ensure compliance with these GN policies, procedures and legislative obligations.

Federal Formula Financing Agreement

Any energy supply system must recognize the sensitive relationship between the Federal Formula Financing Agreement and revenues generated and collected by the GN. These issues were discussed with the Department of Finance when we developed our recommendations and are set out in more detail in the Recommendations section of this Report.

Federal Government Energy Related Policies

Given Nunavut's close relationship with the federal government, the GN's new energy strategy will need to consider federal commitments, including the United Nations Framework Convention on Climate Change, the Kyoto accord, the National Implementation Strategy and the First National Business Plan.

(3) Policy Guidelines for New Structures

Guiding goals and policy considerations for the design of new structures and systems

Design Goals

Want reliable supply, system efficiency, cost communication and energy management

To determine the energy supply structures that best meet Nunavut's needs, we need to know what those structures are supposed to accomplish. Based on our discussions it appears the goal is a set of structures and systems that:

- *Ensure essential supply*—Ensure the energy consumers needs will continue to be there and at a price they can afford to pay;
- *Increase efficiency*—Minimize the cost and complexity of procuring, transporting and delivering energy;
- *Communicate costs*—Enable GN and consumers to identify, understand, and respond to, the true costs of energy used.
- *Enable energy management*—Enable the GN to monitor consumption, pricing and performance and act on this information to achieve its energy goals.

These are structural goals, not output goals. If the new structure meets these goals the GN will be in a better position to manage its energy situation. In particular it will be able to develop and implement a long-term energy strategy that will:

- *Foster self-reliance*—Enable the GN to encourage a shift from reliance on imported oil toward local alternatives where possible;
- *Encourage environmental protection*—Encourage the adoption of environmentally friendly generation technologies and consumer practices;
- *Assist domestic development*—Maximize Nunavummiut involvement in energy development and delivery to encourage employment and entrepreneurial development.

We deal with these long-term energy strategy issues later in this Report. The focus at this point is on the structures and systems needed so that these issues can be effectively addressed. Given that the structural goals may not be completely compatible—for example, efficiency and affordability—we need to look at what is involved in balancing these as guidelines.

Balancing Objectives

We have identified four system design goals: supply security, system efficiency, cost communication, and management capacity. Those need to be discussed before we turn to considering potential models.

Ensure essential supply

The new model must ensure a reliable and affordable energy supply

In Nunavut, the supply of energy is an essential service. Without it people would literally freeze in the dark—meaning security and affordability are major criteria for the system. To ensure a secure supply, restructuring should avoid radical changes that could undermine the reliability of the energy delivery system. That means working on changes that fix structural problems but build on existing delivery systems.

For affordability, the system must also enable the GN to ensure that the basic energy needs of Nunavummiut are met at fair and affordable prices. This does not mean that the GN should be able to ensure all energy wants are affordable. The new mechanism must determine a "true" base level of energy costs that the GN may be asked to subsidize to ensure affordability. The system must also be able to identify supply costs and subsidies to enable the GN to make these difficult decisions.

Increase system efficiency

The new model should increase efficiency and cost accountability

To reduce its overall energy costs, the GN must find ways to reduce overhead costs. In the discussion of NPC and PPD we identified a number of areas in which supplying the two forms of energy—fuel and power—involved the same types of functions. Both services manage purchasing arrangements, storage facilities, and billing systems, for example. A good supply system model should minimize this duplication. It should also integrate and coordinate the two services by streamlining decision-making on energy supply matters and enabling energy cost accountability.

Communicate energy costs

The new model should encourage consumer stewardship

One of the most important things a new energy supply model must be able to do is communicate the true cost of energy to those who pay for it—the consumers and the GN. To encourage efficient energy use and wise energy stewardship, the people

who pay must be aware of what their energy decisions will cost them. That means the proposed model must:

- allow the total cost of energy to be identified;
- ensure consumers understand that cost and accept its fairness; and
- inform the GN of the potential cost of energy subsidy decisions.

Enable energy management

The new model must enable the GN to manage subsidies

As indicated above, the new model must inform the GN of energy subsidy costs. It should enable the GN to track information on energy consumption and direct or indirect costs to the GN, through mechanisms that:

- monitor energy consumption and prepare forecasts similar to the current budgeting process;
- assess service pricing proposals to determine their impact on subsidy costs;
- identify and track total energy costs and the GN subsidy costs; and
- make subsidy allowance recommendations to Cabinet.

The mechanisms should be able to accomplish these goals under the government's direction in order to adjust to meet changing situations and ensure public accountability.

4.3 Problematic Models

An brief overview of approaches that have been rejected on the basis that they do not appear to have the potential to meet Nunavut's present needs—Reasons why rejected

(1) Existing

Existing structures don't enable overall energy management

It is clear that the existing energy supply and management structures within the GN cannot properly manage Nunavut's current energy resources and develop Nunavut's renewable energy reserves. We believe that the current situation should be changed for many reasons, including:

General

- Nunavut is almost completely dependent on imported fossil fuels and so is very vulnerable to fluctuations in world prices.
- Projected growth in fossil fuel consumption will continue to put a financial strain on the GN's budget.
- Projected growth in fossil fuel consumption increases environmentally unfriendly emissions that hurt Nunavut's pristine environment.

PPD

PPD's existing structure makes it difficult to identify costs and recover them in product prices

- The PPD's current structure makes it difficult to identify hidden subsidies. This discourages realistic cost-recovery pricing that would promote conservation. It also masks the true cost of petroleum products making more expensive forms of alternate energy appear to be less feasible.

- There is no independent review process in place for setting fuel prices. This creates the perception that the price setting process lacks transparency and accountability.
- Because the PPD is a division of a larger department, it lacks administrative and operational flexibility and so may not engage in other worthwhile opportunities.

NPC

- NPC's mandate is to provide safe, reliable, affordable power. At present, diesel generators do that best. There is no GN energy policy mandate, or resources, for NPC to engage in research and development projects on alternate energy sources such as wind, trash burning and hydroelectric generation.

DSD-EPS

- EPS' mandate is to protect the environment and the enforcement of the *Environmental Protection Act*. The affect on the environment as a result of climate change is a part of that mandate and has become a key component of their operation. Research & development on alternatives and renewable energies fall outside of the mandate and there are very limited resources within the Division for this function.

NRI

- The NRI's role in energy matters appears to be limited to storing information, scientific data and studies as a result of its licensing authority and involvement in environmental issues, climate change, renewable and alternate energies. NRI's status as a non-governmental organization (NGO) for energy research, may make it an important component in Nunavut's comprehensive energy strategy.

(2) Privatization

Corporate Ownership

The problem of having ultimate responsibility for essential services in Nunavut in private hands

The GN rejected private ownership of the power system—similar principles likely apply to fuel

One energy supply option for Nunavut is for the government to get out of the business and turn over the supply of fuel and power to private enterprise. When considering electricity supply options, the GN considered the alternative of turning the operation of the system over to the private sector. With this approach, NPC would have been essentially a holding company owning all the system assets and an outside utility would have been contracted to operate and maintain the system. In considering options, the GN specified that the goal was

> to create an electric energy supply system in Nunavut that will:
>
> ◦ Provide safe and reliable power to all Nunavut communities, at the lowest cost consistent with government social and economic development objectives;
>
> ◦ Ensure the people of Nunavut maintain effective ownership and general direction of the power system for the foreseeable future; and
>
> ◦ Develop NPC as a vehicle for delivering electric utility services now and in the future.

We assume these criteria also apply to fuel supply. It would be difficult for a totally privatized approach to fuel supply to meet these objectives.

The major problem with a totally privatized approach is that it would make it more difficult for the people of Nunavut, through the GN, to maintain effective ownership and general direction of the fuel supply system. This is important in the unique situation of Nunavut where the government ultimately pays most of the fuel bills and where overall energy management is critical.

Parts of the fuel delivery system, are, and should remain, privatized

Even with a Crown corporation approach, however, there are good reasons to privatize certain components of the supply system. The Bailey Report referred to frequently in our discussion of fuel supply pointed out the merits of using the commercialization of some delivery components to encourage small business development and hopefully achieve savings. If fuel supply is transferred to a Crown corporation, we believe the company should be given the flexibility to contract for support services in any way consistent with good management practice.

4.4 Models From Other Jurisdictions

Approaches in other areas—Strengths and weaknesses of these models given GN goals

(1) Introduction

Saskatchewan and Yukon are two closest models

In order to provide the GN with options to consider when restructuring its fuel and energy delivery systems, we reviewed structures currently used in other Canadian jurisdictions. Because of the limited time available and the need for meaningful comparisons, we looked at two places where Crown corporations supply electricity—Saskatchewan and Yukon Territory. Of the two, the Saskatchewan structure provides a much greater role for government in providing direction to the utility.

(2) Saskatchewan Model

Principles

In Saskatchewan, Crown corporations supply both electricity and natural gas. This public enterprise model means that the government chooses to own or invest in energy supply corporations on behalf of its residents, in order to ensure universal, reliable, safe and reasonably-priced power distribution and delivery. In general, through the public enterprise model, operational autonomy is essentially granted to the Crown corporations while ensuring that the Corporations remain accountable to the people of Saskatchewan. The Government sets long-term strategic direction while leaving the Crown corporations responsible to oversee the business activities and to ensure strategic planning fits within the overall direction as set by the Government.

Saskatchewan Power Corporation (SaskPower)

In Saskatchewan Crown corporations provide electricity, natural gas, and many other services

SaskPower is the Crown corporation that was created to generate and deliver power in Saskatchewan, pursuant to the *Power Corporation Act*. SaskPower is wholly owned by another Crown corporation, the Crown Investment Corporation (CIC). The CIC is the holding company for all Crown corporations in Saskatchewan and acts as supervisor of those corporations on behalf of the Government of Saskatchewan.

Structure

Because SaskPower's affairs are governed by the CIC, it is important to review the structure of the CIC and its links to the Saskatchewan government. The CIC is governed by its Board of Directors, who are all Cabinet Ministers. The Board is directly responsible to the Legislative Assembly and Cabinet regarding the conduct of the CIC. The Board's responsibilities include recommending policy and management practices for the Crown corporations, recommending potential directors for the Crown corporations, and assessing and monitoring the performance of those directors.

Saskatchewan has a "top" Crown corp (CIC) over top of other Crown corps

SaskPower is governed by a Board of Directors appointed by the Lieutenant Governor in Council from a list of candidates recommended by the CIC's Board. The Lieutenant Governor in Council also determines which Minister the Board reports to, designates the Chairperson of the Board, and establishes quorum for Board meetings. SaskPower's Board can establish any committees it considers necessary to manage the company's operations.

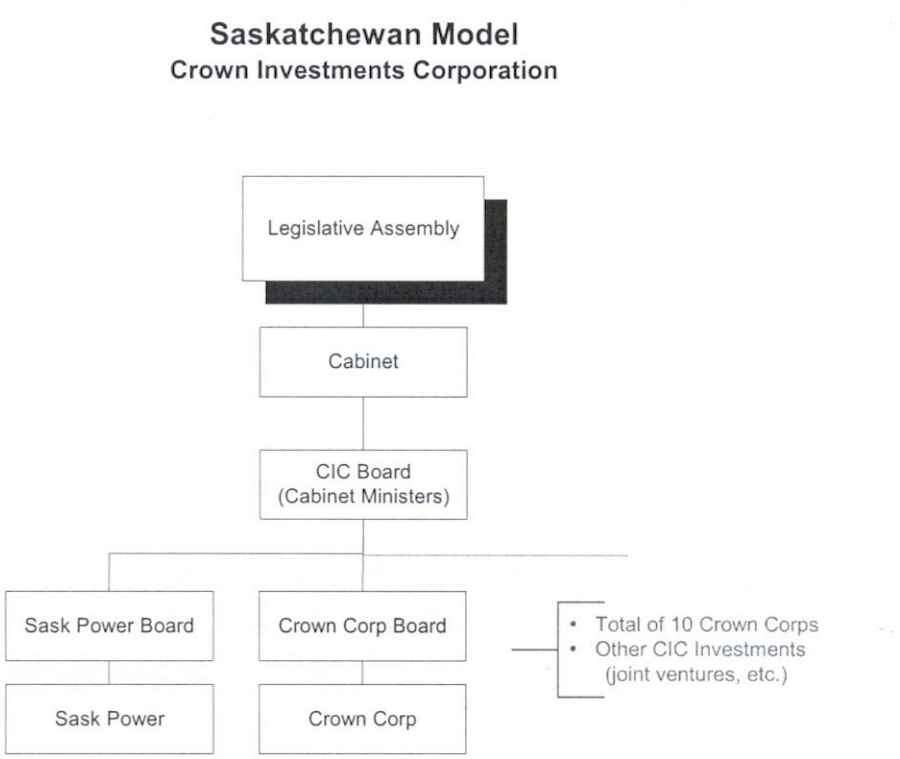


Figure 6 Saskatchewan Energy Governance Model

Decision-making

The CIC sets targets for other Crown corps and tracks performance

Under the *Power Corporation Act*, the CIC is primarily responsible for setting policy, determining accountability and providing overall governance to SaskPower and other Crown corporations. The Board of Directors of SaskPower is responsible for day-to-day operations of the corporation, including supplying and distributing electrical power. However, the Board must receive the CIC's approval for any recommendations it makes regarding planning, budgeting and operational goals. The matrix in the table above shows the types of decisions made by or for SaskPower, and who makes those decisions.

Under the Saskatchewan model, the CIC establishes performance targets and monitors the progress of the subsidiary Crown corporations. The CIC is responsible for ensuring the overall strategic direction of the subsidiary Crown corporations is consistent. Responsibility for the day-to-day management of the subsidiary Crown corporations, including approval of the strategic, business and operational goals, generally rests with the Board of each of the Crown corporations. In the past, Ministers of the Crown were members of the Board of Directors of each subsidiary Crown corporation. As a result of a Public Enterprise Review process conducted several years ago, Ministers of the Crown were removed from all Boards of the commercial Crown corporations. In turn, the CEO of each commercial Crown corporation was appointed as a Director.

Decision Making Matrix—SaskPower	
Board Appointments	SaskPower Board provides nominees to the CIC Board for recommendation and approval by Cabinet
Board Compensation	Approved by CIC Board
Public Policy Initiatives	Recommended by CIC Board and approved by Cabinet
Board Performance	The SaskPower Board, through its Governance Committees, oversees the implementation of annual performance evaluations. The results are approved by the SaskPower Board and reported to the CIC Board for Assessment.
Dividends	Recommended by SaskPower Board and approved by CIC Board
Strategic Plan	Recommended by SaskPower management and approved by SaskPower Board
Business Plan	Recommended by SaskPower management and approved by SaskPower Board
Capital Budget	Recommended by SaskPower Board and approved by CIC Board
Operating Goals/Objectives	Recommended by SaskPower management and approved by SaskPower Board
CEO Appointment	Appointed by SaskPower Board in consultation with the CIC Board and Cabinet
Rate Setting	Reviewed by Rate Review Panel and approved by Minister

Table 11 SaskPower Decision Matrix

Rate Setting

Rates are reviewed by an independent panel, but it can only give advice

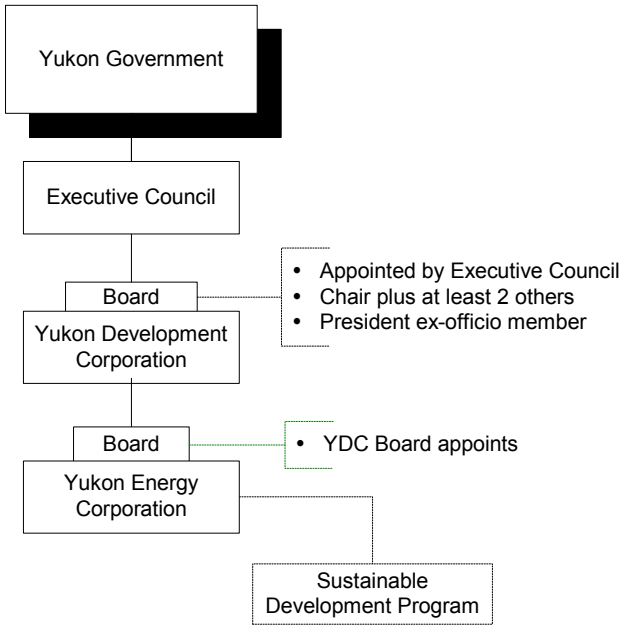
At one time Saskatchewan had an independent Public Utilities Review Commission that determined rates for utilities. This operated much the same as the Public Utilities Boards in the Yukon, the NWT and Alberta. The Commission was disbanded in the 1980s and rate setting became once again a Ministerial decision. Pressure for more public participation led to the government establishing in 2000 a Ministerial Advisory Committee known as the Saskatchewan Rate Review Panel. The Panel provides an independent review of rate change requests from SaskPower and certain other Crown corporations. The six-member Panel gets input from the public and the company proposing the rate change, evaluates the proposed rate changes, and provides advice to Government on the change. In many respects it is similar to Nunavut's Utility Rates Review Council (URRC) although it lacks some of the powers of the URRC.

(3) Yukon Model

Principles

In contrast to the Saskatchewan model, where SaskPower is part of a large network of Crown corporations, the Yukon model is limited specifically to matters concerning the supply and delivery of energy throughout the Yukon.

Yukon Model
Energy Governance Structure



YDC is a Yukon Crown Corporation with a broad energy mandate; it owns the electric utility

The Yukon Development Corporation (YDC) was established under the *Yukon Development Corporation Act* as a self-financing business and as an agent of the Government of the Yukon. Its mandate is to assure a continuing and adequate supply of energy in the Yukon in a manner consistent with sustainable development, and developing energy systems to generate and distribute all forms of energy.

For some time, electrical energy was supplied to part of the Yukon by a private enterprise company operating out of Alberta. Ultimately, the Yukon government decided to terminate this arrangement and assumed responsibility for the supply and distribution of electrical power throughout the Territory. This led to the incorporation of the Yukon Energy Corporation (YEC) in 1987. The YEC is a wholly owned subsidiary of the YDC. It was incorporated under the *Territorial Business Corporations Act,* which provides a legal framework for the company along with the *Public Utilities Act* and the *Yukon Water Act*. The YEC is the primary producer and transmitter of electrical energy in the Yukon. It is responsible for distributing electrical power to retail, wholesale and industrial customers within the Yukon.

The electric utility is incorporated as a business corporation

Governance structure

The structures of the YDC and the YEC are linked, as shown in the diagram above. The members of the Board of Directors of the YDC are appointed by the Commissioner in Executive Council. The Board is responsible to an identified Executive Council member. The Board of Directors consists of a Chairperson and at least two other members. The President of the YDC is an *ex officio* member of the Board of Directors. The affairs of the YEC are governed by a Board of Directors whose members are appointed by the YDC as the sole shareholder of the YEC.

Decision-making

The Yukon model creates a middle layer between government and electric utility

In the Yukon model overall management, policy making, and accountability rests with the Board of Directors of the energy-producing corporation. Even though the YEC is defined by the legislation as an agent of the Government, and while ultimately the YEC's Board of Directors are accountable to the Government, this approach leaves more operational and business decisions within the utility corporation. The table shows the governance decision-making matrix for the YDC and the YEC.

Decision Making Matrix—Yukon Energy Corporation	
Board Appointments	Made by YDC
Board Compensation	Made by YDC
Policy Initiatives	Recommended by YEC management and approved by YEC Board
Board Performance	Assessed by YDC
Dividends	Recommended by YEC Board and approved by YDC
Strategic Plan	Recommended by YEC management and approved by YEC Board
Business Plan	Recommended by YEC management and approved by YEC Board
Capital Budget	Recommended by YEC management and approved by YEC Board
Operating Goals/Objectives	Recommended by YEC management and approved by YEC Board
CEO Appointment	Appointed by YEC Board upon approval of YDC
Rate Setting	Set by independent Public Utilities Board

Rate Setting

The utility is fully regulated, with rates set by an independent Utilities Board

In the Yukon the Yukon Utilities Board regulates all utility services. The Board is an independent body established by legislation. The legislation gives the Board sweeping powers to set rates, set utility standards, order utilities to take action to fix service problems, etc. The Yukon government appoints members to the Board, but it has no direct influence on the Board's decisions on rates or other matters.

Rate Stabilization Fund

Like Nunavut, the Yukon has a Rate Stabilization Fund. The initial Fund was established by a $10 million government grant and was due to expire in March of 2002. In October 2001, however, the Minister responsible for YDC announced an additional $2 million investment in the Fund in recognition of the need to provide stable power bills to consumers. The expectation was that the additional injection of cash would fund the RSF until 2005.

Sustainable Development

YDC is funded to research and develop sustainable energy alternatives

The Yukon Government has identified the importance of establishing a viable, sustainable development program. In 1998 it established the Green Power Initiative Program. The Government provided a $3 million contribution to the YDC at that time. The overall intention of this Program was to achieve the following:

- Displace diesel production and reduce emissions;
- Provide consumers with a green power option;
- Expand the technical capability to develop green power alternatives;
- Improve the cost effectiveness and long-term competitive base of green power alternatives.

Through this program, the YDC has undertaken initiatives in relation to both solar and wind power. It established a renewable power sales incentive program intended to encourage planning and implementing of energy saving measures. This program provides the following:

- Information on potential benefits;
- Access to technical service such as commercial energy audits, financial assistance for feasibility planning, building or installation design and business case analysis;
- Financial assistance through loans, interest abatement and capital contributions for installation of secondary power, electronic power dispatch and building energy management reporting.

The Yukon Government, recognizing the importance of sustainable development, has made the YDC responsible for such Programs.

4.5 Analyzing Options

Structural option—Transitional legal issues—Legal issues related to PPD special funds

The Crown Corporation Model

Like Yukon, NWT and Saskatchewan, a Crown corporation approach is the best fit for Nunavut

The Working Group recommends that the GN adopt a Crown corporation model for its restructured energy management system. As can be seen from the review of the Saskatchewan and Yukon models, Crown corporations may be structured in a variety of ways to meet community needs and maintain government accountability. This section of the report will set out the basic features of Crown corporations, and address some of the challenges that are unique to Crown corporations. The recommendations in section 5 follow from the general information in this section.

Balancing Profits and Public Policy

Unlike private corporations, which focus solely on commercial goals, Crown corporations usually have both commercial and public policy goals. From a commercial perspective, a Crown corporation is expected to make a profit and to provide a reasonable rate of return to the government as its shareholder. However, from a public policy perspective, a Crown corporation may be required to take action to accomplish the government's economic or social development goals. These activities are often costly, and may reduce the Crown corporation's profitability.

Crown corporations need to balance business and public policy objectives

Any evaluation of a Crown corporation, then, must balance these competing objectives of earning profits and meeting public policy goals. Whether or not a Crown corporation achieves its goals will depend upon several factors, including the clarity of its objectives, the ability of its directors and employees to make key decisions, and the extent to which the government is involved in controlling the policy and management of the corporation. This raises the essential policy issue of who guides the corporation and how.

Providing Direction to Crown corporations—The Directing Mind

The comparison of the Saskatchewan and Yukon models earlier in this Report showed different ways a Crown corporation can be governed. Our recommended model for Nunavut's energy management system is based on a review of these models and a testing of ideas on what would be needed to provide effective governance for energy supply Crown corporations in Nunavut's unique circumstances.

We call this the "directing mind" issue—how the GN and the Board of Directors share responsibility for guiding and operating a Crown corporation. The Auditor General of Canada's report classified three types of directing minds for Crown corporations as follows[16]:

- **Governing Boards**. In this model, the Crown corporation's Board of Directors has total authority and accountability for all corporate activity, within the organizational framework. Such Boards are the true directing minds of Crown corporations.
- **Administrative Management Boards**. In this model, the Board of Directors oversees the delivery of certain services and programs, makes binding decisions

[16] Canadian Comprehensive Auditing Foundation, page 125, Report of the Auditor General

in certain areas and may be responsible for implementing policy decisions made by the Minister responsible or Cabinet. However, this type of Board must consult with the Minister responsible for the Crown corporation when making significant decisions.

- **Advisory Boards**. Boards whose function is to give counsel to the Government, but not to govern the business of the Crown corporation.

Saskatchewan and the Yukon show different degrees of independence from government direction

Historically the Saskatchewan model of governance was closely associated with the Administrative Management Board concept. However, in 1997 Saskatchewan reviewed its public enterprise model. This review process weighed the question of decision-making, the ability of SaskPower to respond to market forces, and concerns with political interference in SaskPower's business. In attempting to balance the legitimate, if somewhat contradictory concerns, a new governance structure was implemented which essentially has moved Saskatchewan closer to the governing Board concept with greater autonomy, authority and accountability being placed at the Board level as opposed to the Minister Responsible.

The Yukon model, like the new Saskatchewan model, now sits closer to a Governing Board concept than to an Administrative Management Board concept. It is the recommendation of the Working Group that this is the concept that should be adopted by the GN for its new energy management structure.

Challenges of the Crown Corporation Model

Nunavut's current energy supply system makes it difficult to balance the need to ensure a reliable supply of affordable energy and the need to control GN expenditures on energy. Without the means to track true energy costs, and communicate those costs to consumers, the GN cannot manage its energy situation. In our view, the Crown corporation approach, with a suitable governance structure, provides the optimum balance between public policy and business-like cost recovery for the GN.

A Crown corporation needs a governance structure that will ensure accountability, flexibility and sound business management

The governance structure is critical. Recent studies have suggested that the governance of Crown corporations must be carefully designed in order to avoid problems with accountability, flexibility and sound business management. The Auditor General of New Brunswick, in a 1996 Report, proposed a set of criteria to enhance the governance of Crown corporations[17]. In particular, the report recommended that Boards of Crown corporations should:

- Be comprised of people with the necessary knowledge, ability, commitment, and level of independence to fulfill their responsibilities;
- Have a clear understanding of their roles, responsibilities and duties, and the accountability structure within which they operate;
- Develop and maintain sufficient expertise relative to the Crown corporation which they govern including a working knowledge of the environment in which the Crown corporation operates and the needs of its customers;
- Provide strategic direction to their corporation, along with a policy framework within which management may operate;

[17] 1996 Report of the Auditor General of New Brunswick, page 124.

- Monitor the performance of the Crown corporation by obtaining governance information from management that will allow the board to assure itself that its policies have been complied with and that will enable it to assess the degree to which the corporation has achieved its mission and strategic goals; and
- Ensure that sufficient relevant information is reported, through the Minister responsible, to allow the Government and the Legislative Assembly to determine the degree to which the corporation has achieved its mission.

In the following section we outline a governance model that we believe satisfies these criteria. It should encourage accountability, flexibility and sound business management while ensuring that those responsible for supplying fuel and power are accountable to the GN and therefore the people of Nunavut. It will also provide the GN with the tools to develop and implement initiatives to manage consumption and develop energy sources other than imported oil.

5 RECOMMENDATIONS

A proposed model and how it could be put in place

Based on our analysis of the situation and consideration of various approaches used to deliver energy in other jurisdictions, we have developed a proposed model and some recommendations for its implementation. First the model—the diagram below shows its basic structure. This is followed by a list of the recommendations, and then the reasons for specific points.

Nunavut Energy Management Model

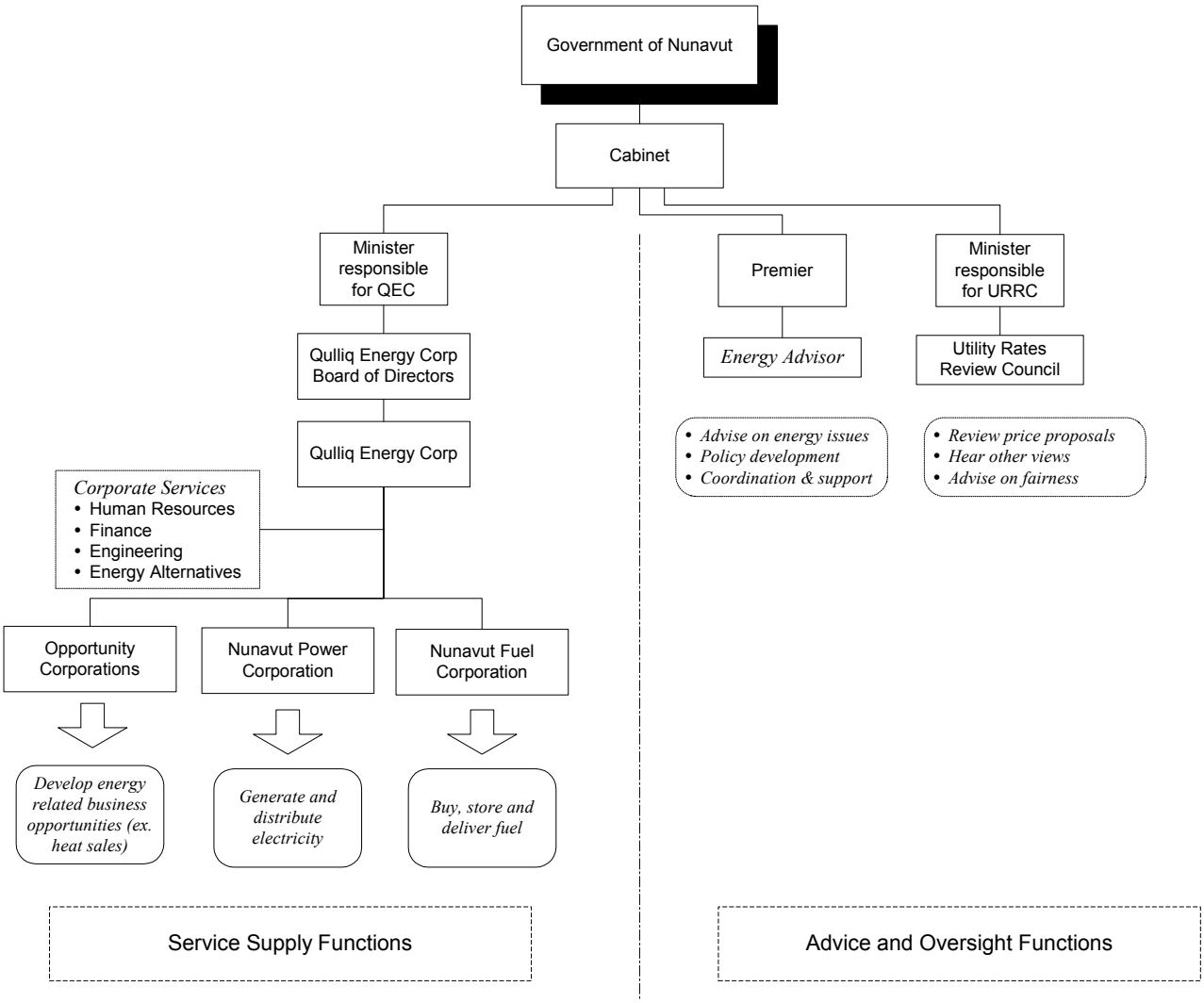


Figure 7 Nunavut Energy Management Model

5.1 Summary of Recommendations

Based on this study, we recommend the GN consider the following course of action to manage its long-term energy situation:

1. **Establish Qulliq Energy Corporation** (QEC) as the Crown corporation responsible for supplying fuel and power in Nunavut.

   (1) Unless an implementation review suggests a better approach, amend the existing *Nunavut Power Utilities Act* to transform NPC into QEC.

   (2) Instruct QEC to establish two operating subsidiaries—a new Nunavut Power Corporation (NPC) to supply electricity and Nunavut Fuel Corporation (NFC) to supply petroleum products.

   (3) Appoint additional directors of QEC so that the Board of QEC includes one or two members with expertise in fuel supply and general energy matters and can function as the Board of both subsidiaries.

   (4) Eliminate potential conflicts of interests by clarifying that a person cannot be a President of QEC, or any of its subsidiaries, and also a Director of QEC.

2. **Appoint an Energy Advisor** reporting to the Premier to monitor energy related issues, recommend policies to Cabinet, and coordinate action on Cabinet level energy decisions.

3. **Establish the same pricing approach for fuel and power—**Ensure the pricing of petroleum products follows the same rules as the pricing of electricity by specifying that NFC and NPC are "designated utilities" under the URRC Act.

4. **Create an Affordable Energy Fund** and the financial procedures to enable an annual appropriation for power and fuel price subsidies.

5. **Establish implementation mechanisms** so these proposals can be carried out:

   (1) Create a GN Transition Planning Team to review implementation issues, develop an implementation plan, and submit an action recommendation to Cabinet.

   (2) Provide QEC with the mandate and resources to establish an implementation team to plan and coordinate implementation at the operational level.

6. **Establish the foundation for a comprehensive Nunavut Energy Strategy**

   (1) Find government and private sector partners with a similar interest in developing new energy strategies for isolated northern communities.

   (2) Establish a long-term Comprehensive Energy Strategy project with these partners to develop energy strategies and determine the feasibility of alternate energy projects (hydro line ties, local hydro projects, wind power, etc.).

That is the short list of what we think needs to be done. An explanation follows.

5.2 Context of The Model

Goals: security, efficiency, cost awareness, issue management

In discussing what Nunavut's energy management model should accomplish, we identified four design goals: *security of supply*, *system efficiency*, *cost communication*, and *management capacity*. The model should ensure consumers continue to get the energy they need, at a price they can afford to pay, and with no loss of service quality. It should minimize the cost and complexity of procuring, transporting and delivering energy. It should make it possible for the GN and consumers to know, and act on, the true costs of the energy they use. And, most important for the GN, it should enable the GN to manage its energy situation—acquire information, forecast impacts, develop plans and policies, implement them, and assess results. We believe the proposed model can meet these design goals.

Crown corporation model adopts GN's electricity approach

We assumed in developing this model that the GN retains the policy objectives it set out in creating NPC. After reviewing the ownership options discussed in the Ikuma Report, the GN decided that the supplier of electricity for Nunavut should be a standalone company owned and guided in a general way by the government. Consequently the GN chose a Crown corporation model. We have adopted that approach as the starting point for the design of an energy management model rather than revisiting the issues addressed in detail in the Ikuma Report.

Need to balance independence and GN guidance

The Crown corporation model is, we think, the best for this situation. It has its own problems, however, as we have already pointed out. The biggest is how to balance the independent business focus needed for efficient operation with the government guidance needed to achieve larger GN socio-economic policy goals. To address the problem, we recommend an energy management model that separates service supply functions from advice and oversight functions. This creates an institutional framework that can do the job, but to achieve balance in practice these institutions will need to develop clear policies and lines of communication. It will take a focused GN effort to make that happen.

Fuel shipping shows the balance problem

To illustrate the independence/guidance balancing problem, consider the example of decisions on how to ship fuel. We discussed this problem earlier in looking at the constraints faced by the PPD. The problem is basically this. An independent company responsible for supplying fuel will look for the lowest cost shipper so that it can deliver fuel at the lowest possible cost. It may be able to get a lower bid if the shipper carries only fuel and does not have to also carry dry goods. But if dry goods go in a separate shipment, the people buying the goods will pay more for freight. If the GN is the person buying the dry goods,[18] and also the person buying the fuel, it may be cheaper for it to pay more for shipping fuel so it can pay less for shipping dry goods. As the owner of the "independent" company supplying fuel, the GN will need some way of forecasting the costs and impacts of these shipping decisions and providing guidance to the company without unduly interfering with its efforts to provide services as economically as possible. This will require a policy framework in which the GN can provide guidance, but the company, as long as it stays within the framework, can make decisions without GN interference.

Before discussing the proposed model we need to emphasize that this model involves significant change. Given the need for security of supply, the change

[18] The GN may not be the direct customer. Food and household goods are shipped for commercial suppliers, co-ops, and contractors for the GN. In many cases, however, the GN pays the people who pay for the goods, including the shipping cost, what it costs to acquire the goods.

Phasing in the model will take time

cannot be implemented overnight. If the GN decides to seriously consider adopting the model as a framework, it will need to set up a Transition Planning Team of senior officials in NPC, PPD and the Department of Finance to develop a transition plan. The plan should enable the GN and the new energy company to develop and phase in the structures and policies needed for a coordinated move toward energy management goals. For the plan to work, it must be developed by those who make the current system work and who will be responsible for a transition with minimum disruptions. We will discuss the transition planning process later.

5.3 The Energy Management Model

(1) The Concept

Key – one energy corporation for fuel and power

The key component of the proposed model is a Crown corporation to supply all energy services. On the operational level, the Crown corporation—"Qulliq Energy Corporation"—would put the services provided by NPC and the PPD under one roof. They would be in separate rooms, however, providing power and fuel services through two sister companies. At the policy level, an "Energy Advisor" with expertise on energy issues would enable the GN to monitor Nunavut's energy situation, develop energy policy initiatives, work with other governments on energy policy issues, and coordinate action on Cabinet's energy policy decisions.

(2) Creating the Structures

Establishing the Energy Company

QEC set up to combine NPC and PPD

In the model shown, Qulliq Energy Corporation (QEC) would be set up as a Crown corporation responsible for supplying power and fuel throughout Nunavut. QEC would create two subsidiaries, one for power and one for fuel. Operationally the power company would be the present NPC. The fuel company would be essentially the present PPD. The Directors of QEC would also be the Directors of each of the subsidiaries.

Two options – Pass new Act, or amend existing

There are two ways QEC could be established. One is to pass new legislation specifically designed to create QEC and the necessary governance structures. The other is to simply amend the existing *Nunavut Power Utilities Act* so that it refers to "Qulliq Energy Corporation" rather than "Nunavut Power Corporation" and to ensure the scope of the Act is broad enough to enable the purposes envisioned for QEC.

Each approach has strengths and weaknesses. Passing new legislation specifically for the purpose of creating QEC may take more time at the outset since an entirely new piece of legislation would need to be drafted, reviewed and passed by the Legislative Assembly. It may in the long run make it simpler to reorganize the assets and liabilities of NPC and PPD. In contrast, the amending approach would likely take less legislative time and effort, but may result in more legal complexity when it comes to transferring NPC and PPD assets to the proper operating corporation. This matter is discussed in more detail in Appendix G on "Implementation Issues". To avoid confusion, for the rest of this discussion we will focus on the "amending" approach. Details of how things would be different under the "new legislation" are in the Appendix.

Creating Power and Fuel Subsidiaries

QEC would have fuel and power subsidiaries

To provide an orderly phase-in, QEC could start as essentially a holding company. It would need two operating subsidiaries—a technically "new" Nunavut Power Corporation (NPC) for electricity and Nunavut Fuel Corporation (NFC) for petroleum products. This could be done by QEC under the amended *Nunavut Power Utilities Act* since section 5 of the Act says:

> (2) The Corporation may, with the approval of the Executive Council, establish one or more subsidiaries to carry out its objects.

Consequently QEC could, with Cabinet approval, create subsidiary power and fuel business corporations under the *Business Corporations Act* of Nunavut. As the owner of QEC, the GN would also own the subsidiaries, NPC and NFC. We believe it would be best to keep NPC and NFC as separate corporate identities until the transition is complete. How things are structured after that should be a matter for the QEC Board to determine in consultation with the GN.

Senior GN staff need to do implementation plan

There should be no difference to the GN in terms of taxes or Federal Formula Financing whether the subsidiaries are established by special legislation or by QEC as business corporations. That is our view based on limited research. The implementation team should confirm that before the GN makes a final decision. At the same time the team should look at human resource issues. Our preliminary review suggests either approach can achieve the goal of a seamless transfer of the workforce, but this is something the Transition Planning Team should confirm.

Establishing Corporate Boards

Present NPC Board could start as QEC Board

Once QEC and its subsidiaries have been established legally, they need to be made operational. With the proposed amendment approach, the existing directors of NPC would automatically become the directors of QEC, unless the Act was amended to say otherwise. In our view, this part of the Act should be left as is. In that case the Minister responsible for the Corporation would be responsible for appointing Directors. Since QEC will be responsible for fuel as well as power, we believe one or two more directors should be added who have expertise in the fuel supply area. At the same time, adjustments should be made so that people responsible for the operations of the companies, the Presidents of QEC and its subsidiaries, are not members of QEC's Board. That will decrease the chance of a conflict of interest and reflect the practice in most Canadian jurisdictions.

One Board for QEC and subsidiaries

One of the design goals stated earlier is to make the energy supply system as efficient as possible. Given that, and the need for a seamless transition to this new model, we recommend that the Board of QEC also be the Board of QEC's subsidiaries—NPC and NFC. In effect this would be the existing Board of NPC subject to any changes or additions made by the GN after amending the legislation. At the policy level, the "one Board" approach will provide clear, consistent and cost effective direction and control for NPC and NFC. At the operational level, it will help the operating companies sort out their individual roles and responsibilities and coordinate operations. It will also simplify lines of communication between the Minister and the bodies responsible for energy services.

Advice and oversight

Informed advice at Cabinet level will be needed to develop and manage energy policy

Consolidating fuel and power supply into one Crown corporation will provide better coordination and more efficient delivery of these services. It will not satisfy the GN's need for an independent source of informed advice on energy matters. This need becomes more critical as energy issues play a growing role in government decisions, as is increasingly the case in the North. The NWT shares many of the same energy problems and opportunities as Nunavut. We believe the GNWT's decision to appoint an Energy Advisor to assist Cabinet on these matters has merit and a similar approach should be tried in Nunavut.

Energy cost savings should pay cost of advice

The Energy Advisor would be responsible for alerting Cabinet to energy issues, providing policy advice, and coordinating energy initiatives. That would require a person, or group, with considerable knowledge and expertise on energy issues. Considering the millions of dollars the GN spends on energy each year, this position should pay for itself through energy savings. It may also bring economic benefits by attracting the support of industry and other public and private agencies involved in energy initiatives.

(3) Transition Issues

Transferring Assets

NPC and NFC would have separate identities but share services

As discussed above, once QEC is established it can, with Cabinet approval, create the subsidiary operating companies NPC and NFC. There are at least three ways the transfer of assets could be carried out. Deciding which would work best is beyond the scope of this report and should be a top priority issue for the Transition Team. In our view, the transfer should have two goals. First the transfers should be structured in a way that interferes as little as possible with NPC and PPD operations. Second, the results should be two separate, effective and coordinated operating companies capable of sharing core services but tracking all costs along standard utility lines so that rates can be set properly.

The Transition Team will have to review 3 transfer options

The first two transfer options apply if QEC is established by amending the existing Act. Option 1 is to put everything in QEC and leave it there. Option 2 is to move everything to NPC and NFC. Option 1 would require establishing internal procedures for allocating costs to NPC and NFC. Option 2, transferring electricity related assets to the "new" NPC and fuel supply related assets to NFC, may make cost tracking easier, but may involve complex legal transactions. A third alternative would be to try to address all these issues in enabling legislation creating QEC as an entirely new Crown corporation. Determining which approach would work best for Nunavut should be the top priority for the Transition Team as part of developing a recommendation on whether to use the amending or new legislation routes to establishing QEC.

Keeping power and fuel in separate companies will reduce transition problems

Creating separate companies under QEC, ensures the power business and the fuel business can be kept separate initially and integrated over time as the QEC Board considers appropriate. This is in line with the "security of supply" guideline. There will be some restructuring with the inevitable accompanying confusion as PPD converts from a government department into a utility corporation. Keeping that corporation separate from NPC will prevent the transition from disrupting NPC operations. By creating a "new" NPC as a subsidiary, the present NPC will be able

to maintain its corporate identity—the signs, the trucks, the buildings, the bills are unchanged—and carry on business as usual with a minimum of interruptions.

Revolving Fund and Rate Stabilization Fund

The existing funds do not fit the utility model

When discussing the restructuring of PPD into a utility company model, questions frequently arose as to the affect this would have on the Petroleum Products Revolving Fund and the Petroleum Products Stabilization Fund. The short answer is that the Revolving Fund will not be needed and the Stabilization Fund for fuel would be treated the same as the similar account for power. We discussed these Funds earlier when comparing NPC and PPD operations. In brief, the *Revolving Fund Act* creates the Revolving Fund as a sort of operating account for PPD. The GN advances PPD "working capital"—money it needs to buy fuel, pay wages and accounts, carry out construction and maintenance, etc. The Act limits the amount the GN can advance at $55 million. The money from PPD sales goes back to the Fund to offset the advances. The Act requires the PPD to operate on a break-even basis. The Stabilization Fund operates as a $5 million buffer so that the PPD mandate to break even doesn't cause constant price changes to match costs. It protects consumers from unexpected jumps in fuel prices due to an unexpected increase in world oil prices.

The Revolving Fund would not be needed

In the proposed model there is no need for the Revolving Fund since NFC operates as a standalone utility financed in the same way as NPC. We discussed how that works earlier in the Report. Simply put, NPC, with GN backing, borrows the money it needs and pays off the loan with the money it collects in rates. NFC would operate the same way. It prepares an annual budget for approval by its Board. The budget says how much the company needs and where it will get it. As explained in the section on price setting, the amount the company needs would include all its operating costs, an allowance for working capital, and the cost of the financing that replaces the $55 million now advanced by the GN to the Revolving Fund. In terms of where the money will come from, some will come from the GN in the form of a budgeted affordable energy appropriation. The rest will come from selling products. The pricing of those products will be subject to review by the URRC and the approval of the Minister. We will discuss the details of this process in the next section on price setting.

NFC prices would be stabilized the same as NPC

Similarly, the Stabilization Fund would be treated the same as NPC's Rate Stabilization Account. It would not be an actual fund, but rather an account tracking over and under collections. NFC would not need to change prices as long as the amount it over or under collected stayed within a prescribed zone. The zone would be determined as part of the price setting process. Eventually, it may be possible to combine the stabilization accounts once the operations of NPC and NFC become sufficiently integrated.

Establishing Pricing and Subsidy Control Mechanisms

NPC and NFC should be designated utilities

The goal of the recommended restructuring is to integrate Nunavut's energy supply systems and enable the GN to manage its related subsidy costs. For that to work, the same price setting approach will need to apply to both electricity and fuel. In short, NFC would need to be brought into the URRC rate setting process that now applies to NPC. This can be done by a regulation identifying NPC and NFC as designated utilities under the *Utility Rates Review Council Act*.

Customers pay cost minus subsidies

The process set out in the URRC Act requires a designated utility to obtain Ministerial approval for any proposed price (rate) changes. The Minister in turn must seek the advice of the URRC. This ensures an independent review of price change proposals. There is an essential component of the pricing process, however, that is determined by GN policy rather than the Act—the level of subsidies. That component needs to be an integral part of the pricing process because the prices charged in Nunavut for power and fuel are not ultimately determined by what the service costs. They are determined by service costs **less** GN subsidies.

GN should budget subsidies in advance

At present, prices are set first and the GN absorbs whatever subsidy cost results. In our view, if the GN's goal is to manage its energy costs, it will need to establish a process that determines funds available for energy subsidies as part of the budgeting process and then has the utilities set rates that will recover the rest of the cost through rates. We believe this makes the most sense from an energy cost management perspective. We do not have the mandate or the expertise to say whether that approach is realistic in the GN's financial management context. That issue will need to be addressed by the financial experts of NPC, PPD, and the Department of Finance on the Transition Planning Team.

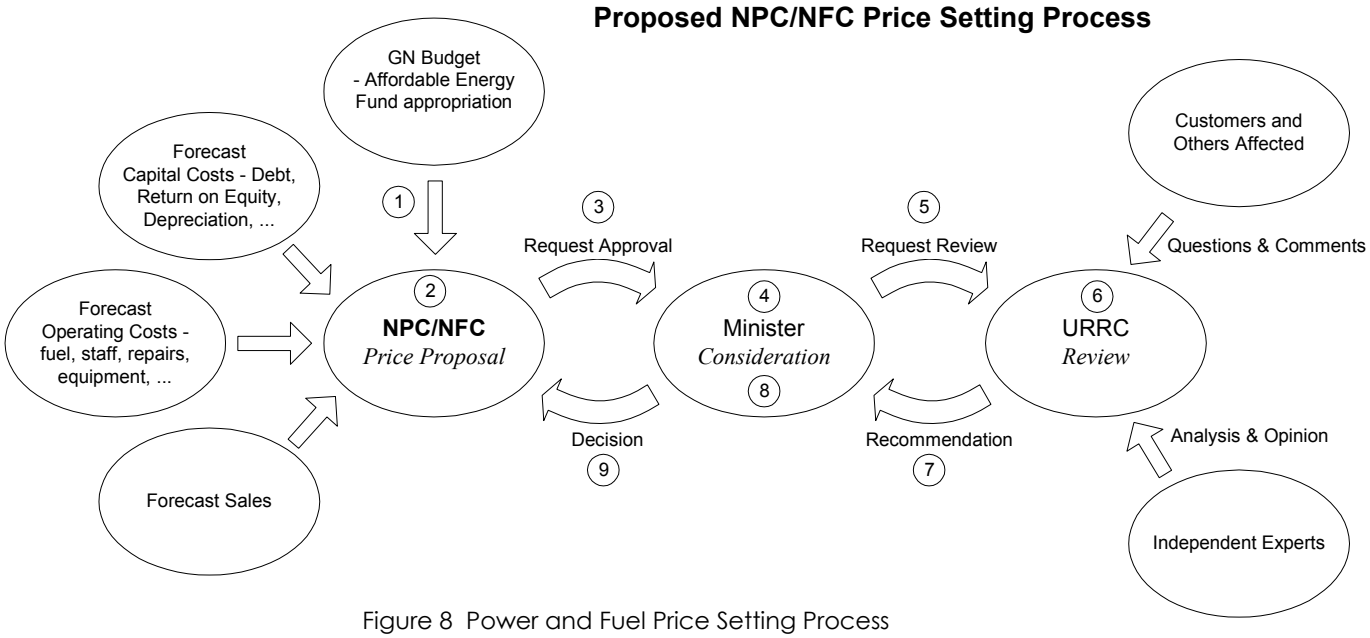


Figure 8 Power and Fuel Price Setting Process

Present URRC price review process would apply once subsidies are set

As the diagram above illustrates, a price setting process consistent with URRC Act and the goal of energy cost management would apply to both NPC and NFC. It would be along the following lines:

- FMB annually budgets a fixed amount for an "Affordable Energy Fund" to be used for funding subsidies for fuel and power;
- Company (either NPC or NFC) tracks all costs (operating and capital) required to supply services so the real cost of supplying the energy is known.
- Company develops a "Full Cost Recovery Rates" proposal that shows the rates required to recover costs.

- Company submits a Rates Proposal to the Minister based on the Full Cost Recovery Rates less the available subsidy from the AEF;
- URRC reviews the Rates Proposal as required under the URRC Act to determine if the proposed rates are fair and reasonable;
- Minister approves rates after consideration of the URRC's report.

GN policies are needed to implement the budgeted subsidy approach

Except for the parts dealing with subsidy determination, the process outlined above is required of all designated utilities by the URRC Act. It would automatically apply once NFC is specified as a "designated utility". GN policy decisions are needed, however, to implement the parts dealing with subsidies. The Transition Planning Team will need to address how this approach can be implemented. Part of the Team's mandate should be to consider the benefits of replacing the Territorial Power Support Program with an Affordable Energy Fund (AEF) that would determine the total amount available from the GN to subsidize both power and fuel.

Establishing Funds and Guidelines

A Transition Team should advise on how to restructure funds and simplify price reviews

The Team should also look at how the AEF would be funded. The present TPSP program is partially funded by dividends from NPC. The result is that NPC includes in its rates an amount so that it can declare a dividend to the GN. The GN then pays the dividend into the TPSP program to reduce rates. In developing the "one subsidy fund" approach, the concept of a dividend should be retained to reflect the full cost of the service, including the cost of capital. The Team should, however, explore the option of eliminating the need for NPC and NFC to declare dividends that the GN must pay into the Affordable Energy Fund. A notional equivalent of a dividend may satisfy the need to fully track costs and measure management performance and be easier to administer. The decision on this point should also take into consideration the impact on funding under the Formula Funding Agreement and any GN negotiations on adjustments to that agreement.

It should also be noted that, while creating NFC and the AEF could eliminate the need for the Petroleum Products Revolving Fund and the TPSP, there may still be a need for some form of stabilization fund to buffer rates from the effect of changes in oil prices. Such funds are standard for utilities to prevent the need to change rates every time fuel prices change.

Finally, it should be noted that the process set out above could become unwieldy for annual fuel price adjustments for NFC unless guidelines are adopted to facilitate the pass through of the cost of fuel to NFC. These guidelines would be designed to enable an annual adjustment of prices to reflect changes in the cost of fuel to NFC without a comprehensive URRC review of all aspects of NFC and NPC operations. Without such guidelines, the Minister may need to use the provisions of the URRC Act allowing the interim imposition of proposed rates pending a URRC review.

5.4 The Transition Process

(1) GN Planning for Transition

A team of officials from affected agencies should develop a Transition Plan

As indicated above, if the GN decides the proposed energy management model should be seriously considered it will need to create a Transition Planning Team of senior officials to develop a Transition Plan. The Transition Plan should address:

- ***Governance Issues***

As shown by the fuel shipping issue, in some cases the GN may want QEC's Board to operate within government policy guidelines when making business decisions. To avoid later confusion, these areas must be identified and the guiding policy spelled out.

- ***Human Resources Issues***

There will be some staff transfers involved in restructuring PPD into a corporation with the added responsibility of NPC fuel supply. In the short term this will probably mean no significant change in the total workforce, but it will mean new employers. The Implementation Plan needs to address the related human resource issues to ensure there is no interruption in the delivery of PPD services.

- ***Federal Formula Funding Agreement Issues***

Based on discussions with the Department of Finance, the proposed structure should have no effect on the funds received through the Federal Formula Funding Agreement. The Transition Team will need to look at this issue, however, since negotiations will likely be underway on the Agreement by the time the structures can be put in place.

- ***Legislation Issues***

The Team will need to develop the legislative package needed to create the necessary structure. This may include amendments to the *Power Utilities Act*, the *Petroleum Products Revolving Fund Act*, and other statutes and regulations. It will also include draft Orders in Council authorizing QEC to set up the subsidiaries and specifying that NFC and NPC are designated utilities under the *Utility Rates Review Council Act*. Finally, there will need to be a package of legal documents prepared to set up the subsidiaries and transfer property.

- ***Other Transition Planning Issues***

This is not a complete list of issues. The Transition Plan will have to address other matters such as communication. There will be resistance to changes in PPD if people do not understand why the change is being made and how it will be carried out. The plan will need to deal with how customers, employees, politicians, and municipal officials will be informed of, and involved in, the transition process. There are many other issues of a more technical nature, such as staff housing. They are beyond the scope of this Report, but will need to be addressed by the Team. Appendix G on Implementation Issues provides a more detailed look at these issues.

The output of this phase of the process is a Transition Plan for Cabinet approval. The plan should provide clear terms of reference, a suggested time line, and a budget. On approval, the implementation phase would begin. We believe QEC, as

the body ultimately responsible for making the system work, should play the lead role for this phase.

(2) QEC Planning for Implementation

QEC needs its own implementation team to address operational issues

Although QEC would not yet formally exist, it would play a major role in the GN's Transition Planning Team through the participation of senior people from NPC and PPD. In preparing its Transition Plan, the Team will need to deal with primarily GN issues—policy, finance, legislation, etc. It will also need to touch on operational issues—how QEC gets up and running effectively with two operating subsidiaries and no service interruptions. That group of issues is best left to the QEC component, with assistance from various GN departments as required. This QEC Implementation Group may have many of the same members as the Transition Team, but it would be focused on preparing a QEC Implementation Plan. The Plan's objective would be to ensure QEC's assumption of responsibilities maintains service quality while being carried out in a timely, orderly, and efficient manner. That can't be done unless operational people are directly involved in preparing the plan.

The QEC Implementation Plan would address three main classes of issues:

- ***NPC Operational Issues***

There should not be many transition issues for NPC at the service delivery level since these components will likely remain intact. With basically the same Board and employees the only short-term difference would be the transfer of fuel responsibilities to NFC. To get through the initial transition period, NPC staff may need to provide support services to QEC. In the longer term, however, there will be changes in both NPC and NFC as QEC management consolidates the common functions of the two subsidiaries.

- ***NFC Operational Issues***

The major issue for the Implementation Group will be how to transfer PPD from a government department to NFC as painlessly as possible, and with no disruption of service. It is unlikely staff will need to change location, so the staffing side should be relatively straightforward. It will, however, take a lot of planning and work to ensure this staff has NFC systems in place to replace services currently provided to PPD as part of government.

- ***QEC Operational Issues***

The implementation plan should address the question of how QEC will develop its core capacity to provide support services to both NPC and NFC. With the guiding goal of efficiency in mind, QEC will need to identify areas in which NPC and NFC require similar types of support services. The likely areas would include

- Human Resources—records management, labor relations, payroll, benefits;
- Financial Services—billings, accounts receivable, contracting, audit functions, treasury functions (raising capital), information systems;
- Engineering Support—infrastructure planning, facility design, cost studies, capital project management, technical support to O&M;
- Research and Development—conservation, energy management, alternate energy.

Although not spelling out the process in detail, the Implementation Plan should provide general guidance on how QEC will structure the supply of services to each of NPC and NFC, including how the cost of providing those services will be tracked and paid for. Consolidating these services should reduce costs and increase the level of skill and expertise available to NFC and NPC. Proper cost tracking will be essential, however, to provide the GN with a clear picture of the cost of each form of energy and an insight into the efficiencies of each of the subsidiary operating companies.

(3) Implementation Schedule

The transition should be completed within three years

The following chart shows a proposed schedule for implementing the recommendations in this Report. The Transition Planning Team will have to develop a realistic schedule. We have include this simplistic version here because we believe it is essential that, once having set a direction, the GN provide clear targets and timelines so the transition takes place as soon as practicable. Otherwise the matter may get studied to death.

The last part of this schedule deals with a comprehensive energy strategy. We turn to that next.

Task	Fiscal Year		
	2003	2004	2005
GN Transition Action			
Decision on Energy Management Model			
Appoint Transition Planning Team			
Appoint QEC Directors with fuel expertise[19]			
Develop GN Transition Plan			
Draft legislation and transition documents			
Implement GN Transition Plan			
QEC Action			
Appoint QEC Implementation Team			
Develop QEC implementation Plan			
Set up NFC and transfer PPD assets			
GN Comprehensive Energy Strategy			
Retain Energy Advisor			
Develop energy strategy agreements (fed/prov/industry)			
Develop overall energy strategy			
Negotiate devolution of oil & gas resources			
Implement long-term energy strategy			

Figure 9 Implementation Schedule

[19] With the legislation amending approach, NPC would essentially be renamed QEC so at this stage the appointments would really be to the Board of NPC. It would be helpful to have directors with fuel expertise in before the actual transition to help with planning and follow through.

6 NEXT STEPS

Overview of action needed to get to stage three—Developing a comprehensive energy strategy

6.1 Introduction

Nunavut is at stage 2 of a 5-stage journey back to energy self-reliance

At the beginning of this Report we talked about the change in Nunavut over the last century—the move from energy self-reliance to almost total dependency on imported oil. This report is the second stage in Nunavut's long five-stage journey back to energy self-reliance. The long journey can be summarized as:

- ***Stage 1 - Get control of electric energy***. That was dealt with in the original Ikuma Report.
- ***Stage 2 - Create the capacity for the GN to manage Nunavut's energy situation.*** The capacity to rationalize fuel supply and energy pricing, to manage energy costs, and to make informed energy policy is the topic of this Report.
- ***Stage 3 - Develop and implement a comprehensive energy strategy.*** To get through the next 20 years the GN needs to be able to identify and develop renewable energy sources, control consumption, and manage energy costs. That will take a comprehensive energy strategy that will be expensive and require cooperation with other governments with similar objectives.
- ***Stage 4 - Acquire control of all of Nunavut's energy producing resources.*** The GN needs control of water, minerals, and oil and gas to develop their energy potential. That is the objective of devolution talks with the federal government. The earlier an agreement can be reached the sooner the GN can begin laying the foundation for the fifth stage.
- ***Stage 5 - Develop Nunavut's energy resources***. Given its hydro and hydrocarbon resources, in the long run Nunavut will be an energy exporter. Developing these resources will involve long lead times and enormous amounts of capital. Although it may take 20 years or more for many of these projects to begin producing energy, the GN should start putting the planning and policy foundation in place within the next 5 years.

So far in this Report we have concentrated on stage 2—creating the institutional capacity to cope with Nunavut's energy situation. In this part we look at what is need to move on to stage 3, the development of a comprehensive energy strategy that will enable the GN to effectively address Nunavut's long-term energy needs.

(1) The energy cost situation

Energy takes 18% of the GN budget, limiting options for other programs

To recap the situation described earlier in this report, Nunavut has a major energy problem. In the lifetime of some residents, communities have changed from self-reliant efficient users of local sustainable energy resources to totally dependent consumers of large amounts of imported fossil fuels. If this dependency continues, or increases further it will severely limit the GN's economic and social options.

To illustrate, in fiscal 2001, the cost of providing fuel for heat and transportation in Nunavut was about $86 million. The cost of providing power was another $51 million. That's a total of $137 million to provide energy. Because of the GN's ownership of public buildings, its assistance programs, and its policy of rate subsidies, roughly 84% this total was paid, directly or indirectly, by the GN. That is

$121 million, or 18% of the GN budget, not available for other purposes. As current consumers increase their per capita energy use, the number of consumers increases, and oil prices rise, a larger and larger share of the government's resources will have to be withdrawn from health, education, culture and other programs to buy imported oil. This reallocation of funds may prevent the GN from achieving important economic, educational and social objectives.

Bringing Nunavut's oil and gas on-stream will make it an energy exporter

As discussed earlier, the long-term picture is less bleak. Nunavut has large known oil and gas reserves. They are unlikely, however, to provide much relief in the short or mid term. Barring some kind of North American supply crisis, it will likely be at least 20 years before these resources will be brought into production. In the intervening period, ensuring an affordable supply of energy throughout Nunavut will be a major problem for the GN.

(2) International Factors

Factors beyond its control are likely to increase the GN's energy costs

The financial linkage between Canada and Nunavut ensures a mutual interest in addressing the implications of the Kyoto Accord and unpredictable world oil markets. To fulfill its commitments made under the Kyoto Accord, Canada needs to take extraordinary measures to reduce its dependence on oil for energy and especially for the production of electricity. This will inevitably lead to some form of greenhouse gas emission penalties applied to burning oil—driving up the effective price of oil as an energy source. While the cost of these pollution penalties is somewhat within Canada's control, there is little it can do about the international price of oil. Vagaries in this market place can be expected to increase budgetary anxiety and also costs for the GN and Government of Canada. In addition to the greenhouse gas situation stringent regulations have been imposed on shipping companies transporting and handling fossil fuels by sea. These changing regulations will further escalate costs of transportation.

(3) GN Efforts

The GN's efforts to address energy issues need to be strategic and coordinated

The GN has begun addressing its energy problem by initiatives on both the supply and demand side. On the supply side the first step was to set up its own power company—NPC. As a corporation answerable to the GN, NPC provides a vehicle for initiatives to develop alternate sources of electric energy and reduce the cost to the GN of electric energy use. Because NPC is run like a regulated utility, with rate proposals reviewed by an independent body,[20] the costs associated with providing electric energy can be identified and monitored by the GN. The creation of a similarly constituted and regulated corporation for fuel services as recommended by this Report should provide similar benefits on the fuel use side.

On the demand side, the GN has directed government departments to look at ways to reduce consumption and consider sustainable alternatives. As discussed earlier in this Report, the Department of Sustainable Development is working on identifying and developing energy conservation options for housing and community facilities. The Research Institute at Arctic College is also helping in the effort to identify sustainable energy alternatives. In the search for lower-cost electric energy options, the GN has carried out a review of the Churchill Kivalliq Transmission Line

[20]The Utility Rates Review Council reviews NPC's rate proposals to determine whether the forecast costs are reasonable and the rates charged various customer classes are fair.

Study—a pre-feasibility study on a transmission line into the Kivalliq. In spite of these efforts, at present there is no coordinated overall effort to develop a long-term energy strategy for Nunavut. Developing such a strategy will be expensive, but once in place should pay for itself many times over as lower cost energy options are developed and related GN expenditures brought under control. The GN's next step should be to develop such a strategy.

6.2 Developing A Comprehensive Energy Strategy

(1) Finding Partners

Partners are needed to cost-share the development of mutually beneficial energy strategies

A comprehensive energy strategy should include the policies, programs, and structures needed for the GN to manage its energy situation. In particular, the GN will need to be able to initiate and coordinate efforts to

- **develop local energy alternatives**—find local sources of energy that can be developed using modern technology;
- **reduce energy consumption and demand**—individually and collectively;
- **increase generation efficiency**—get more energy (heat and power) out of each barrel of imported oil; and
- **streamline energy supply systems**—reorganize energy acquisition, transportation and delivery systems in Nunavut to avoid duplication and reduce costs.

Developing such a strategy will be expensive—it will require extensive research, data collection, analysis, and policy development. To reduce the cost to Nunavut, an effort should be made to partner with governments and industry that stand to benefit from new approaches to providing energy to isolated northern communities. In particular, the Government of Canada will benefit significantly and is an obvious partner. Given the existence of Crown corporations with responsibilities for supplying energy to isolated northern communities, there should also be areas of mutual benefit with Nunavik, northern Ontario, Manitoba, Saskatchewan, and the NWT.

(2) The Benefits to Canada

The federal government is a natural partner—last year it paid $111 million for Nunavut energy

The Government of Canada will benefit from effective energy strategies in Nunavut. It funds roughly 92% of the GN's budget. Using figures from earlier in this Report, that means Canada paid roughly $111 million[21] in fiscal 2001 to supply energy to Nunavut. As energy costs increase for Nunavut, so will they increase for Canada. That is one good reason for Canada to be interested in any project that develops effective strategies to reduce Nunavut's energy costs. There are two other good reasons—Canada's energy responsibilities in isolated communities outside Nunavut, and Canada's commitments to reducing greenhouse gas emissions. An energy strategy for Nunavut that lowers costs and reduces reliance on fossil fuels should have the same benefits for other isolated northern communities. That would

[21] Basis of calculation (millions). GN budget: $713. Federal funding: $655 (or 91.86%). Total amount spent on fuel and power in Nunavut: $145. Amount of that paid directly or indirectly by GN: $121.3 (84%). Amount of what GN paid that was federally funded: $121.3 x 91.86% = $111.4.

mean significant savings to Canada given the scope of its responsibility to provide power to hundreds of such communities, either directly or through the funding of Territorial or First Nation governments.

(3) Energy Strategy Components

A 25-year energy strategy should specify goals, identify costs, find viable new energy sources, and address implementation

The Study should develop the components necessary for Nunavut and Canada to develop a mutual energy strategy. It should, at least, provide an understanding of Nunavut's long-term energy situation—needs, sources, conservation options and costs. It should identify alternate energy options with emphasis on renewable sources. It should also recommend a framework of strategies, policies, programs, structures and funding that, based on a 25-year time frame, will achieve clearly identified and measurable objectives. In short, the study should provide the basis for an overall energy strategy.

The content of the study will have to be developed with the study partners. To illustrate, however, the GN may want to consider including the following:

- **Statement of Objectives**—An energy strategy should identify specific results (such as percentage change) to be reached by a target year in areas such as:
  - Increase in the share of energy provided by local sources;
  - Reduction in the GN cost of dependency on imported oil;
  - Reduction in per capita energy consumption;
  - Limits on capital additions required to provide fuel and power;
  - Improvements in efficiencies in fuel use for heat and power; and
  - Increase in share of energy used coming from "Renewable/Green" sources.
- **Forecast of Long-Term Energy Costs**—The GN needs a credible forecast of costs related to energy use to make informed decisions on investing in energy alternatives. To that end the study should provide:
  - Data on energy use and trends—per capita consumption, new facilities, etc.;
  - Trends that cause concern—demographics, oil price increases, Kyoto accord costs, etc.;
  - Budgetary implications for the GN and the Government of Canada.
- **Energy Alternatives**—Feasibility of alternate local supply energy options—wind, low-head hydro, fuel cells, solar, geothermal, etc.—and of building lines to import power;
- **Cost of Alternate Strategies**—Impact of inaction—cost to social, cultural and education programs of importing oil for energy—Payback period on investment;
- **Strategies For Reducing Consumption and Demand**—Pricing mechanisms to create incentives for wise use—Funding mechanisms to support changes to more efficient equipment and appliances;
- **Strategies For Efficiency and Coordination**—Enable GN to focus efforts and reduce duplication; and
- **Strategies for Implementation—**Identify funding mechanisms for developing alternate energy sources and reducing consumption.

This is not a definition of what the study should cover, but an illustration of topics that should be addressed with prospective partners in order to develop acceptable terms of reference.

(4) Implementation

Nunavut needs agreements with partners for work on energy strategies that will help northern communities generally

A study along the lines suggested will be time consuming, expensive, and require the assistance of an independent and respected consulting group with expertise in alternate energy, and in the production and transmission of electric energy. Although such a firm can provide the specialized technical expertise needed for the study, Nunavut communities will need to participate to ensure that the strategies developed reflect the realities of community situations, their needs, and potential cultural impacts. The GN will also need to play a key role by providing data, project coordination and reality checks on ideas. The Energy Advisor would be the logical person to coordinate GN efforts.

The next step should be to begin assembling a project coordinating team made up of representatives of governments and industry that stand to benefit from the results of the project and wish to participate. As a stable government with responsibility for communities that are isolated, northern, diesel dependent and largely aboriginal, the GN should be acceptable as the entity responsible for project coordination. It may also be useful to include the Nunavut Research Institute as a vehicle for related scientific studies.

The third and last step for the purposes of this Report will be to get agreement among project participants on the scope, objectives, work plan and funding for the project. With that in place a suitable consulting firm can be found and the work can begin.

In summary, to effectively deal with long-term northern energy problems there needs to be a mechanism for communities, technology companies, and governments to cooperate in and benefit from developing solutions. An Energy Strategy development mechanism coordinated by the GN, along the lines set out above, could play that role.

7 SUMMARY OF APPENDICES

(1) Appendix A—NPC Governance

(2) Appendix B—NPC Financial Administration

(3) Appendix C—NPC Fuel Consumption by Community

(4) Appendix D—Petroleum Products Division Operations

(5) Appendix E—NPC 2002 Fuel Re-supply by Community

(6) Appendix F—Fuel and Power Cost Forecast

(7) Appendix G—QEC Implementation Issues

(8) Appendix H—Abbreviations and Acronyms