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*The Energy
Initiative*

ENERGY STRATEGY
for the
NORTHWEST TERRITORIES
1980 - 2000

a strategy paper
for the achievement
of
reasonable prices
and
energy self-sufficiency

Ministry of Energy
November, 1981.

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Purpose of this Report

This report is intended to provide an overall perspective on the energy problems of the NWT. The report highlights the major problems and suggests where the solutions lie.

The report was written initially in October, 1980 and was circulated to program departments and reviewed by the Executive Committee February 3, 1981. It was first tabled in the Legislative Assembly on March 13, 1981 and has subsequently been updated in the light of new developments.

The report is hereby presented to the Legislative Assembly for discussion of the recommended strategies. Subsequent to the consideration of the Assembly, a formal energy policy will be drafted.

SUMMARY

It is rapidly becoming "old hat" to talk about high energy prices, so much has the subject been discussed lately. However, the NWT's energy problem is very real and of dangerous proportions, and can no longer be accepted without heavy penalties to our future economic growth.

Heating oil and diesel motor fuel are the mainstays of our energy diet. Together, they account for 60% of the "end use" energy consumed in the NWT. For these fuels, we consume from three to six times the national per capita average. Coupled with the fact that these products are significantly more expensive in the North, this situation creates a financial burden of oppressing proportions.

Given the provisions of the recent Canada/Alberta accord, prices for these products will, at least, double by 1986 and rise by a factor of three by 1990.

Current NWT consumption levels are possible only with massive federal and territorial subsidies. As prices rise, it will become increasingly difficult for our Government to maintain the same levels of energy subsidization.

Regardless of who funds the subsidies, no responsible government, particularly one seeking to develop its powers, can allow the current situation to continue. This Government must accept energy as a priority focus equal in importance to economic and constitutional development.

In response to its energy problems, this Government has adopted objectives of energy self-sufficiency and stable/reasonable prices. These goals appear attainable within the foreseeable future if an aggressive attack is launched simultaneously on two fronts:

1. Conservation of considerable proportion is possible. While the private sectors have both an incentive to conserve and remedies that can be applied, there is too little in the way of incentive or remedy for the public sector (public housing and institutional government). The immediate focus of the renewed drive to conserve should be the public sector.
2. Local supply sources must be developed to replace conventional products shipped from the South. Conservation alone will reduce the size of the problem, but will not eliminate it. There are two new supply possibilities.

First, new supply may come from the development of alternative sources of energy such as wind, water, wood and coal, on a community scale. These can be developed within two to ten years. Economically viable alternatives do appear to exist today for some communities.

The Government of the Northwest Territories has been reviewing these possibilities as quickly as resources permit. However, funds available to the key departments for energy investigation work are severely limited. As a result, we have depended largely upon federal funding sources. Though the federal Department of Energy, Mines and Resources continues to develop its programs in this field, and there is a promise of some future remote community programs, to-date the Department has focused on the energy problems in the South. As a result, analysis of our energy alternatives has proceeded too slowly and certain promising opportunities await evaluation.

Notwithstanding the federal efforts, treatment of the problem will require a dedication of territorial resources in manpower and capital. It is anticipated that solutions will only be developed in an acceptable time-frame if this Government "leads" the effort.

Second, the major development projects being planned for the North could provide energy to neighbouring communities within ten to twenty years.

Neither industry nor the Federal Government have adequately recognized the possibilities here. This Government is adopting the policy that oil and gas developers in the NWT must include in their project planning and production proposals, plans to provide energy to accessible NWT communities.

There are several forms in which this supply could be delivered:

- as conventional products, diesel and gasoline;
- as propane, a liquified petroleum gas usually found with natural gas;
- as methanol, an alternate liquid fuel produced from natural gas;
- as LNG, liquified natural gas.

Propane, methanol and LNG have varying potential for replacement of oil for space heating, transportation and diesel generation. Methanol, for example, would require little change to our current tank farms and furnaces and could be transported in barges as is done now with oil. Propane, on the other hand, would require community conversions of a large scale.

This report discusses the strategies noted above and their implications for current government programs. The role of subsidies is treated at length.

The report notes that unilateral action by the Territorial Government with respect to the development of alternative energy systems is not possible given the lack of key resource control powers. Therefore, negotiations with DIAND and EMR are currently taking place with a view to assuring that developing federal policies properly account for northern problems. Acceptance of the principle strategies contained herein by the executive and legislative branches of this Government will provide the force required for a more active role in these negotiations.

The NWT is recognized as a Canadian leader in the development of wood gasification, engine waste heat capture, and community heating systems. We have an opportunity now, albeit the necessity, to extend this lead to become the Canadian pioneers in remote community energy systems, based on fuels other than oil. This will be accomplished only if the Government of the NWT is willing to dedicate more resources to energy solutions.

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A. THE PROBLEM

1. The Nature and Cost of NWT Energy Consumption

As commonly believed, living in the NWT truly is an energy intensive activity. In comparison with the Canadian average, NWT and Yukon residents use roughly 40% more energy when all forms are combined (see Table 1). Much of this high consumption appears attributable to space heating requirements and the widespread use of diesel electric generating sets.

Thus it is not surprising to find that the NWT alone uses 7 times as much diesel fuel and 2 ½ times as much fuel oil on a per capita basis as the Canadian average (see Table 2). Fuel oil alone accounts for roughly 35% of total NWT energy consumption.

On the other hand, our use of electricity and motor gasoline is considerably lower than Canadian averages.

The delivered cost of different energy forms to the user varies widely. Using the domestic consumer for comparison, prices move from a current high of \$58.25 per gigajoule* for diesel generated electricity to a low of \$7.91 for heating oil. Table 3 provides a summary of the cost of various energy forms.

These costs are roughly projected into the future on the basis of expected fuel price increases and inflation. Petroleum based forms of energy are shown to rise significantly in the near term, while hydro electricity rises more slowly.

* gigajoule (10^9 joules) is a unit of energy. Different forms of energy such as electricity, gasoline and heating oil can be compared when they are all expressed in this same way. One gigajoule is equivalent to roughly 275 kW.h, or 6 gallons of heating oil.

Diesel generated electricity is a highly fuel intensive activity. Prices will rise to extreme proportions in the future, over \$200/GJ by 1990. Though this form of energy accounts for only 3% of total NWT consumption, its extreme cost leads it to account for an estimated 20% of total NWT energy expenditures. Obviously, the use of diesel to generate electricity is a key problem area.

Comparing the price of energy in the NWT to Canada (Table 4), it is apparent that the private and corporate residents of the NWT are generally at a decided disadvantage to identical consumers in major centres in the South. The price of domestic service hydro electricity in the NWT, is not greatly out of line with prices charged in other off-grid areas of Canada. The price of petroleum products, on the other hand, is definitely out of line with all other areas of Canada except Yukon.

Considering:

- the forms of energy which we rely most heavily on, and
- the current and projected costs, and
- the Canadian norm for these commodities.

it becomes apparent that this Government's immediate strategy must revolve around reducing the use of petroleum products for space heating and electricity generation.

2. Supply Uncertainty

We know that diesel and furnace fuel are the mainstay of our energy diet and that the cost of these fuels can be expected to rise dramatically. At least we have always had as much as we wanted. That situation may not continue in the near term.

Reserves of conventional crude in Canada are declining rapidly and at the current rate of production will be largely depleted by the year 2000. These are being replaced by new supplies of synthetic crude from the oil sands and frontier production. Moreover, switching from oil to natural gas in Eastern Canada and conservation across the country has reduced the demand for oil. However, these new supplies and demand reductions are not taking place fast enough to prevent a rapid increase in the amount of oil imported. Canada currently imports about 450,000 barrels per day to supply refineries in the Maritimes and to some extent Quebec and Ontario. This represents 25% of the total Canadian demand. Forecasts for the future vary widely from source to source. It appears reasonable to predict that imports will increase in the near term and taper off gradually thereafter as new supply is developed in response to higher producer prices. By the year 2000, imports are likely to be down to more reasonable levels, likely 100,000 to 200,000 barrels per day.

In the event of a prolonged conflict involving oil-producing countries, the NWT would have to share reductions in oil supplies with the rest of the nation. The Federal Government has provided for the continued shipment of fuel to remote NWT communities in the event of a national shortage. However, Northerners would be expected to carry their share of the burden in reducing oil use.

Any action we can take now to reduce our dependence upon uncertain fuels, makes good sense for the continued economic and social well-being of the people.

B. THE OBJECTIVE

1. Energy Policy Objectives

One goal of the GNWT has been stated as:

"Controlled growth, expansion and development in the North in keeping with the aspirations of the people, their culture, tradition, pursuits, lifestyles and skills, while affording useful and meaningful employment opportunities at all levels of society."

This goal cannot, in part, be achieved without certain assurances about the cost and availability of the energy required to fuel the economic activity. It follows that the energy goals of the GNWT must be:

- self-sufficiency in energy, that is the development of a supply that can be controlled within the region, and
- a pricing structure that is reasonable and moreover, is stable.

C. THE SOLUTIONS

1. Conservation

It has often been stated that the cheapest source of fuel is conservation -- it is cheaper to save a gallon than to buy it. There is little doubt that this "truism" is valid in the NWT in 1981.

It is proper for this Government to make its conservation program as strong as possible, before going on to other solutions to the energy cost crunch.

Conservation programs should vary by economic sector.

- a. The private sector - residential, industrial, commercial - have ample incentive to conserve considering that consumers in this sector bear the cost of their own consumption.

The Federal Government has established programs that assist the residential consumer to improve the energy efficiency of his home. These programs, Canadian Home Insulation Program (CHIP) and SuperCHIP, offer up to \$1,300 in grants for insulation and other conservation measures. These programs have been well publicized and are administered by the Federal Government.

It appears that the valid role for the GNWT in the private residential sector is one of education and encouragement, to change attitudes with respect to energy consumption and to inform people as to the means/practices available to conserve.

For business and industry, there is a program designed to provide technical advice on conservation through a free energy audit of the customer's premises and operations. Called the National Audit Program, this effort is administered by the province or territory and is cost-shared 80/20 with the Federal Government. The NWT has not undertaken the program, though other provinces and Yukon have.

NWT involvement in this program appears advisable. A review of the opportunity is being undertaken by the Office of Energy Conservation. If the program is determined to be significantly beneficial, resources should be allocated to the appropriate implementing department.

- b. The public sector - housing 63% of all residential heating oil is consumed in public housing. This consumption is almost totally subsidized and there is little incentive to conserve. The NWTCHC is making an effort to stimulate "user pay" practices and this is appropriate strategy. However, it

must be recognized that for the foreseeable future, given the economic nature of the remoter communities, it will not be possible to transfer a majority of costs to the client. The price mechanism, as a force for conservation, will remain largely inoperative.

Given this fundamental system failure, the GNWT must play a larger role in these remoter communities by planning, funding and installing alternative energy supply systems that will provide the benefit of long-term price stability.

In the short term, the NWT Housing Corporation could make use of Canada Oil Substitution Program grants that provide up to \$800 per unit for the installation of a heating source other than oil. Throughout the Mackenzie Valley, considerable savings to the GNWT are possible if wood was used to replace oil. It is suggested that immediate consideration be given to the development of a conversion program to bring about this change. This suggestion is treated in greater depth under the heading Community Energy Sources.

- c. The public sector - government operations 31% of all heating oil used in the NWT is used by the GNWT, for residence and building heating. Though fuel costs are rising, this Government is not adversely affected due to the method of utilities payment negotiated with the Federal Government. Fuel price increases are automatically funded, reducing our need to worry about the amount of our consumption.

A further impediment to effective GNWT conservation is the placement of the utilities budget with one Department - Public Works. This Department has often stated that they bear the burden of government conservation planning and action, while the consuming departments are not burdened with the responsibility of controlling their use. As a result, any casual observer can see occasions of energy waste, sometimes gross and negligent waste, attributable to lack of attention to this matter by departments.

As a last point, though DPW currently spends \$2.5 million a year on conservation, no bench marks, guidelines, targets or objectives have been developed that can be used to evaluate government performance or to judge whether we are spending too little or too much.

To improve the GNWT conservation effort, and as a matter of immediate strategy, four things must happen, and all four must take place for effective conservation within this Government.

- establish time-frame specific conservation targets for each department/region and the Northwest Territories Housing Corporation;
- give department responsibility for their utility budgets with the ability to make use of saved funds for other purposes;
- advise departments that energy budgets will not be automatically increased because prices have increased, but that departments will have to demonstrate attention to reducing their energy use;
- funds allotted to conservation education and information should be increased, particularly with respect to a continuation of the current public campaign.

As a general rule in conservation programs, whether for public housing, schools, or government departments, a portion of the moneys saved through conservation should be given back to the conserving agency for use in other programs.

- d. The public sector - municipal. Municipal conservation is fostered by the Department of Local Government in a variety of ways including: advice, the release of money budgeted for energy but not used by the municipality, the development of better community design standards.

There is a federal program that offers even another way to achieve energy savings. Called the Municipal Energy Program,

this plan will fully fund the first year costs of a specialist to work with a community to find ways to save energy. With some redesign, this program could provide assistance to a number of communities on a part time basis. NWT involvement in this program should be immediately studied by the Department of Local Government and if appropriate, resources should be allocated to the appropriate department.

- e. All sectors - building standards There appears to be a need for a more explicit building code for the NWT that enforces standards appropriate to the climate. These standards could be based upon "life cycle costing" principles that ensure that future energy costs are considered as important as initial capital cost in the construction of any structure.

The Federal Government has announced their intention to develop a new Arctic Housing Standard. The Department of Public Works and the NWT Housing Corporation should become fully involved with this process.

- f. Conservation: It's Affect on Prices It is commonly argued that there is no point in conserving electricity in the NWT. The reasoning is that the producing utility will increase rates to make up for lost revenue, and individual customers will end up paying the same for a lower standard of living. People feel that this is particularly true when electricity comes from hydro.

The argument is not valid as a reason for avoiding conservation.

First, in principle, conservation is the avoidance of unneeded energy consumption. It has little to do with a lower standard of living. It is more a careful use of a commodity. We do not throw away food, why burn electricity for no reason - why leave lights on in unoccupied rooms, why plug a car in all night when

two hours in the morning will heat it to the same point.

Second, no customer in the NWT is serviced solely by hydro. Diesel generation supplements every hydro source and adds significant cost. The kW.h that is conserved is a diesel generated kW.h in every case.

Third, reducing the load on a diesel does save fuel and extends the life of the equipment. Savings do accrue to the rate payers, and in the short run the savings are proportional to the amount conserved.

Fourth, community conservation on a reasonable scale will put off the need for larger generators that might otherwise have to be brought in to handle the community's growth. This would save the rate payers a considerable amount.

A person who carelessly uses too much energy, is throwing away not only his own money, but some of his neighbor's as well.

2. Developing our Strengths: Community Energy Sources

Despite the best efforts in the world, conservation alone will never achieve long-term price fairness/stability, or self-sufficiency. To achieve these goals, we must simply back-off the use of oil as an energy source. Faced with similar problems and goals, the provinces have each moved to capitalize on "home" resources in "off-oil" strategies of one kind or another.

Quebec is making increased use of hydro-electricity, the Prairies are heating with natural gas and British Columbia is converting to gas, developing its coal and using forest industry waste.

Our own particular strengths lie in the energy alternatives available locally to our communities.

Enough studies have been carried out in the recent past, to indicate that we may now have economically viable energy alternatives in water, wood, wind, coal, or natural gas. Our current knowledge of these resources is documented in the report Community Specific Energy Supply in the Yukon and Northwest Territories, Adelaar and Associates, Ottawa, 1981.

Keeping in mind, that alternatives must be applied to replacing oil for space heating and electricity generation, the following is a summation of how these alternatives can be used.

a. Water

Hydrological surveys have been completed for most rivers in the NWT, backed by specific power site proposals for promising locations. Hydro power offers a long-term source of stable cost energy for domestic and industrial use including space heating. However, most of the hydro studies in the NWT have focussed on large scale generation proposals. These studies were done when the main concern was providing power for pipelines. Very little work has been done to identify the economic feasibility of small scale projects to provide power for a single community.

Newfoundland, Ontario, Saskatchewan and British Columbia have proceeded to develop remote community sites, generally sharing the capital costs with the Federal Government. In the NWT, some preliminary studies of Keewatin and Hay River area

potential have uncovered encouraging results.

The NWT Science Advisory Board has undertaken a survey of the community-scale hydro generation possibilities within the NWT to identify the most promising sites. This study is expected to commence early in 1982.

b. Wood

Readily available throughout the Western Arctic, this resource can be burned directly for space heating, or chipped and gasified for the small scale production of electricity.

In the Mackenzie Valley given the relative value of wood and oil, their combustion efficiencies and natural heat value, wood is significantly cheaper than oil now. (Table 5).

The Housing Corporation has reacted by planning the installation of wood heating in many new houses constructed in 1981.

Conversion from oil to wood for space heating should be considered for public and government housing in some areas. Funds from the Federal Canadian Oil Substitution Program could be used for this purpose, perhaps incorporated with a GNWT program to further assist homeowners and tenants with conversion.

Conversion to wood heating would give important benefits other than lower energy prices. First, it would allow the NWT Housing Corporation to remove the subsidization of tenant's oil purchases. In Mackenzie Valley communities, most residents who own their own homes use wood. There seems no reason for public housing tenants to require a level of service higher than the norm elsewhere in the community.

If the Housing Corporation were to assist their tenants in converting to wood, the gathering or purchase of fuel could thereafter be the tenant's responsibility.

Second, conversion of many of a community's home to wood, would give a significant economic boost to the community. Demand for wood would create a wood gathering business. Payments for wood would be made to other residents in the community. In contrast, payments for oil leave the community and are lost to the South.

Before conversions are contemplated on a large scale, data must be gathered to evaluate the available standing wood, and the productivity and accessibility of the forests. The time required for this evaluation should provide the time needed to develop a conversion program. Both should start now.

The wood gasifier in Fort Providence has been designed to produce electricity and heat for a number of buildings. This unit has recently been operated on a 'start-up' basis. As operating data becomes available, the technology will be evaluated for use in other communities as a replacement for diesel.

c. Wind

Wind turbines can be used to supplement diesel generation, and if large enough, to replace diesel altogether. An initial survey by the NWT Science Advisory Board of wind potential in the NWT, indicates good prospects for a number of Central and High Arctic communities. At the request of the Science Advisory Board, the National Research Council (NRC) has completed a detailed economic feasibility study for the communities of Baker Lake,

Hall Beach and Cambridge Bay.

In addition, several GNWT departments are monitoring the performance of a 50 KW wind turbine installed in Churchill, Manitoba.

Pending study of the results of the NRC study and the Churchill unit, the GNWT will undertake the installation of a unit in one of the three communities on a pilot project basis.

d. Coal

Coal deposits, primarily low grade lignite, lie within proximity of eleven communities in the lower Mackenzie and Baffin areas.

Recent research and application indicate that coal gasification may be an appropriate conversion technology, with the possibility of providing energy for space heating and electrical generation. Wood gasification technology can be applied to coal.

The economics of a total energy system, using coal gas in a territorial community, is still open to question. Further work must be done to assess this possibility. The GNWT has approached the Federal Government with a view to studying this alternative.

e. Natural Gas

Natural gas discoveries have been made in close proximity to some upper Mackenzie and Delta communities. This gas could be used for space heating and electrical generation.

Natural gas production equipment and pipelines are sufficiently expensive to make this energy appear an economically poor alternative for most communities in the near term.

Exceptions are the natural gas discoveries in the Inuvik/Tukttoyaktuk and Hay River areas. In these cases, the size of the potential market improves the economics. Both possibilities are under active study by the municipalities, the Federal and Territorial Governments and the utility companies.

Industry has recently proposed another way of using natural gas. It has been suggested that communities on the road system could use liquified natural gas (LNG). Gas from non-producing wells in the upper Mackenzie could be liquified at the wellhead and simply trucked to neighboring communities in insulated tanks. Once in the community, the LNG could be regasified and used as fuel for diesel generators. This suggestion is being studied.

f. Nuclear

Atomic Energy of Canada Limited is developing a small reactor called the SLOWPOKE III (Safe Low Power Critical Experiment). They believe that SLOWPOKE may provide community energy in the form of hot water for heating at favourable prices. The reactors will become commercially available in about ten years at a price of about \$1 million (1980 \$) a copy. They would operate without supervision of any kind. Refueling would be required every two years.

SLOWPOKE is being designed as a "super-safe" instrument, but would produce toxic nuclear wastes that would have to be disposed of somewhere in the NWT. Therefore, this alternative brings up a set of issues that go beyond simply energy matters. The use of SLOWPOKE would have to be fully discussed in the Legislative Assembly before any decisions were made.

Moreover, SLOWPOKE produces hot water that would have to be distributed through communities using a utilidor system. Considering the cost of these, SLOWPOKE seems most promising as a heat source for building complexes in the larger communities, or for isolated mining towns.

The appropriate course of actions with respect to this alternative seems to be the adoption of a "wait and see" attitude. The progress of the reactor's development will be monitored. If results are encouraging, the relevant information concerning the reactor's benefits and drawbacks will be brought to the attention of the Assembly.

g. Peat

Peat deposits may be of some use in the future. Experiments taking place in Saskatchewan and Newfoundland will be monitored. If appropriate, the NWT could proceed with a pilot project in the future.

3. Energy from Large Projects

a. Hydrocarbons

We have made it clear to the Federal Government and industry that residents here must receive an energy benefit from large scale hydrocarbon developments taking place in the NWT. This position would be strengthened by a Legislative Assembly motion of support.

Useful precedents have been established in this regard. The Northern Pipeline Act (1977) guarantees that Yukoners will receive natural gas at Alberta Border prices from the Foothills Pipeline Project. The company is required to invest up to considerable amounts of their own capital to extend pipeline laterals to certain communities including Whitehorse.

The Legislative Assembly should support the position of the Executive Committee by passing a motion that industry be required, as part of a project, to provide energy benefits to NWT citizens.

There are several ways in which the NWT can potentially benefit from these projects:

- through the supply of conventional products such as diesel fuel and gasoline from mini-refineries (called "topping plants") located in the North.
- through the supply of propane and the conversion of communities to the use of this fuel for electricity generation, space heating and transportation. Propane is often recovered with natural gas and is often a byproduct of the liquefaction process.
- through the supply of methanol for electrical generation and space heating. Methanol is an alcohol that can be produced from natural gas. The production technology is well proven.
- through the supply of synthetic gasoline for community transportation. Synthetic gasoline can be produced from methanol.

The new forms - propane, methanol, and synthetic gasoline are exciting new prospects for the NWT. Industry has given little if any, serious consideration to their use in remote communities. A preliminary and very brief analysis done by the Energy and Resource Development Secretariat indicates that the economics may be quite favourable. No technological problems that cannot be overcome have been uncovered.

These forms would not become available until the commencement of oil and gas production in 1986 at the earliest. However, if they can be developed in a cost effective way, and problems in their use overcome, they would completely eliminate the NWT's

dependence upon southern energy supplies as long as oil and gas remain in the Arctic. That exciting prospect dictates that study of their use commence immediately. Industry should be directed to the task. No proposal for energy extraction from the NWT should be considered unless the matter of NWT energy supply has been clearly and fully treated.

b. Hydro electricity

A major 2,000,000 kW hydro project on the Slave River is being considered by the Alberta Government. If undertaken, this project would be completed in the early 1990's. The environmental impact on the NWT is considered minor. There will be little effect on the Slave River Delta.

Studies have shown that the communities of Hay River, Fort Smith and Pine Point could be economically supplied with hydro power from this project, eliminating the future need for diesel. The possibility of supply to communities north of the lake, including Yellowknife, was considered but found to be uneconomic.

The connection of all communities around Great Slave Lake including Yellowknife, in a territorial power grid, is viewed as an extremely desirable possibility from both social and economic development standpoints. With this outcome in mind, new material is being provided to Alberta's consultants with a request that the economic analysis for the North Great Slave area be reviewed.

4. The Use of Subsidies: A Temporary Solution

The provision of subsidies to one group of society, for whatever reason, over the long-term can create unhealthy conditions within the economy of that society and in the end, harms it. This is true in the case of energy. Artificially low Canadian prices in past years have induced consumers to demand a disproportionate quantity while at the same time preventing the capital expenditure required to bring on new sources, hence Canada's current situation.

Within the NWT, energy subsidization of \$23.2 million in 1980/81 (Table 8) has undoubtedly led consumers to use more energy than they would have if the true cost was charged. The value of this subsidization, and the burden on government will increase dramatically in the near term based on known future price increases.

Moreover, these subsidies have hidden the fact that *our energy problem is really one of the forms of energy we use (Southern supplied oil) and not one of supply (local supplies seem abundant).*

There are basically two conclusions to be drawn from this.

First, subsidies should be viewed as short term measures, lasting only as long as it takes to bring about the solution to the underlying problem. Only if no solution can be found, should the subsidization continue.

Second, energy itself should not be subsidized, particularly by government reducing the price below the real cost. Price subsidies are counter-productive in the extreme. Rather, energy should be billed at cost directly to the consumer, whether he be a government employee, a private citizen in his own home or public housing, or a government department.

Rather than subsidizing energy by reducing its price below market value, Government should include the needed support in whatever general income support packages are developed to compensate for higher northern costs generally.

ACTION PLAN

1. As a matter of principle, the legislative and executive branches of the GNWT must accept energy goals as priorities for government equal in importance to economic development goals.

2. As a matter of principle, we must recognize that the development of alternative energy sources cannot be carried out by this Government alone, given the current federal jurisdiction over waters, forest and mineral resources, power generation and other key matters. *It will be necessary for this Government to work in concert with federal departments and agencies.* However, Northerners are more acutely aware of energy costs than others. To assure that solutions are undertaken in the appropriate time-frame, we should *continue to lead* by taking whatever steps we can to inform, encourage and assist federal agencies to assure that their northern programs conform to the appropriate long-term strategy.

To lead this effort, we must be in a position to analyze the alternatives as they are uncovered and to provide some capital monies to develop worthwhile ventures. That would require more funds to be channeled by departments to energy related work.

Consistent with the adoption of energy as a priority of government, funds must be drawn from other uses until such time as solutions are identified and the necessary works are in place.

3. The development of alternative energy sources cannot take place without *additional delineation of the options* available on a community by community basis. *This Government must be willing to allocate additional funds to the study of alternatives if it is to plan a significant role in northern policy development.*

This delineation is required for the *preparation of any "energy alternatives development" plan* - required now to guide current departmental plans. For example, it makes little sense to develop wind power in the Mackenzie now, if a delineation of the options indicated that wood is a preferable option.

4. The proposed strategy suggests that *federal programs available to the NWT be employed aggressively*. This would include:
- initiation of new and imaginative GNWT sponsored pilot projects under the current *Demonstration Program*.
 - the potential benefits of the *National Audit Program* should continue to be assessed by the Office of Energy Conservation with a view to establishing the program in the NWT.
 - the potential benefits of the *Municipal Energy Program* should be immediately assessed by the Department of Local Government and a request made of Energy, Mines and Resources to redesign this program for the NWT.

- use of the *Canadian Oil Substitution Program* should be considered by the NWT Housing Corporation to switch from oil to wood in rental units. Conversion programs can be designed at the same time that forest inventory studies are carried out.

- 5. *The GNWT should supplement the funds available from the Federal Government* when those programs are inadequate to study or develop alternatives deemed to be critical by us. All federal-territorial shared cost programs are subject to administrative review by federal officials. It may be necessary for the GNWT to demonstrate its will to solve energy problems by funding projects otherwise rejected by federal officials.

- 6. The proposed strategy suggests that *locations faced with thermal generation and high oil space heating inputs should be the first targets for experimental projects.*

- 7. As a matter of government policy, *the effectiveness of GNWT in-house conservation must be improved.* The following will be examined as methods of effecting this improvement:
 - *establishing time-frame specific conservation targets* for each department, region and the NWT Housing Corporation;

 - *transferring responsibility for utility budgets* from DPW to the consuming department or agency, and where that unit can demonstrate energy dollar savings through their own conservation efforts, allowing a retention of the saved funds as a positive incentive to act;

- *renegotiation of the method of utility funding with the Federal Government to re-install the conservation imperative to the Territorial Government;*
 - *increasing the funds allotted to conservation education and information, particularly to allow a continuation of the current public campaign.*
8. *Government employee benefit packages should be redesigned so that employees pay for their utilities directly, at the going community rate, substituting some other form of assistance in their place. This will provide a positive incentive to conserve.*
 9. *A northern building code must be developed based on life cycle costing practices to assure that energy costs are included in the design parameters of Northern construction.*
 10. *This Government should consider support in principle for the Slave River Project in connection with a request to the Alberta Government for assignment of power to the NWT.*
 11. *The Legislative Assembly should move to support in principle the condition that hydrocarbon developments in the NWT must provide an energy benefit to NWT residents, and that industry must make substantial contributions of their own capital to the development of this new supply.*

Comparative Energy Consumption

1979

Terajoules (TJ)

| | <u>NWT/YT</u> | <u>ONTARIO</u> | <u>ALBERTA</u> | <u>CANADA</u> |
|-------------------------------|---------------|----------------|----------------|---------------|
| Selected Sectors ¹ | 9,177 | 734,913 | 281,156 | 2,045,555 |
| (per 1000 people) | (142) | (86) | (135) | (85) |
| Total Energy Use ² | 23,052 | 2,251,684 | 791,476 | 6,165,144 |
| (per 1000 people) | (357) | (263) | (381) | (258) |

Source: Statistics Canada, 57-003, 1979-IV

1. This category includes Residential, Public Administration and Commercial categories. Excluded are Mining, Manufacturing, Industrial and Transportation.
2. Final Demand for primary and secondary energy, all sectors.

N.W.T. - CANADA
Selected Comparative Energy Demand

| | Electricity ³ (millions of kW.h) | Motor Gas ----- | Diesel Fuel (thousands of cubic meters) | Light Fuel Oil ----- |
|---|--|--------------------|--|-------------------------|
| Canada Sales | 339,125 | 38,475 | 14,977 | 13,803 |
| N.W.T. Sales | 455 | 38 | 186 | 61 |
| per capita Canadian demand ^{1,2} | 14 | 1.6 | .6 | .6 |
| per capita NWT demand ^{1,2} | 11 | .9 | 4.3 | 1.4 |

Sources:

Petroleum product sales are 1980 domestic sales as per Stats Canada 45-004 June 1981

Electricity figures are 1980 cumulative generation available for purchase as per Stats Canada 57-001 June 1981

Notes:

1. figures are cubic meters per person for petroleum products, and, M.W.L. per person for electricity.
2. population figures used are 1980 preliminary postcensal estimates derived from statistics Canada publications 91-512 and 91-518.
3. Available generation after exports

COMPARATIVE CONSUMPTION AND COST OF ENERGY FORMS
N.W.T. 1981

TABLE 3

| | Generation MWH | Generation GJ | Total Cost \$(000) | Cost ² \$/GJ ex tax | Fuel as a % of Cost | % Total NWT Energy Consumption | Forecast 1986 Energy Cost \$/GJ | Forecast 1990 Energy Cost \$/GJ |
|--|-------------------|------------------|-----------------------|--------------------------------------|------------------------|--------------------------------------|---------------------------------------|---------------------------------------|
| <u>Electricity</u> ³ | | | | | | | | |
| Hydro | 254,176 | 915,034 | 13,196 | 14.42 (1980) | 3 | 7 | 32 | 50 |
| Diesel | 133,804 | <u>481,695</u> | 28,061 | 58.25 (1980) | 44 | 4 | 130 | 204 |
| | | 1,396,729 | | | | | | |
| <u>Petroleum</u> ^{1,4} <u>Products</u> | <u>(000/gal)</u> | <u>GJ</u> | | | | | | |
| Heating Oil | 25,949 | 4,545,000 | | 7.91 - 15.21 YK-Spence Bay | | 34 | 16-30 | 25-48 |
| Diesel Motive | 19,975 | 3,498,000 | | 9.04-15.21 YK-Spence Bay | | 26 | 18-30 | 28-48 |
| Motor Gasoline | 8,800 | 1,385,000 | | 10.14-16.11 YK-Gjoa Haven | | 10 | 20-32 | 32-51 |
| Aviation Fuel | 2,278 | 372,000 | | 13.11-17.49 YK-Rankin Inlet | | 3 | 26-35 | 41-55 |
| Turbo Fuel | 11,922 | 2,040,000 | | 11.19-14.09 YK-Rankin Inlet | | 15 | 22-28 | 35-44 |
| Other | | 63,000 | | | | | | |
| TOTAL | | 13,274,729 | | | | 99 | | |

See Notes Attached following

NOTES:

1. All figures for petroleum product demand are taken from the Science Advisory Board report Energy in the Northwest Territories, a Summary of Electricity and Petroleum Product Consumption. Data are for 1979.
2. Prices are current prices as at November 16, 1981 and are exclusive of Territorial and Federal taxes as shown in Table 6. The prices used for analysis are shown in Table 7.
3. Electricity data for generation and cost are taken from rate submission material for 1980/81 in the case of NCPC and 1980 in the case of Alberta Power. Forecasts are developed assuming an annual rise in non-fuel costs of 12% per year, and in fuel costs of a factor of 2 for the period 1981-1986 and a factor of 12% per year from 1986-1990. These forecasts cannot be expected to be anymore accurate than $\pm 50\%$ based on the fluctuations possible in water levels and other factors.
4. Petroleum products are forecast to rise by a factor of 2 by 1986 and thereafter to 1990 at a rate of 12% per year.

COMPARATIVE FUEL PRICES

Major Regional Centres in Canada
(net of provincial fuel taxes)

Data contained in this table suffers from collection at varying points in time. Figures cannot therefore be taken as absolutes but must be used with great caution and only as a general indication of the regional differences within Canada.

| | | <u>Full Service Regular Gasoline ¢/litre</u> | <u>Home Heating Fuel ¢/litre</u> | <u>Electricity Residential \$/1000 kw.h</u> |
|--------|-------------|--|--|---|
| Canada | Low | Edmonton 29.1 | Saskatoon 25.0 | Kelowna, B.C. 17.98 |
| | High | St. John's 35.7 | St. John's 27 | Summerside 78.78 |
| NWT | Low | Hay River 37.0 | Fort Simpson 30.1 | Yellowknife 66.84 |
| | Yellowknife | 40.2 | 30.4 | 66.84 |
| | High | Rankin Inlet 57.1 | Rankin Inlet 48.8 | Rankin Inlet 173.00 |

Sources:

Statistics Canada 62-010 April-June 1981
Government N.W.T., POL Division - September 1980
Alberta Power Ltd., Rate Application - May 31, 1980
Stats Canada 57-203 - 1981
Northern Canada Power Commission, Proposed Rate Adj., August 1980

COMPARISON OF WOOD AND HEATING OIL

Wood: A standard 4' tall by 4' wide by 8' long cord of spruce with a 20% moisture content (air dried) and 50 cubic feet of solid wood contains 15.5 million BTU or 16.35 GJ. Assuming 75% conversion efficiency of an airtight stove, each cord provides 12.3 GJ.

Home Heating Oil: An imperial gallon of heating oil contains 166,000 BTU or .18 GJ. Assuming 65% conversion efficiency of an average furnace, each gallon provides .11 GJ.

Comparison: 1 cord wood is equivalent to $\frac{12.3}{.11} = 112$ gallons of fuel

Wood/Oil Cost Comparison, Yellowknife, Nov. 81

| | <u>Price of Wood</u> <u>\$/Cord</u> | <u>Price of Oil</u> <u>\$/Gal.</u> | <u>Cost \$ Per</u> <u>GJ Wood</u> | <u>Cost \$ Per</u> <u>GJ Oil</u> |
|--|--|---------------------------------------|--------------------------------------|-------------------------------------|
| Purchased and Delivered Cut to Stove Length | \$100 | \$1.43 | 8. | 13. |
| Gathered and Cut by Homeowner | \$ 30 | \$1.43 | 2.40 | 13. |

For a Yellowknife homeowner burning 1,000 gallons of fuel per year, the estimated annual fuel savings, after conversion, would be \$550 to \$1200 depending upon the method of obtaining wood.

Table 5

NWT Energy Taxation

November, 1981

(all figures in cents per litre)

| | <u>Territorial Tax</u> | <u>Federal Tax</u> ¹ | <u>Total Tax</u> |
|----------------|------------------------|---------------------------------|------------------|
| Heating Oil | 0.7 | nil | 0.7 |
| Diesel Motive | 4.0 | 2.59 Sales | 6.59 |
| Motor Gasoline | 3.5 | 1.5 Excise 2.59 Sales | 7.59 |
| Aviation Fuel | 0.7 | 1.5 Excise 2.59 Sales | 4.79 |
| Turbo Fuel | 0.7 | 2.59 Sales | 3.29 |

Notes:

- 1 Federal Sales Tax is charged at 9% of the wholesale price and therefore increases over time. This tax will be reduced to 8% in January 1983 according to the November, 1981 Federal Budget.

Table 6

Retail Energy Prices

November, 1981

(all figures in cents per litre)

| | | |
|--------------------------------|-------|--------------------|
| Yellowknife: Heating Oil | 31.14 | Gulf Home delivery |
| Motor Gasoline | 42.7 | Gulf Self Service |
| Diesel Motive | 41.4 | Gulf Self Service |
| Aviation Gasoline ¹ | 51.82 | Gulf delivered |
| Turbo (Jeb B) ¹ | 45.36 | Gulf delivered |

Other

Communities: POL published prices for 1981-82 are used

Notes:

- 1 Price varies based on credit terms. Price shown is highest.

Sources: Yellowknife prices: personal communication with Gulf agent.

POL prices: as published by Department of Government Services.

Table 7

NWT Energy Subsidies

Fiscal Year 1980-81

| | \$ |
|---|----------------------|
| A. <u>Direct Subsidies (obvious)</u> | <u>Actual Value</u> |
| 1. <u>Federal Power Support Program</u> | 500,000 |
| Reduces residential rate for first 700 kW.h to Yellowknife rate | |
| 2. <u>Commercial Power Relief Program</u> | 950,000 ¹ |
| Reduces commercial rate for first 1000 kW.h to Yellowknife rate | |
| 3. <u>Home Heating Subsidy</u> | 350,000 ¹ |
| Reduces the cost of 1500 gallons per year to Yellowknife rate | |
| B. <u>Indirect Subsidies (Hidden)</u> | |
| 1. <u>POL Subsidy</u> on heating oil and gasoline. GNWT does not charge full costs offered to customers, but retains cost | 4,500,000 |
| 2. <u>Electricity</u> is not charged at its full cost to non-government domestic and commercial customers. The governments pay higher than cost | 1,850,000 |
| 3. <u>Public housing tenants</u> ² in remote communities are in effect not charged utilities as total rental charges are less than accommodation cost above. | 13,600,000 |
| 4. <u>Municipal</u> energy costs are subsidized by Department of Local Government | 1,430,000 |
| C. Total Energy Subsidization | \$23,180,000 |

Notes:

- 1 These figures are budget only. No actuals available
- 2 Estimate of subsidy portion of NWTHC utility budget

Energy Strategy for the Northwest Territories

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ሩዳጋደጋግገጋገጋገጋ

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3. ራዳጋደጋግገጋገጋ ለሌሎች ሚኒስጥሮች ጋር ማህበራዊ ቤቶች ማቆየት የሚችል ሲሆን ለሌሎች ሚኒስጥሮች ጋር ማህበራዊ ቤቶች ማቆየት የሚችል ሲሆን...

ራዳጋደጋግገጋገጋ ለሌሎች ሚኒስጥሮች ጋር ማህበራዊ ቤቶች ማቆየት የሚችል ሲሆን ለሌሎች ሚኒስጥሮች ጋር ማህበራዊ ቤቶች ማቆየት የሚችል ሲሆን...

4. ራዳጋደጋግገጋገጋ ለሌሎች ሚኒስጥሮች ጋር ማህበራዊ ቤቶች ማቆየት የሚችል ሲሆን ለሌሎች ሚኒስጥሮች ጋር ማህበራዊ ቤቶች ማቆየት የሚችል ሲሆን...
- .../5

- ከወርሃ ሲሆን ለሀገር ልማት ለማድረግ ለሚያስፈልገው ነገር ስርዓተ ስራውን ማሻሻልና ማራገፍ ይቻላል።

- የሥራ ስራዎችን ለማሳካት ለሚያስፈልገው ነገር ስርዓተ ስራውን ማሻሻልና ማራገፍ ይቻላል።

8. ለሀገር ልማት ለሚያስፈልገው ነገር ስርዓተ ስራውን ማሻሻልና ማራገፍ ይቻላል።

9. ለሀገር ልማት ለሚያስፈልገው ነገር ስርዓተ ስራውን ማሻሻልና ማራገፍ ይቻላል።

10. ለሀገር ልማት ለሚያስፈልገው ነገር ስርዓተ ስራውን ማሻሻልና ማራገፍ ይቻላል።

11. ለሀገር ልማት ለሚያስፈልገው ነገር ስርዓተ ስራውን ማሻሻልና ማራገፍ ይቻላል።