# VUNTUT GWITCHIN FIRST NATION

## *STRATEGIC ENERGY PLAN*
## 2001-2005

DA

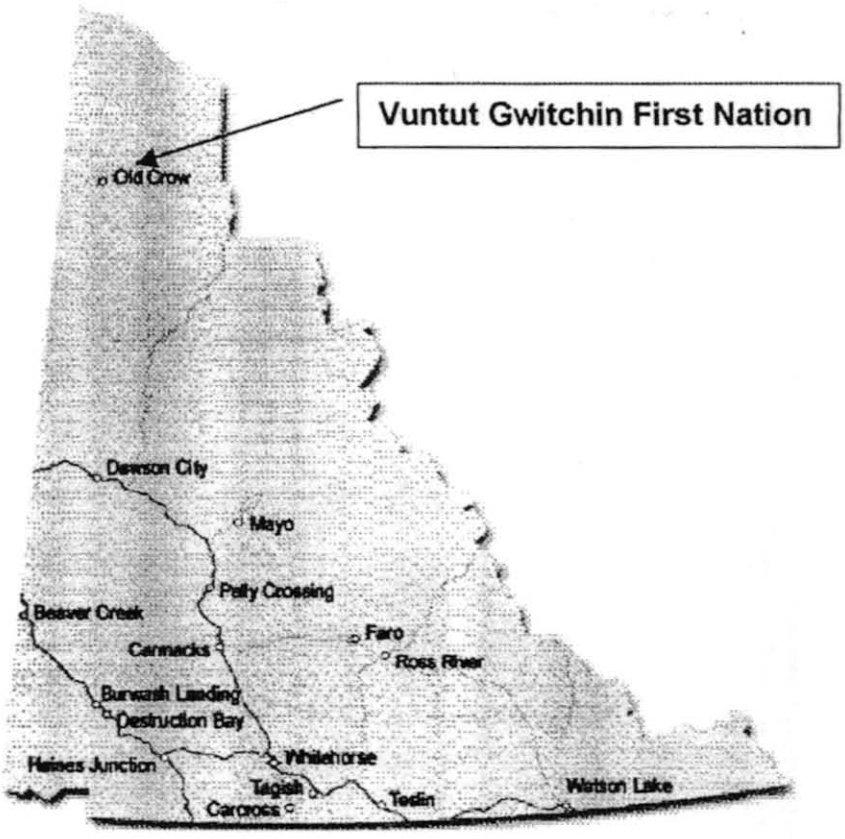
March, 2002

---

Vuntut Gwitchin First Nation
Box 94, Old Crow, Yukon Y0B 1N0
(867) 996-3261 www.oldcrow.yk.net

Morrison Management Consulting
Box 124 Pelly Crossing, Yukon Y0B 1P0
(867) 668-6750

## Map of the Yukon



## ACKNOWLEDGEMENTS AND THANKS

Many people contributed their time and knowledge about energy matters affecting the Vuntut Gwitchin First Nation ("VGFN") and the community of Old Crow, Yukon. The completion of this draft ***Strategic Energy Plan*** would not have been possible without this vital participation.

**Vuntut Gwitchin First Nation**

Chief Joe Linklater and Council

Howard Linklater

Barbara Abel

**Vuntut Gwitchin Development Corporation**

Ron Daub, Vuntut Gwitchin Development Corporation
(Also General Manager, Dempster Energy Services)

## PROFESSIONAL BUSINESS SUPPORT

Arctic Circle Services

Earl Benjamin

Gartshore & Associates Inc

Ed Hall, Hall & Associates

Pembina Institute

Bob King, R. L. King Contracting

Joe Sparling, Air North

James Grattan, Yukon Electrical Company Limited (YECL)

## SPECIAL THANKS

The Vuntut Gwitchin First Nation would like to thank the Minister of DIAND, the Hon. Robert Nault, for the federal government's financial contribution to this project. A special thank you to Trudy Taylor, DIAND Economic Development, for her help and co-operation.

# TABLE OF CONTENTS

# 1.0 INTRODUCTION

Several factors combine to make this Vuntut Gwitchin First Nation Energy Strategy timely and necessary to the future of the First Nation and all people living and working in Old Crow, Yukon. These factors include:

- Obsolete and environmentally hazardous fuel storage and distribution systems requiring immediate replacement.
- Poor quality fuel due to old contaminated storage tanks and improper fuel handling.
- High-energy prices in the community due to rising fuel prices.
- Worldwide concern about greenhouse gas (GHG) emissions as evidenced by the Kyoto Accord, to which Canada is a signatory.
- VGFN's extensive building plans for house construction and renovation in the community that will create more demand for energy.
- Recent and planned additions to community infrastructure.
- The proven economic and environmental viability of alternate energy sources.
- The declining supply of wood and the recognition that the use of wood for heating should be reduced in order to conserve the resource.
- The realization that an energy strategy is a vital component in planning for community economic development in the North.
- The realization that in planning for a secure energy future, VGFN must involve its partners in the government, private and nonprofit sectors.

The Vuntut Gwitchin First Nation hired Alex Morrison, Morrison Management Consulting to assist it begin the strategic energy planning process and to prepare this report. When completed, this strategy will provide a clear and comprehensive framework within which VGFN and other government decisions relating to energy supply and community infrastructure may be made.

## 2.0 THE PURPOSE OF THIS STRATEGIC ENERGY PLAN

The Vuntut Gwitchin First Nation, undertook this Strategic Energy Plan to:

- Review the present fuel distribution system and make recommendations in improving the system.
- Identify resource partners and partnerships in energy related projects.
- Look at ways to create an energy storage, distribution, use and production regime that is sustainable and reduces the existing environmental risks due to improper fuel storage and distribution.
- Review the existing system of wood fuel use in Old Crow and make recommendations.
- Reduce the cost of petroleum products and electricity in Old Crow.
- Identify potential funding sources for development.
- Review the existing situation and related research for the completion of a Strategic Energy Plan.
- Review the impact of present energy use in the community, including diesel generation and wood fuel on the community and the environment.
- Consult with those involved including Chief and Council, Economic Development staff, Vuntut Development Corporation, and the community to discuss energy consumption, management, and distribution.
- Establish energy development goals and objectives.
- Visit existing fuel storage and distribution sites and systems.
- Investigate and review any other potential energy opportunities for Old Crow, such as green plan initiatives.
- Complete a Strategic Energy Plan including partnership opportunity identification, environmental restoration and protection, job potential, education and training requirements, economic benefits, and impact of the energy-based project.
- Identify potential resources and funding agencies to assist in regional economic development.

## 3.0 SCOPE OF THIS STRATEGIC PLAN

This strategic plan has focused on community based energy issues and the potential of energy resource partnerships at the community level. Some of these partnerships would be business oriented, while other partnerships would be more of a Government (community) service and involve the Government of VGFN.

At the time of commissioning the plan, of critical importance to VGFN was strategic planning and identifying potential business opportunities and partners respecting fuel storage, distribution and use within the community of Old Crow.

At the same time as this planning process was occurring, the Pembina Institute has been working with VGFN and VGDC on a number of energy related initiatives, which are discussed briefly in this strategy.

There are oil and gas exploration, development and servicing opportunities for the Vuntut Gwitchin First Nation in the Yukon, as well as joint venture and partnership opportunities with the Gwich'in of the Northwest Territories. These opportunities and related strategic planning are the responsibility of the Vuntut Gwitchin Development Corporation and its energy joint venture company, Dempster Energy Services. Consideration of these opportunities was not part of this strategic planning process.

By developing this report, VGFN:

- Is demonstrating its commitment to resolving energy and related issues.
- Will complete a preliminary assessment on the effect of energy use, supply, storage and distribution on the environment and economy.
- Will report on the environmental impact that harvesting of trees for fuel has on area forest resources.
- Will report on the environmental impact of using diesel fuel to produce electricity
- Will consult with those involved including Chief and Council, Economic Development staff, Vuntut Development Corporation, and the individuals in the community.
- Will consider the environmental, cultural values and traditional land use when considering energy development opportunities.
- Review the goals and objectives stated in the draft and make changes as necessary
- Will assess and review viable options for energy supply, use, storage, and distribution in the community.
- Will define the role of the Vuntut Development Corporation and the role it could fill in the implementation of the final strategic energy plan.
- Will define roles for companies not based in the community.
- Will identify resources and funding agencies to assist implement this strategy.

## 3.1 VGFN Principles on Energy Matters

### Conservation of Our Natural Heritage

Taking responsibility for:

- Renewable resources.
- Non-renewable resources.

### Sustainable Development

- Development that meets the needs of current generations without compromising the ability of future generations to meet their own needs.

### Individual Responsibility

- Sustainable development and wise use of energy is everyone's responsibility.

### Preservation of Our Living Resources

- Accepting ecological interdependence.

### Global Awareness

- Awareness of the Kyoto Accord, greenhouse gases and the North's exposure.
- Canada agreed to reduce its greenhouse gas emissions 6% from 1990 levels by the period 2008-2012. In real terms, this would require at least a 25% reduction from current projected emission levels for the period. This will require significant reductions in non-renewable energy production and use in Canada by Canadians with direct effects on the amount of energy we use and how we produce the energy we do use.

VGFN is doing their share with this strategic energy plan, which includes initiatives to increase energy efficiency and look at alternate energy sources.

## 3.2 Expected Outcomes from the Strategic Energy Plan

The VGFN expects the outcomes from completing this strategic energy plan will include:

1. Identifying existing environmental liabilities created by the existing fuel storage and distribution systems.
2. Progress on replacing existing fuel storage and distribution systems with systems that are environmentally and economically responsible.
3. Better-managed energy supply in the community.

4. More responsible energy use and consumption planning in the community in which the VGFN Council will provide leadership.
5. Reduced pressure on scarce and fragile forest resources as a fuel source.
6. An increase in local employment related to energy supply and distribution.
7. Increased revenues to the VGFN government.
8. Increased investment in the community.
9. Achievement of energy efficiencies in energy use.
10. Identification of options to generate electricity in a sustainable way.

## 4.0 INTRODUCTION TO THE COMMUNITY AND PEOPLE OF OLD CROW

The population of Old Crow is approximately 300 people, the majority being citizens of the Vuntut Gwitchin First Nation. The people fish, hunt, trap, or work for government institutions, service industries and for exploration and scientific parties in the vicinity. The community consists of a school and teacherage, nursing station, RCMP detachment, Northern store and some government service facilities.

The settlement of Old Crow is the home of the Vuntut Gwitchin First Nation and the most northerly community in the Yukon. It is the only community that cannot be reached by road. It is located on the north bank of the Porcupine River, about 120 kilometres north of the Arctic Circle and about 800 kilometres north of Whitehorse.

There is archaeological evidence that the Old Crow area might be the site of the earliest human occupation in North America. The record of people in the area can be traced back about 15,000 years. The community of Old Crow became a year-round settlement in the 1950s with the building of a school and store. Before this, the site was a gathering spot for hunting and for trade along the Porcupine River.

As part of the Vuntut Gwitchin land claim agreement with the Governments of the Yukon and Canada, Vuntut National Park was created. The 1980s Berger Report had previously recommended that a national park be created at this location. The park and an adjacent Special Management Area encompass much of Old Crow Flats, a world-renowned wetland. The Governments of Canada and the Vuntut Gwitchin First Nation will jointly manage these protected areas.

The Vuntut Gwitchin First Nation is part of the Gwitchin people whose traditional territory extends across parts of Alaska, the Yukon, and the Northwest Territories. The people of the Vuntut Gwitchin First Nation live a traditional life, relying heavily on the Porcupine Caribou herd to maintain themselves, their economy and their way of life.

The Vuntut Gwitchin of the Northern Yukon belong to the Athapaskan language family and their traditional area of use extends far into Alaska and the Northwest Territories. One of the oldest archaeological sites of North America, the Bluefish Caves Site, has been located on the Gwitchin's land base. The ancient ancestors of the Gwitchin have inhabited

the land for at least 15,000 years, according to archaeological findings.

The people of the Old Crow are known as the Vuntut Gwitchin. Their close relatives who lived in the Blackstone area are known as the Tukudh Dug-oo, and the people of the Peel River area are known as the Tetlit Gwitchin. Close relatives are also in the Alaskan village of Fort Yukon.

The Gwitchin followed a nomadic way of life and hunted caribou as a main source of their diet, drawing on the resources of the Porcupine Caribou herd, which remains a main staple of the Gwitchin diet today. They also relied heavily on the muskrat population that continues to be harvested at Crow Flats.

Before settling in the village of Old Crow, the Vuntut lived in Fort Yukon. They moved to Rampart House, a trading post, in 1867 when the US/Canada border was established.

Gwitchin, Inuvialuit, Northern Tutchone and Inupiat from 13 communities in Alaska, Yukon and the Northwest Territories, rely on the Porcupine Caribou herd for food. Non-native people from these villages and from larger communities such as Whitehorse and Fairbanks also hunt these caribou. The community of Old Crow has depended on the caribou for thousands of years and the Gwitchin people are dependent on the herd for the survival of their culture. The reported harvest of Porcupine Caribou has ranged from 2,000 to 7,000 per year over the past 15 years. The herd also supports predators such as wolves, grizzly bears and golden eagles.

Global warming, some scientists predict, may cause the northern Yukon to have greater snowfall in winter, faster melt period in spring and warmer summers. If this happens, the population size of the Porcupine Caribou herd could shrink (Yukon State of the Environment Report).

Old Crow is located in the North Yukon State of the Environment Reporting Unit. This unit extends south from the Beaufort Sea coastline and covers seven ecoregions. They range from the coastal plain with tundra vegetation to heavily forested areas such as the Fort McPherson plain to areas with extensive wetlands such as Old Crow Flats. Prominent mountain ranges, the British and Richardson Mountains, provide additional diversity (Yukon State of the Environment Report).

The Vuntut Gwitchin First Nation has a registered membership of 455 as of April 1999 with land claim beneficiaries numbering more. About 200 members live outside the community. The First Nation administers most services in Old Crow and is actively involved in protecting a traditional lifestyle for the people, including both international and national efforts to protect the land base used by the Porcupine Caribou herd in Alaska and the Yukon.

The Vuntut Gwitchin were one of the first four First Nations to complete their negotiations for First Nation Final and Self-Government Agreements on May 31, 1992. The agreements became part of the highest law of Canada when the Vuntut Gwitchin, the Yukon

Government, and the federal government on May 29, 1995 initialed them. Today the Vuntut Gwitchin are implementing their agreements and are coming up to the five-year review provision set out in the Final Agreements.

The Vuntut Gwitchin First Nation Final Agreement follows the structure laid out in the Umbrella Final Agreement but contains provisions specific to the Vuntut people and their environment. In particular, it helps safeguard the habitat of the Porcupine Caribou herd with the establishment of the Vuntut National Park. This park is managed cooperatively with the Vuntut Gwitchin First Nation.

The people of the Vuntut Gwitchin First Nation are concerned about maintaining their traditional lifestyle. They have established active communications, using the Internet, to ensure that the breeding ground of the Porcupine Caribou herd is not affected by developments in Alaska and that their rights, and the rights of the larger Gwitchin Nation, to pursue traditional activities are supported.

The Vuntut Gwitchin is continuing the process of assessing economic and community development projects that could provide employment opportunities. The Old Crow is isolated by distance and lack of road access or easy transportation. However, the First Nation has made effective use of the Internet to link to the outside world.

Nearby Vuntut National Park and the Special Management Area adjacent to it could provide some employment for Old Crow residents in the future and generate additional demand for fuel and other energy sources in the region. VGFN is a full partner in wildlife and wildlife habitat management in both the park and the Special Management Area. Vuntut Gwitchin people could well play a major role in future research, administration, and enforcement.

### Tourism

Though Old Crow is far off the beaten path, it is certainly possible that there will be tourist interest in the area. Attractions include pristine wilderness areas near the community, Vuntut National Park, and the culture and traditional lifestyle of the Vuntut Gwitchin First Nation. There already are visitors, especially government representatives and scientists, traveling to Old Crow. Further accommodation and food services might be provided for them, creating further employment and attractions for tourists.

The skills required to operate accommodation and food services will be very important in establishing tourism activity in Old Crow or providing more services for government or business visitors. Communication skills are also important, both in using the Internet for marketing and in providing information and services to visitors. Other emerging needs are community development skills, in both economic and social services fields.

## 4.1 The Old Crow Economy

The economy of Old Crow and the Vuntut Gwitchin is largely a traditional, subsistence-based economy. Many people rely on traditional hunting, fishing, and trapping activities for food. The Vuntut Gwitchin people have relied on the Porcupine Caribou herd for generations. They use the caribou for food, as well as for skins, clothing, and other purposes. Living close to nature, the people make sure that no part of the caribou is wasted. Some seasonal work in hunting and fishing also provides income.

Salmon have long been an important food source for the Vuntut Gwitchin. Three species, Chinook, Coho and Chum travel up the Yukon and Porcupine Rivers on their way to spawning areas on the Fishing Branch River. The Department of Fisheries and Oceans, in cooperation with the people of Old Crow, have set up a counting weir and are closely monitoring yearly salmon returns. Heavy harvests by Alaskan fishers have taken a toll and the numbers of returning chum are below management objectives.

There is conflict between using gravel from the Porcupine River for roads, residential and other building site preparation, and for gravel pads for the proposed new fuel tank farm.

There is a very limited market-based economy in Old Crow, in addition to traditional activities. Government services provide a significant share of total employment in the market, or money, economy. Over 60 percent of measurable employment falls into this category, compared with 21 percent across the Yukon. Government services in Old Crow include the First Nation government and administration of services for First Nation members, as well as territorial and other government services like policing.

Since the Vuntut Gwitchin Council is responsible for providing most services in Old Crow, First Nation government employment includes such things as construction and maintenance of housing, and fuel supply and distribution. In addition, First Nation government activities involve providing social services and support for the elderly. Other First Nation employees find seasonal work in projects run by the First Nation or in other seasonal government jobs.

Education and health care also provide some employment in the community. The Northern Store and Arctic Circle Services both employ several people from the community. Other industry sectors either offer no employment in Old Crow or the numbers are too small for measurement.

In recent years, the Vuntut Gwitchin First Nation has been developing its capacity as a local government in Old Crow. People in the community have been working toward community healing and revival of their traditional culture and history to deal with the effects of mission school and related problems and the changes to their society and the economy on which it was based. Self-government and devolution will provide opportunities to Old Crow residents in employment training.

Unemployment ranges from about 70% in the winter months to about 50% in the summer. Most employed people in the community work in service occupations with one of the three levels of government; Canada, the Yukon and the First Nation.

A few people work mostly seasonally in construction, transportation and the tourism industry. Some people work in primary industries like oil and gas, mining, trapping, or forestry sectors that experience boom and bust cycles. Oil and gas activity in the Mackenzie Delta and Eagle Plains has created employment and training opportunities in oil and gas exploration.

Tourism is the fastest growing economic sector world wide and in the Yukon. Development of infrastructure and tourism businesses and associated government infrastructure may entice people already traveling through the area to stay longer.

## 4.2 Community Energy Services

### 4.2.1 Electricity, Power, Water, Sewer and Fuel Delivery

Electricity and power are distributed by Yukon Electric Company Limited through a local 650MW plant.

All petroleum products arriving in Old Crow from Eagle Plains and/or Fort McPherson arrive on Air North. There are fuel pump dispensers at the temporary tank farm site, however there is no service station-type set-up to access the stored fuel.

Fuel delivery is currently a Vuntut Gwitchin First Nation government services responsibility. New enviro-tanks have been installed on the existing tank farm site Water and sewer services are also a Vuntut Gwitchin First Nation government services responsibility.

### 4.2.2 Wood Harvesting

Many years of harvesting a valuable resource (trees) has created a growing concern over

long-term supply. It is desirable for the community to look at alternative energies and energy efficient technologies to reduce the demand on a diminishing resource.

The price of a cord varies from season to season. The average cost being $300 per cord. While most wood is harvested within a ten kilometer radius of the community, people must go farther and farther to find wood. Some wood is harvested up river and floated downstream to the community.

## 4.3 Other Community Services

The Yukon Government completed construction of a new school with gymnasium, shops, and a modern computer lab to replace facilities destroyed by fire in 1998. The new school is heated with oil and has energy efficient design features.

The Chief Zzeh Gittlit School offers kindergarten to Grade 10. Most students still move to Whitehorse to complete high school. Eventually students may be able to complete higher grades in the community. Gwitchin language and Gwitchin life have been incorporated into the curriculum.

The school is an integral part of community life. The new gymnasium is used almost every night for various activities. In addition, the students spend time on the land and at the school's wilderness cabin during the school year.

The Old Crow campus of Yukon College, recently renamed the Alice Frost Community Campus, first opened in 1987. The campus is heated with oil.

Alice Frost was instrumental in bringing about the new building that houses the college. The campus, in partnership with the Vuntut Gwitchin First Nation, offers training to meet the needs of the youth and adult population in the community. Recently, a 12-month Office/Business Program was offered to train people to work for VGFN government. College programs have included wilderness tourism, carpentry apprenticeship, computers, accounting, varying levels of science, mathematics, and English, small engine repair, driver training (class 3-7), and arctic plumbing.

Old Crow has a community health centre, which is staffed by two community nurses and is open weekdays. A doctor is available the first week of each month. Emergency services are available at any time. The health centre is heated with oil.

YTG Health and Social Services has a social worker providing services in the community.

The RCMP operates a detachment in Old Crow with one corporal and two constables. A probation officer who visits monthly from Whitehorse also serves Old Crow. The RCMP building is heated with oil.

Access to Old Crow is by air via Air North on a gravel airstrip. There is regularly scheduled

service six days a week from Whitehorse, excluding Saturday. The VGDC has purchased 49% of the airline. The airline plans to expand its air service to Vancouver, Calgary and Edmonton.

The Northern Store sells groceries and some dry goods, and Arctic Circle Services has a hardware outlet, in addition to ATV/snowmobile repair, heavy equipment, truck rental and welding. Dagoo General Store offers dry goods, hardware, and snacks. Mabel's provides take-out service for cappuccino and snacks, and the Vuntut Gwitchin First Nation runs a gasoline outlet. Other services include Ch'oo Deenjik Accommodations and Douglas & Bella's Movie Rental, Arcade and Restaurant.

### 4.4 Climate

The climate in Old Crow reflects its location within the Arctic Circle. In 1997, weather reports showed the average daily temperature in January was minus 34.2 degrees Celsius, while in July the daily average was plus 14.5 degrees. Daily averages are based on a 24-hour day, so daytime temperatures are somewhat higher. The record high in 1997 was 27 degrees, and the record low was minus 52 degrees. Annual precipitation in 1997 totaled 73.3 millimetres. This included 160.8 millimetres of rain and 158.8 centimetres of snow.

## 5.0 THE REGIONAL AND ENVIRONMENTAL CONTEXT

The Vuntut Gwitchin First Nation (VGFN) is self-governing, having reached land claim and self-government agreements with the Governments of Canada and the Yukon in 1994. As self-government, VGFN is poised to act decisively on energy issues within its longstanding community goals of environmental protection and community economic development.

VGFN has extensive land holdings, not only in its home base of Old Crow, but within its traditional territory. The traditional territory is located mostly in the Northern Yukon region. The VGFN traditional territory reaches from the western border with the US, to the Peel River and Richardson Mountains, and from Ivvavik National Park to the Ogilvie Mountains in the Central Yukon.

VGFN is also the single largest employer in the area and the largest purchaser of goods and services. Most VGFN members live in the approximately 300-person settlement at Old Crow, Yukon, near the Porcupine River. Access to the community is by air only, though a winter road has been installed and used on two occasions, most recently in 1998 to respond to a community emergency. The cost of installing the 1998 winter road was about $800,000.

Among Yukon First Nations, VGFN has the highest percentage of its members and beneficiaries living away from the main community home base, about 66%, mainly due to the high cost of living in the community and limited opportunities in Old Crow for:

- Employment.
- Education.
- Business.
- Housing.

The local economy is dominated by government spending. Together, the governments of Canada, the Yukon and the VGFN provide almost all full-time jobs in the community.

The community of Old Crow and the Vuntut Gwitchin First Nation are in a period of transformation. In Old Crow, there is a new community store, an increased level of services provided by the First Nation Government, the addition of community infrastructure, and the certainty created with the conclusion of land claim and self-government agreements.

With the age profile of the community, the population of Old Crow is expected to increase over the next twenty years by about 1% per year. Based on a 2000 population of 300 people, this population growth model means that by 2010, the population will be about 350, a substantial increase, given existing community resources. This population increase will necessitate the provision of about 20 new homes, in addition to the construction of homes to replace some of the existing housing stock that is beyond repair. VGFN recognizes that more homes will be needed in Old Crow to:

- Meet the needs due to population growth.
- Meet the needs of in-migration.
- Meet the needs of people living in sub-standard housing.

VGFN is taking a proactive approach to community planning and is involved with a broad range of activities to support:

1. Secure funding for community infrastructure to meet community needs at a level enjoyed by most Canadians with equitable financial support from by the Governments of Canada and the Yukon to VGFN as a local government.
2. Energy efficiency in supply, storage and use equitable funding.
3. Reduce green house gas emissions produced by community activities and operations, making development in the community more sustainable.
4. Support local business development.
5. Environmental cleanup and protection.

## 6.0 BUILDING ON RECENT COMMUNITY PLANNING STUDIES

To meet is needs as an emerging self-governing First Nation, VGFN commissioned the following studies:

## 6.1 Crow Physical Development Plan (2000)

This document reported on:

- Community development goals, objectives and principles.
- A broad description of land use policies, objectives and priorities all land uses. This physical development plan reflected the priority, which the VGFN now places on energy matters, particularly on the replacement of the existing fuel storage and distribution systems. The report also contained information reflecting the environmental hazards of continuing to remove gravel for building purposes from the Porcupine River and the much higher cost of alternate gravel and its big impact on all future development.

## 6.2 Crow Capital Plan 2001-2006 (2001).

- This report identifies the problems associated when one level of government completes multi-year planning but funding on which it depends is from other governments who do not do multi-year capital planning. So while the VGFN has a five-year capital plan, there is no commitment on the part of either the federal or territorial government to participate in capital funding on a multi-year basis. In addition, the report summarizes key capital projects.

## 6.3 Residential Home Energy Conservation Project Proposal

- This project was defined in January 2001, and occurred between August 2001 to August 2002.
- The project completed energy audits of existing homes and prescribed renovations to effect energy conservation and public awareness of home energy issues.

## 6.4 Proposal to Conduct a Pre-Feasibility System Design for a District Heating System for Old Crow (November 2000)

- This proposal was one of four options VGFN was considering last year. The others were:
  - Residential home energy conservation program.
  - Wind-powered electrical generation.
  - Community energy conservation program.
- The proposal was to capture waste heat from the existing diesel generators to supply heat and hot water to buildings nearby.

## 6.5 Wind-powered electrical generation with co-generated hydrogen.

- This project is in the conceptual stages.

# 7.0 THE STRATEGIC ENERGY PLANNING PROCESS

VGFN intends to use the following process to complete its strategic energy planning process.

1. Secure funding to complete the strategic energy planning process. While funding from one source is desirable, the reality is that funding from more than one source is likely. VGFN will make applications to fund this work to the Governments of Canada (INAC) and the Yukon (Economic Development). The estimated cost of completing the VGFN Strategic Energy Plan is $75,000 within a six-month timeframe commencing when VGFN secures funding.

2. In the strategic energy plan process, VGFN and the Consultant will identify priority projects and potential funding partners and agencies, companies and individuals that could assist in the development and implementation of this plan. Potential sources of funding and technical expertise include:
   - The Government of Canada, through Indian and Northern Affairs (INAC), Natural Resources Canada (NRCAN), Department of Fisheries and Oceans (DFO) and the national infrastructure plan.
   - The Government of the Yukon, through the Departments of Community and Transportation Services and Economic Development, Yukon Energy Corporation and Yukon Housing Corporation
   - Yukon Electrical Company Limited
   - Companies interested in joint ventures with VGFN
   - The Federation of Canadian Municipalities, Green Municipal Enabling Fund
   - Others to be identified.

3. Identify priority project areas and options for completing priority projects.

4. Complete background studies as required.

5. Prepare a five-year implementation plan (2001-2005).

6. Prepare a five-year implementation operating and capital budget (2001-2005).

7. Present the revised draft Strategic Energy Plan to the VGFN Council for approval.

8. Present the approved draft Strategic Energy Plan to the Old Crow community to complete the consultation process.

9. Commence implementing the plan with a tentative start date of no later than April 1, 2002.

# 8.0 HISTORICAL STRATEGIC ENERGY ACTIVITIES

This strategic energy plan is related to activities in each of these five areas and represents a continuation of efforts begun in the 1990s.

1. **Secure funding for community infrastructure to meet community needs at a level enjoyed by most Canadians**

- The Self-government Agreement (Section 16) considers a financial transfer between the Governments of Canada and the VGFN that would allow the First Nation to assume responsibility for program delivery while taking into account "dis-economies of scale" which impose higher operating or administrative costs while allowing the First Nation to provide public services at levels reasonably comparable to those generally prevailing in the Yukon. This is a vital component of the land claim and self-government agreements, which the three levels of government (Canada, the Yukon and VGFN) have signed.

- One of the objectives of the land claim agreement is to respond to the disadvantages of location of Old Crow and to ensure that the quality of service delivery is on a par with that already available to other Yukon communities of a similar size. Present reality falls far short of this objective, and while the VGFN is doing all it can with its resources, the federal and territorial governments clearly are not.

2. **Reduce green house gas emissions produced by community activities and operations, making development in the community more sustainable.**

- VGFN is willing to participate in a program to reduce GHG emissions through energy efficient building design and retrofitting, identifying options to replace fossil fuel use, reduce overall community energy demand, and to maintain and enhance existing forest cover that acts as a carbon sink. However, VGFN requires the financial and technical support of other governments, nonprofit groups, and training agencies for such initiatives. VGFN has an on-going relationship with the Pembina Institute to develop and implement "green" initiatives.

3. **Support local business development.**

- After careful study, VGFN believes that the storage and distribution of petroleum products and wood fuel together with the supply and maintenance of alternate energy systems can all create new employment and business opportunities in the community. With unemployment in the community among the highest of anywhere in Canada, taking advantage of these opportunities makes good economic and social sense.

4. **Environmental cleanup and protection**

- The previous fuel storage system created an environmental liability, as it was leaky, had regular fuel spills, and was decentralized throughout the community, spreading the environmental problem of fuel storage and distribution.
- Some sites are contaminated and require restoration, at least to industrial standards. This cleanup may involve removal of contaminated soils, storage and rehabilitation of soils in an appropriate location, or disposal in an accepted form.

5. **Energy efficiency in supply, storage and use. Current systems are not energy efficient in energy supply, storage and use.**

- VGFN purchased new fuel storage tanks that meet current environmental standards and trucked them to the community when the winter road was operational in 1998.
- The current distribution is inefficient, dangerous to human health, involves regular fuel spillage, and is an ongoing and increasing environmental liability.
- Except for cost, there are no constraints on energy use. New building and building retrofit projects generally are not designed to effect energy efficiency.

# 9.0 DISTRICT HEATING PROPOSAL BY PEMBINA INSTITUTE[1]

## 9.1 Background

The Vuntut Gwitchin First Nation have indicated a strong interest to establish a district heating system which uses residual heat from local diesel engines which are used to generate electricity. In the future, other sources of heat may be identified. Establishing a district heating system will have both environmental and financial benefits.

Rob Macintosh and Andrew Pape-Salmon of the Pembina Institute visited Old Crow on December 13th and 14th of 2000, hosted by VGFN Councilor and Director of Government Services – Howard Linklater, and VGFN staff - Dorothy Frost, and Alex Morrison. Meetings were held with: VGFN Council, VGFN Government Services Department and staff, VGFN Renewable Resources Director and staff, VG-RRC (Renewable Resource Council).

The purpose was to achieve the following:

- Meet with the VGFN leadership and administrative staff to ensure a basic understanding of the community's interests and needs regarding energy conservation and clean energy.
- Raise awareness of some of the YTG and Federal climate change and clean energy programs and opportunities, which might assist the VGFN to meet community needs and meet government objectives.

1 Proposal to Conduct a Pre-Feasibility Assessment and Preliminary System Design for a District Heating System for Old Crow, Pembina Institute, November 15, 2000.

- Hold preliminary discussions on specific opportunities in Old Crow

In general terms, Chief and Council, and other community members, indicated an interest in pursuing initiatives, which will contribute to the following goals:

- Local economic development and job creation;
- Increased self-sufficiency and lower community operating costs;
- Reduction of pollution and greenhouse gas emissions and/or
- Advancing energy conservation and clean energy.

## 9.2 Project Objectives

The following overall economic, social, and environmental objectives would be pursued:

- Capture residual heat from the existing YECL diesel-fired electricity plant in Old Crow and use it to heat selected community and institutional buildings near the YECL diesel plant.
- Reduce diesel fuel consumption for space heating by individual furnaces and boilers in those buildings and therefore reduce local air emissions and greenhouse gases.
- Reduce energy costs of those buildings in the long-term by supplying space and water heating at a price equivalent to oil heating costs, until the district heating capital costs are paid out (i.e., 5 years or less), at which time the price of district heat will be reduced to less than oil costs.
- Reduce operations, maintenance, and equipment costs of heaters in those buildings, resulting from their reduced operation. Instead, many of the responsibilities for the operations and maintenance of heating supply will be transferred to the district heating utility.
- Create a small economic development opportunity and revenue stream from a district heating utility business venture.
- If appropriate, supplement the heat supply with heat generated from the excess power of a wind generator (which could be installed in the future), wood-fired heat from the old school boiler or from oil-based heat supplies in existing community boilers.

## 9.3 Basic Technical Description of District Heating System

The proposed district heating system will include the following components:

- Heat exchangers to recover heat from both the engine water jackets and, if appropriate, the exhaust stacks of the diesel power engines at YECL's existing electricity plant.
- Insulated, aboveground, hot water supply lines looping from the plant out to the connected buildings and back to the plant (water will be protected with glycol or similar freeze protection).
- Heat meters on the supply line at each connected building to measure and charge for the heat sold to each building (just as electricity sales are metered and billed).
- Heat exchangers at each connected building to transfer heat from the district heating supply line to the building's own existing heat distribution system. Alternatively, some buildings may be connected directly to the district heating system without a heat exchanger to reduce system costs.

- The connected buildings would most likely keep their existing furnace or boiler as a back up for when the district heating system was not operating, or as a supplementary supply in extreme conditions when extra heat is required.

# 10.0 MEETING CURRENT COMMUNITY ENERGY NEEDS

Several fuel types are used to supply heat, vehicular power, and electricity in the community of Old Crow. These sources include:

- Diesel fuel.
- Gasoline.
- Unprocessed fuel wood.

## 10.1 Electricity

Electricity in Old Crow is generated at a diesel plant. The approximately 650 MW plant consists of three diesel generator sets of 250 kW, 250 kW and 150 kW capacities. The plant and the electrical distribution system are owned by Yukon Electrical Company Limited, an Alberta-based Atco Company. That plant has used an increasing number of litres in recent years and approximately 530,000 litres of diesel fuel in 2000.

Fuel consumption for electrical generation in the community has increased by about 44% and increases are expected to continue. Factors contributing to this increase include:

- An increase in the number of residential consumers in 1990 to 2001.
- An increase in office space in the community, such as a new VGFN office complex.
- An increase in community services (ice rink, youth centre)
- An increase in commercial space.

The anticipated installation of new residential lots confirms that demand from residential power users will continue to grow as population increases because of in-migration, increased economic activity and natural growth due to the age profile of the community.

The cost of electricity has increased substantially in recent years for several factors including:

- The highest oil prices in about twenty years
- The closure of the lead, zinc and silver mine at Faro, Yukon, the largest purchaser of electricity in the Yukon.

The increase in demand from residential customers is primarily due to the increase in the number of customers, a trend that is continuing. While the new administration complex also increased demand for electricity, it is residential customers that are leading demand.

New houses being constructed by VGFN are generally larger than older homes. While some of the newer homes incorporate energy saving features, including construction to R2000 standards, no overall cost savings are realized due to increased area of new

homes compared to older homes.

The increase in the population in Old Crow caused by population growth will cause a continued demand for new homes, about 20 houses over the next 10 years. The increase in demand for new homes will be compounded by the following factors:

- An increase in employment and economic opportunities.
- An increase in the number of staff necessary for existing social programs and devolution to meet the needs of the increased population.
- An increase in incomes will cause increased demand for more housing (for single people, families and elders).

There is very little electrical demand for baseboard or other electrical space heating, mainly because of the cost factor. The predominant heat source for residences is wood fuel readily available in the Old Crow area. Institutional buildings, such as the school and VGFN administration offices use oil as a heat source.

What the numbers for 2000 clearly show is that total electrical demand is up, as are the numbers of houses and customers served. Most dramatic is the increase in the load factor. The VGFN expects the trend of residential consumption growing absolutely and as a percentage of gross consumption to continue. However, energy conservation measures advocated in this strategy can reduce the rate of increase over time.

## 10.2 Unprocessed Fuel Wood

### Extent Of Residential Wood Heating In Canada

Wood stoves and fireplaces have become commonplace in homes throughout North America. In northern locations such as Old Crow, wood has been a main source for heating homes.

Modern wood burning stoves and fireplaces are a perfect match for new energy efficient houses. A centrally located wood stove can fully heat a home of moderate size, and for larger homes, the heat from an elegant new fireplace can be ducted to all areas. All the advanced models deliver a reliable overnight burn.

An advanced technology stove or fireplace doesn't pollute indoor air and can be virtually smokeless. It can deliver up to 75 percent seasonal efficiency while emitting 90 percent less smoke than the old "airtight" stove. This means that 1/3 less wood will provide the same amount of heat. The new technologies raise the temperature of the fire, making it more environmentally friendly to the atmosphere and the people using wood heat.

According to Statistics Canada figures almost 1.4 million households, or about 21 percent of the single-family dwellings in Canada, report the use of wood as either a principal or supplementary heating fuel (14 percent of total households). The use of wood as the principal heating fuel is reported by 6.5 percent of those who live in single-family dwellings

and as a supplementary heating fuel by 14.2 percent. These percentages have not changed substantially during the past decade.

This shift in equipment usage patterns reflects the concurrent evolution of wood burning appliance technology. In recent years the technology of space heating appliances such as wood stoves, fireplace inserts and heating fireplaces has developed rapidly, due in part to environmental legislation in the United States that mandates low emission combustion systems in these classes of appliance. Another development that has influenced the selection patterns is the "glass air wash" systems that keep door glass clear for unobstructed viewing of the fire. At the same time, Canadian houses have been made more energy efficient, making whole-house heating with a space heater more effective. Together, these developments have improved the consumer appeal of space heating equipment and have supported the move of the wood heating system from the furnace room to the living or family room.[2]

When we talk about the impact of wood burning on the environment we should consider three distinct forms of impact:

- Smoke pollution outdoors.
- Indoor air pollution.
- The impact on the health of the forest.

Even though there are these three different forms of impact, being environmentally responsible is not such a complicated task. Responsible wood heating is so straightforward that its main requirements can be stated in a single sentence, like this one:

> *Burn sustainably harvested, properly processed and seasoned fuel in an advanced combustion stove or fireplace that is vented through a chimney that runs straight up through the building.*

Properly processed wood is cut to the correct length and split to the correct range of sizes for the appliance. Having wood the right length and range of size makes it easy to build good, clean burning fires.

Properly seasoned fuel is processed in the spring and stacked in an area open to sun and wind for the summer. You cannot burn without smoke if you are using wet or green wood.

Sustainable harvesting involves selective, uneven age cutting so that an acceptable level of biomass and biodiversity is maintained permanently on the site. Advanced combustion stoves and fireplaces burn wood about 90 per cent cleaner and one-third more efficiently than older conventional appliances. That means a lot less smoke outside and lower forest

2 1993 Air and Waste Management Association annual conference by Dr. Ole Q. Hendrickson, Forest Ecologist, Forestry Canada and John Gulland, Gulland Associates Inc.

impacts because less wood is used. The same advanced appliance characteristics that result in lower outdoor emissions also result in less chance that smoke will be spilled inside the house.

### The Old Crow Experience

The wood mostly used in the Old Crow is softwood, namely spruce or pine provided from Yukon forests, as opposed to hardwood such as oak, cherry, etc. The main problems have been:

- Supply.
- Burning "green" or "wet wood."
- Lack of harvesting in advance to dry the wood.
- Inefficient wood stoves.
- Burning green wood creates a higher rate of creosote build up, therefore becoming a safety issue.

Yukon fire-killed timber from the Pelly area, for example, is estimated to have 10-12% moisture content, weigh about a tonne per cord and produce about 5000 kwh of energy, the metric equivalent of about 17 million BTUs per cord.3 Air-dried (sometimes called "seasoned wood" contains 25% to 35% moisture.4 However, in Old Crow, much of the wood burned is "green," and has higher moisture content. This results in more wood being burned to heat the same area.

### Technology

Over the past decade, researchers and appliance designers have developed technologies that can reduce the amount of smoke and other pollutants produced by wood-burning appliances. All of these technologies are aimed at burning off the smoke before it leaves the firebox. This is not an easy task because to burn, the smoke must simultaneously:

- Be at a high temperature,
- Have adequate oxygen available,
- And have enough time to burn before being cooled.

There are three general categories of technologies in use:

- Advanced combustion.
- Catalytic.
- Densified pellet combustion technology.

3 Environment Canada article, Yukon News, February 11, 2000

4 Firewood USA, Miller Consulting Group, Niskayuna, New York, USA

**Heat Values**

The following are the Heat Values for Specific Species5

| Species | Density (lbs per cubic ft) | Weight Per (lbs) | BTU's Per Cord (millions) | Recoverable Units need BTU's produce 1 Million BTU's |
|---|---|---|---|---|
| White Oak | 47.2 | 4012 | 25.7 | 17.99 | 0.056 |
| Red Oak | 44.2 | 3757 | 24 | 16.8 | 0.060 |
| Beech | 44.2 | 3757 | 24 | 16.8 | 0.060 |
| Yellow Birch | 43.4 | 3689 | 23.6 | 16.52 | 0.061 |
| White Ash | 43.4 | 3689 | 23.6 | 16.52 | 0.061 |
| Tamarack | 38.2 | 3247 | 20.8 | 14.56 | 0.069 |
| Paper Birch | 37.4 | 3179 | 20.3 | 14.21 | 0.070 |
| Elm | 35.9 | 3052 | 19.5 | 13.65 | 0.073 |
| Jack Pine | 31.4 | 2669 | 17.1 | 11.97 | 0.084 |
| Norway Pine | 31.4 | 2669 | 17.1 | 11.97 | 0.084 |
| Hemlock | 29.2 | 2482 | 15.9 | 11.13 | 0.090 |
| Black Spruce | 29.2 | 2482 | 15.9 | 11.13 | 0.090 |
| Ponderosa Pine | 28 | 2380 | 15.2 | 10.64 | 0.094 |
| Aspen | 27 | 2290 | 14.7 | 10.29 | 0.097 |
| White Pine | 26.3 | 2236 | 14.3 | 10.01 | 0.100 |
| Balsam Fir | 26.3 | 2236 | 14.3 | 10.01 | 0.100 |
| Cottonwood | 24.8 | 2108 | 13.5 | 9.45 | 0.106 |
| Basswood | 24.8 | 2108 | 13.5 | 9.45 | 0.106 |

Unprocessed fuel wood provides heat for most residences and commercial buildings in the community. Wood for fuel is becoming more difficult to obtain in the Old Crow area. Much of the harvest for fuel wood is unseasoned green timber. Green wood, as opposed to seasoned wood provides only 50% of heating value (BTUs). Therefore twice as many trees

---

*5* **(footnote source: hearth.com)**

are required to produce the same amount of heat as seasoned wood even in high efficiency wood burning appliances.

Not only does burning green wood produce greenhouse gases (GHG), contributing to global warming and global climate change, but also it removes living trees, which consume GHG. In addition, as trees take generations to reach even a six-foot height, trees in the Old Crow area cannot be considered a renewable resource. The resource simply takes too much time to renew itself and, depending on harvest methods and disruption to the thin soil structure, may renew at reduced volumes, if there is renewal at all.

VGFN does not require that wood burning appliances, purchased either directly or indirectly through its spending, meet an energy efficiency standard.

Applied existing technology can produce wood burning appliances that are about 90% efficient. However, there are three parts to the efficiency of wood burning appliances:

- *The appliance.* Newer wood burning appliances may burn wood at a higher efficiency than older appliances.
- *The qualities of the wood fuel.* The fire-killed wood (which is the primary fuel source) degrades over time as it rots.
- *The people using the appliance.* National Resources Canada will soon begin an extensive public information campaign on using wood burning appliances.

A forest resource inventory for fuel wood supply is required. Without such an inventory, the Vuntut Gwitchin people of Old Crow simply do not have the necessary information to make informed decisions on using forest resources for fuel.

The cost per cord averages about $300 a cord. Given this high cost, other heating fuels are becoming more cost competitive. In addition forest resources:

- Provide habitat essential to many different species of life forms.
- Are an integral part of the forest and regional ecosystem?
- May have higher value for lumber or for use in specialty wood products because of its density and fine grain.

So, it is for many reasons that the VGFN plans a forest inventory, in partnership with the Governments of Canada and the Yukon.

### 10.3 Petroleum Products and Distribution

Electrical power is distributed by Yukon Electric Company Limited through a local diesel fuel generating plant. The approximately 650 MW plant consists of three diesel generator sets of 250 kW, 250 kW, and 150 kW capacities. The plant and electrical distribution system, owned by Yukon Electrical Company Limited, an Alberta based Atco Company, used about 527,026 litres in 2000.

**The Yukon Electrical Company Limited**
**Old Crow Generating Plant**

**Annual Fuel Usage – Litres**

| Year | Litres |
|---|---|
| 1999 | 527,056 |
| 2000 | 525,230 |
| 1998 | 507,991 |
| 1997 | 448,912 |
| 1996 | 451,745 |
| 1995 | 429,510 |
| 1994 | 417,487 |
| 1993 | 335,014 |
| 1992 | 409,213 |
| 1991 | 350,669 |
| 1990 | 366,689 |

All petroleum products arriving in Old Crow from Eagle Plains and/or Fort McPherson arrive on Air North. (See the detail below. Once landed in Old Crow, the fuel is off loaded to a pipeline.

There are fuel pump dispensers at the temporary tank farm site, however there is no service station-type set-up to access the stored fuel. Residents of Old Crow pay for their gas through an arrangement with Northern Stores. Then, an employee of VGFN goes with the resident to pump the fuel from the pump dispenser to vehicles, equipment, snowmobiles, ATV vehicles, or fuel containers.

Air North hauled the following amounts into Old Crow @ delivery.

| | **Gas** (Litres) | **Stove Oil** (Litres) |
|---|---|---|
| Dec 99 | 48,000 | 154,000 |
| March 2000 | 45,000 | 76,000 |
| June 2000 | 30,000 | 61,000 |
| Sept 2000 | 46,000 | 67,000 |
| Dec 2000 | 32,000 | 79,000 |
| March 2000 | 58,000 | 85,000 |

Between December 1999 and March 2000, about 330,000 litres of fuel were flown into Old Crow for commercial sales. In addition, Yukon Electrical Company Limited, the RCMP, and the Yukon Government imported their own fuel to meet their own needs.

The Old Crow fuel consumption during the three fiscal years of 1998/99 through 2000/2001 is detailed in the following table:

**Old Crow Fuel Consumption**
**1998-2001**

**Fiscal Year ending March, 1999**

| | Diesel/litres) Total Heating | Price/litre) | Heating/Litres | Price/Litre | Total | Diesel |
|---|---|---|---|---|---|---|
| **Total** | 65510 | 0.74 | 43250 | 0.74 | $48,278.49 | $31,974.97 |

**Fiscal Year ending March, 2000**

| | Diesel/litres) Total Heating | Price/litre) | Heating/Litres | Price/Litre | Total | Diesel |
|---|---|---|---|---|---|---|
| **Total** | 32644 | 0.94 | 108892 | 0,74 | $30,4000.69 | $80,326.13 |

**Fiscal Year ending March, 2001**

| | Diesel/litres) Total Heating | Price/litre) | Heating/Litres | Price/Litre | Total | Diesel |
|---|---|---|---|---|---|---|
| **Total** | 34274 | 1.01 | 42653 | 1.10 | $34,778.42 | $44,637.30 |
| **3 yr Total** | **132,428** | | **194,795** | | **$113,457.59** | **$156,838.39** |

**3 yr Average**
**Fuel Price** **(FY 1998/99) 0.74** **(FY 1999/00) 0.94** **(FY 2000/01) 1.01**

Fuel delivery is currently a Vuntut Gwitchin First Nation government services responsibility. The current delivery system consists of a truck with a tidy tank. Until this fall, the fuel was stored in old, single walled fuel tanks without adequate spillage protection. The existing tank farm and fuel distribution system does not meet current environmental standards. As an interim measure, new enviro-tanks have been installed on the existing tank farm site. During FY 2000/01, the RCMP used 6000 litres of gasoline and 24,000 litres of heating fuel.

A major problem set relating to the existing fuel storage and distribution system requires urgent resolution. This problem set has six parts.

- The location of the existing fuel tank farm is in the centre of town. In the event of a major fire, lives and property are at substantial risk.

- The aging tanks were beyond their useful life and no longer met environmental standards.

- With increasing dependence on oil, the capacity of the existing tank farm cannot meet the demand for fuel a cold winter would create, as during extremely cold weather, planes bringing in fuel could not land in Old Crow. This too places lives and property at great risk.

- There is no readily available supply of gravel to prepare the site for the new fuel storage tank farm. While a potential gravel site has been identified at Crow Mountain, until extensive blasting and gravel crushing occurs, there is an even insufficient gravel resource to build a road to Crow Mountain. There is a substantial expense to get the gravel from Crow Mountain for road building and to prepare the new tank farm site. (Note. Extensive gravel resources are also required to construct riprap to stabilize the eroding shore of the Porcupine River.)

- VGFN gives its highest capital project priority to resolving the gravel supply problem. Gravel is urgently needed for all new building projects, including roads. Resolution of this problem could begin over Winter 2001-02 if funding is secured.

- The existing tank farm site is contaminated by decades of fuel spills and will require restoration to industrial standards.

# 11.0 CURRENT ENERGY CONSUMPTION PATTERNS

## 11.1 The Changing Housing Inventory

There are about 116 houses in the community and a recent study reported that there was a shortage of 23 units. "Thirty-five houses require major renovations and 30 minor renovations to extend their useful life by 15 years." *(Old Crow Capital Plan 2001-2006, page 5.)*

New houses will cause an overall increase in the demand for electricity, and fuel for heat, regardless of how energy efficient the new homes are. For houses that will be renovated, the need for energy efficiency should be a dominant factor in decisions about renovations. In addition, all new and renovated homes could contain solar panels to heat hot water, high efficiency wood burning appliances, energy efficient fridges and stoves, washers and dryers be sited for maximum solar gain, and achieve an overall high energy efficiency.

With the natural rate of population increase at about 1% per year, and with in-migration,

the construction of new homes and the renovation of existing ones, the look of Old Crow in 2006 will be vastly different from 2001. With careful energy management planning and design, selection of appliances, including wood burning stoves, siting of buildings and inclusion of energy saving features, VGFN will be doing what it can to reduce the production of GHG and reduce energy costs for every new and renovated home.

**Table 2: Capital Plans for Housing 2000-2006**[6]

| Period | New Homes to Replace Sub-standard Homes | New Homes Population Increase | Major Home Renovations | Other Major Buildings |
|---|---|---|---|---|
| 2001-2005 | 30 | 5 | 25 | 0 |
| Cost | $125,000 | $125,000 | $25,000 | 0 |
| Estimated Cost in 2001$ | $3,750,000 | $625,000 | $625,000 | $0 |
| **Total Building Construction Costs 2001-2005** | | **$5,000,000** | | |

[6] From the Old Crow Capital Plan 2001-2006. These numbers do not reflect need, rather the VGFN financial limitations and historic under funding by INAC for housing.

The VGFN new home construction and major renovation programs create opportunities to build homes which are far more energy efficient than existing homes. In addition to cost savings for electricity, using less electricity will result in the production of less GHG by the community.

### 11.2 Other Buildings

The federal and Yukon Territorial governments owns most institutional and commercial buildings in Old Crow. VGFN should work with other governments to get energy saving features added to existing buildings.

## 12.0 ALTERNATE ENERGY OPTIONS

VGFN is considering a range of renewable energy options to meet current and future energy needs. This section contains a brief introduction to these renewable energy options for consideration as the strategy is developed. These options include:

- Wind
- Wood Harvesting
- District Heating
- Solar energy

## 12.1 Wind Generated Electricity

Wind-generated electricity is a proven technology that works even in northern climates, due to advances in propeller de-icing. There are many kinds of wind generators. Wind-generated electricity may use generators with or without moving parts.

According to the Canadian Wind Energy Association, wind energy is a $5 billion US per year industry worldwide and is experiencing explosive growth. In 2000, the capacity of wind power facilities worldwide grew from 13,455 megawatts to 17,700 megawatts, a growth rate of 32%. This rate of growth has been sustained over the past five years.

Canada's wind power capacity grew from 127 megawatts to 140 megawatts in the year 2000, a 10% growth rate and energy analysts expect continued growth in the future. Other things for consideration on wind generated electricity:

- Over the last 10 years, costs for wind-generated electricity have dropped from $0.30 per kilowatt-hour to $0.058 per kilowatt-hour (at the Le Nordais project in the Quebec Gaspe and at Cowley Ridge in southwestern Alberta).
- The technology has matured rapidly with typical reliability rates greater than 98% for good quality, modern wind turbines, making them reliable.
- Canada has far more wind energy potential than its current total use of electricity (about 485,000,000,000 kilowatt-hours used in 1995). While wind energy will never supply all of Canada's electrical requirements, it is not unreasonable to expect this clean, non-polluting, renewable energy source to supply up to 20%.
- Canada has about 136 megawatts of wind generation plant installed producing about 299,000,000 kilowatt-hours of electricity per year - enough to supply about 37,000 typical Canadian homes.
- In Canada, the 18.9 megawatt wind generating plant on Cowley Ridge, Alberta (see picture above) produces more than 55,000,000 kilowatt-hours of electricity per year - enough for 6,800 typical Canadian homes. If this electricity is used to displace coal-generated electricity, it avoids discharging about 55,000 tonnes of carbon dioxide into the atmosphere annually.
- Canada's largest wind plant is located in the Gaspé region of Quebec. The Le Nordais project currently has 133 750-kilowatt turbines producing 100 megawatts of electricity at two locations; Cap Chat and Matane.
- Ontario Hydro's single 600-kilowatt demonstration turbine near Tiverton, Ontario produced 1,218,000 kilowatt-hours of electricity in its first year of operation, enough for 152 Canadian homes.

- Wind-diesel projects in remote northern Canadian and Alaskan locations have demonstrated that wind energy can reduce the high costs associated with transporting diesel fuel to these remote sites.
- There is a significant rural Canadian and potentially huge international market for small non-electric wind turbines for pumping water and aerating ponds.

## 12.2 Biomass Generated Electricity

Biomass generated electricity involves the creation of combustible gases to convert to electricity. For example, methane gas could be produced using landfills in a system where the biomass is broken down without oxygen.

Using biomass to produce electricity is a new and experimental technology. As such, the use of biomass to produce electricity in Old Crow is not now part of this energy strategy.

## 12.3 Thermal Energy

Thermal energy involves using the heat from an occurrence like a hot spring or from a well-drilled deep into the earth surface to create electricity.

This technology is not recommended for inclusion in this energy strategy.

## 12.4 Hydroelectricity

There are three classes of hydro projects.

- Large, producing more than 20 mega watts (MW) of electricity.
- Small, producing between about one MW and 20 MW.
- Micro, producing less than one MW of electricity.

There may be sites that have the potential for hydro projects within the VGFN traditional territory.

Large hydro projects involve dams and flooding of large areas. When large areas are flooded, submerged vegetation decays anaerobically (without oxygen), producing methane gas and thereby contributing to the production of greenhouse gasses.

There are examples of micro hydro projects relative to the energy and other needs of the VGFN and people living in Old Crow. There is one micro hydro project at Fraser, BC. A private company that sells its power to the Yukon Energy Corporation (YEC) owns this installation. YEC resells the power distributing to consumers in the community.

Micro hydro projects ***may*** be designed so that:

- There is minimal impact on the environment.
- Fish are diverted from the turbines.
- Fish habitat is maintained or alternate habitat installed (such as alternate spawning areas).
- Is "greenhouse gas emitting" neutral.
- Result in a net loss of greenhouse gas emissions.

## 12.5 Solar Energy

**Passive Solar Energy**

There are three kinds of passive solar energy; daylighting, heating and thermal storage.

Daylighting is the use of natural light to replace artificial light. Heating is the use of daytime heating to replace artificial heat.

Both daylighting and heating passive solar energy require a microenvironment approach to building design and orientation to the sun. These passive solar energy uses may be maximized in the planning stages of new buildings and major renovation to existing buildings.

Using passive solar energy for daylighting or heating does not increase the cost of new building or major renovations if these are systematically incorporated into building design. Properly incorporated into buildings, daylighting also improves the quality of the internal environment producing an improved sense of well-being. In office buildings, daylighting has been shown to reduce absenteeism and increase productivity. Daylighting is used in many commercial, residential, and institutional buildings in the Yukon.

Solar thermal storage systems capture the energy produced by the sun and store it for use after the sun has set. Solar thermal storage systems are used in the Yukon to provide heat energy for hot water and home heating beyond sunlight hours. Some log buildings can store solar heat.

Many solar thermal storage systems are available commercially in the Yukon. However, none are used in Old Crow. As existing technologies are developed and new technologies make it to the marketplace, increased use of solar thermal storage systems is expected.

According to Natural Resources Canada (*EFT 2030 Technology Perspectives*),
"A passive solar is primarily used in reduction of energy usage in buildings and is used in combination with energy generating systems. There are many building materials and storage structures such as windows, doors, insulation, thermal storage (bricks, floors etc.) and ventilation (solar walls, air heat exchangers etc.) Those are available and economically justified today to take advantage of the energy form solar energy. It is well known that substantial energy savings are still available through the use of passive solar systems both in new building design and retrofitting existing structures."

Using passive solar systems will require a substantial public education process. Working with its partners to implement this strategy can help with the process of public education. VGFN can demonstrate by its own example how renewable energy sources can be used to reduce greenhouse gas emissions and save building owners money.

What makes solar domestic hot water heaters so attractive is that costs have fallen from about $5,500 in 1980 to about $2,100 in 2001.

The use of photovoltaic cells to store solar energy is a new technology and as such, may well be a technology that could be considered in future revisions to this strategy.

Daylighting is the use of natural light to replace artificial light. It requires a systems approach and is most effective if used in the planning stages for new building construction or major renovation. Building orientation (i.e. use of south facing components) and use of materials have a major impact.

Solar Thermal Storage includes mass storage systems to store the heat from the sun. This includes structures like brick walls and concrete floors to water storage tanks and molten salt storage. Typically the material usage has the property of heating and releasing heat slowly. In this way the mass can be heated during daylight hours and the heat released slowly and continuously with the most significant benefit coming during the period outside of daylight hours. In some cases such as molten salt storage, the heat can be used to generate electricity.

Solar thermal storage is a key component of a passive solar system since the use of the solar energy is extended beyond daylight hours. It is the equivalent of a battery that stores electrical energy. By effectively capturing the solar thermal energy and storing it, Solar thermal storage provides heat energy for hot water and for home heating well beyond sunlight hours. It would be difficult to justify solar thermal systems without the ability to store the energy.

Daylighting is commercially available. Research and development is ongoing with respect to window design and materials as well as computer systems to optimize the total building efficiency in balance with other passive and active systems. Solar thermal storage is commercially available. Research and development is ongoing to produce more cost effective and efficient (less heat loss) storage systems.

## 13.0 VGFN STRATEGIC ENERGY PLAN GOALS

The VGFN is committed to doing its share in the global effort to reduce greenhouse gases (GHG). This energy strategy outlines the specific objectives and actions VGFN will take to help achieve the following ten goals:

1. **To Reduce Overall Green House Gas Emissions Produced in the Community**

➢ Figures available for the United States are that, on average, each household produces 23,380 pounds of carbon dioxide each year. It is reasonable to conclude that households in the North, with a higher energy budget, produce more GHG than households in the US.

➢ It is important to remember that not all sources of energy considered renewable reduce greenhouse gas (GHG) emissions. Just about anytime a fuel is burned

2. **To Establish an Environmentally and Economically Viable System of Storing and Distributing Home Heating Fuel and Other Petroleum Products**

3. **To Develop a Sustainable Plan for Fuel Wood Harvest**

➢ Wood as an Energy Source

- Most homes in Old Crow are heated with wood. The wood burning appliances are neither standardized nor fully inventoried. It is estimated that existing residential wood heating appliances operate at between 30 and 90 percent efficiency. VGFN will require that all new wood burning appliances funded through housing or renovation projects or installed by other governments in Old Crow achieve a minimum energy standard. This standard will be developed in partnership with the YTG Green Power office.
- There is no inventory of forest resources within the VGFN traditional territory so there is no scientific information about the future supply of wood for use as fuel.
- VGFN will work with the Governments of Canada and the Yukon to complete a forest inventory no later than March 31, 2003.

4. **To Maximize the Use of Local Labour and Businesses**

5. **To Develop Partnerships in the Public, Private and Nonprofit Sectors**

6. **For VGFN to Become Involved in New Energy-producing Projects**

➢ Including wind power, solar power, co-generation, and district heating.

## 7. To Respect VGFN Values

➢ Each of the six sources of renewable energy listed above has costs and benefits. What the VGFN will use as a decision making guide is how well each of these sources are in accordance with the goals of this strategy, especially goal two, reducing green house gas emissions.

## 8. To Develop Resource Partnerships in the Public, Private and Nonprofit Sectors

➢ VGFN partners in implementing this strategy may include the following:

- Indian Affairs and Northern Affairs Canada.
- The Yukon Department of Economic Development Green Power Initiative, through the Yukon Development Corporation (YDC) provides assistance in four core areas:
  - Green power information and training
  - Green power research and development
  - Tendering and constructing green power projects
  - Green power marketing and consumer choice
- Yukon Electrical Company Limited. YECL owns the existing diesel electrical generating plant and the electrical distribution lines in the community. The company may have an interest in participating in district heating and/or alternative electrical generation.
- Natural Resources Canada, CANMET Energy Technology Centre (CETC) provides four repayable and cost-shared contract funding programs that may be applicable:
  - Building Energy Technologies Program
  - Emerging Technologies Program
  - Industry Energy & Research Development Program
  - Renewable Energy Technologies Program (613) 996-6220 provides cost-sharing and technical assistance in support of technology development and field trials. CANMET's Alternative Energy Division administers the program. The program also funds computer simulation and modeling of hydro turbine flow for businesses.
  - Natural Resources Canada REDI funds up to 40% of the purchase and installation of a qualifying active solar hot water or heating system.
- The Northern Research Institute at Yukon College
- Other Yukon and Northwest Territories First Nations.
- Council for Yukon First Nations.
- Companies in the private sector qualified to support implementation of this strategy.
- Non-profit groups, like the Yukon Conservation Society, which have a mandate to promote energy conservation and alternate energy sources.

- Mackenzie Petroleum or North of 60.
- Local VGFN Members.
- Pembina Institute.
- Suncor and other large oil and gas companies.

### 9. For VGFN to Become a Partner in New Energy Projects

➢ Potential projects include:
- Hydroelectric power.
- Wind power.
- Solar power.
- Co-generation.
- District heating.

### 10. To Maximize the Economic Benefits of this Plan

➢ VGFN will take measures to ensure that the economic benefits of implementing this plan accrue mainly to VGFN members and the community of Old Crow.

## 14.0 STRATEGIC ENERGY PLAN OBJECTIVES

VGFN has developed sets of objectives to help achieve its goals as outlined in this strategic energy plan.

1. To reduce the amount of energy used in existing buildings.
2. To incorporate energy conservation into the design of all new and renovated buildings in the community..
3. To incorporate energy conservation into the design of new housing developments
4. To involve VGFN Departments in the development of the strategic energy planning process.
5. Where economically and environmentally viable, to use renewable energy sources at the community, community service, and household levels to the greatest extent possible..
6. For VGFN to use renewable energy systems in all VGFN-funded projects, where economically and environmentally viable, to the greatest extent possible.

## 15.0 EXPECTED BENEFITS

This energy development strategy could create many benefits to the First Nation, including:

- Clean up an environment hazard, therefore reducing environmental risks.
- Reduce the pressures on a dwindling wood supply.
- Protect the environment through a state of the art energy storage and distribution system.
- Revenues.
- Development of infrastructure.
- Investment in the community.
- Overall improvement in the social and economic development of Vuntut Gwitchin First Nation.
- Increase energy efficiencies.
- Develop alternative energy strategies.
- Clean up existing environmental damage from energy spills.
- Increase community awareness respecting energy.
- Local economic development and job training/creation.
- Increase community self-sufficiency.
- Look at solutions for dwindling wood fuel supply.
- Promote energy conservation.
- Develop locally controlled infrastructure to support self government.

## 16.0 RECOMMENDATIONS AND CONCLUSIONS

The following are the recommendations and conclusions:

### 16.1 Objective: To Reduce the Amount of Energy Used in Existing Buildings

This will be accomplished by:

- Implementing a range of cost effective measures to increase energy efficiency at each energy source in the community.
- Completing energy audits on all VGFN buildings, beginning with the buildings consuming the most energy.
- The *Old Crow Capital Plan 2001-2006* to reflecting the priority of energy saving construction methods for all renovations.
- Requesting that other governments and agencies with buildings within the VGFN traditional territory complete energy audits of their buildings with a view towards completing renovations to reduce energy consumption.
- Installing only high efficiency wood burning appliances (EPA approved) whenever a wood- burning appliance is replaced as part of a residential, commercial, industrial, or institutional renovation project.
- To complete an assessment of heat storage systems by the end of fiscal 2003.
- To take action to begin implementation of the recommendations of the heat storage study recommendations by the end of fiscal 2004.

- To prepare a replacement program to install high efficiency burners in all oil and wood burning appliances in VGFN buildings by the end of fiscal 2003.
- To support actions to supplement wood heat with other sources that do not create greenhouse gases.
- To install only energy efficient appliances in homes in renovations funded by VGFN and other governments.
- To purchase only energy efficient office equipment and to increase cost savings by installing such equipment with power bars.
- To request that other governments and agencies with buildings within the VGFN traditional territory purchase only energy efficient office equipment and to increase cost savings by installing such equipment with power bars.

### 16.2 Objective: To Incorporate Energy Conservation into the Design of All New and Renovated Buildings in the Community

This will be accomplished by:

- Designing all new VGFN buildings with the objective of obtaining a high level of energy efficiency.
- Completing an assessment of installing solar panels on VGFN administrative and industrial building to supply hot water for the building or other buildings nearby.

### 16.3 Objective: To Incorporate Energy Conservation into the Design of New Housing Developments

This will be accomplished by:

- Completing an assessment of district heating options by the end of fiscal 2003.
- Taking action to begin implementation of the recommendations of the district heating study recommendations by the end of fiscal 2003.

### 16.4 Objective: To Involve VGFN Departments in the Development of the Strategic Energy Planning Process

The objective is to involve all VGFN Departments in the development and implementation of the plan. This will be accomplished by:

- Holding workshops with VGFN Department heads and staff on this strategic energy strategy.
- VGFN staff providing copies of the draft and final VGFN Strategic Energy Plan to other government agencies with which they have inter-governmental relations, to seek technical and financial support to implement this plan.

### 16.5 Objective: Where Economically and Environmentally Viable, to Use Renewable Energy Sources at the Community, Community Service, and Household Levels to the Greatest Extent Possible

There is a broad range of renewable energy sources available for use at the community, service, and household levels. These include:

- Solar heating (hot water and storage).
- Heat recovery systems.
- Wind power.
- Waste heat recovery.

### 16.6 Objective: For VGFN to Use Renewable Energy Systems in All VGFN-funded Projects, Where Economically and Environmentally Viable, to the Greatest Extent Possible

There is a broad range of renewable energy sources available for use at the community, service, and household levels. These include:

- Solar heating (hot water and storage).
- Heat recovery systems.
- Wind power.
- Waste heat recovery.

Including renewable energy systems in VGFN-funded projects, will, over time, become part of the project planning process.

### 16.7 Objective: For VGFN and/or its Development Corporation to consider Resource Partner business relationships to develop energy opportunities focused on the community of Old Crow.

The opportunities identified are listed on page 41.