2011

Sharing Knowledge for a Better Future: Adaptation and Clean Energy Experiences in a Changing Climate

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Sharing Knowledge for a Better Future

Adaptation and Clean Energy Experiences in a Changing Climate
The Importance of Sharing Knowledge

Telling stories is a traditional way of communicating important messages for both Aboriginal and non-Aboriginal people across Canada. The stories in this publication highlight successful projects that have received a funding contribution from the current Climate Change Programs at Indian and Northern Affairs Canada (INAC). It is hoped that the stories in this publication will raise awareness in other communities about the steps that are being taken to mitigate and adapt to climate change. It is also hoped that these stories will inspire change in Aboriginal and non-Aboriginal communities across the country to take action on climate change and energy issues.

Past Climate Change Programs at INAC

• 2001-2003: Aboriginal and Northern Climate Change Program (ANCCP)
• 2003-2007: Aboriginal and Northern Community Action Program (ANCAP)

Current Climate Change Programs at INAC

• 2007-2011: ecoENERGY for Aboriginal and Northern Communities Program
The ecoENERGY for Aboriginal and Northern Communities Program is one of eleven ecoENERGY programs funded by the Government of Canada. The main purpose of the ecoENERGY program is to reduce greenhouse gas emissions that lead to climate change. INAC’s ecoENERGY program does this by funding Community Energy Plans, energy efficiency projects and renewable energy projects in Aboriginal and northern communities across the country. The ecoENERGY program also has a special initiative that focuses on assisting the approximately 150 off-grid communities across Canada that rely on diesel fuel for their energy needs.

• 2008-2011: Climate Change Adaptation Program
The Climate Change Adaptation Program supports Aboriginal and northern communities, organizations, and territories in responding to challenges related to climate change. This program supports community planning and builds community capacity to undertake risk assessments, engage in water quality improvement and identify infrastructure issues linked to climate impacts. The program recognizes the importance for Aboriginal and northern communities to identify adaptation priorities and develop management strategies to increase their ability to adapt to issues such as melting permafrost, water management, food security, emergency preparedness, and infrastructure degradation.

INAC’s Climate Change Programs play an important role in assisting Aboriginal and northern communities in adapting to the effects of a changing climate, in becoming more energy efficient and in developing sustainable forms of energy that lower greenhouse gas emissions that lead to climate change.

This document is the third success story publication by INAC’s Climate Change Programs that highlights stories about successful adaptation and energy projects. All three publications are available on INAC’s Climate Change website, found here: [www.ainc-inac.gc.ca/emi/cls/index-eng.asp](http://www.ainc-inac.gc.ca/emi/cls/index-eng.asp)

This document was researched, written and designed by the Centre for Indigenous Environmental Resources (CIER) with participation from Aboriginal and northern community members and INAC staff.
Community Capacity Building

Throughout this process, T’Sou-ke has made sure that its community members are being trained, rather than simply hiring external contractors to do the work. Between the PV, solar thermal and energy efficiency projects, they have had at different times over 25 community members working who may otherwise have been unemployed.

This capacity building was made possible through partnerships with First Power and Home Energy Solutions, two companies that developed oral training programs to teach solar installation skills using the energy that BC Hydro generates. Based on the information they have learned. This was one motivation for T’Sou-ke, who is leading the way in bringing other First Nations and the rest of Canada to a more sustainable energy future.

From an environmental perspective, T’Sou-ke has determined that the community members are being trained, rather than simply hiring external contractors to do the work. Between the PV, solar thermal and energy efficiency projects, they have had at different times over 25 community members working who may otherwise have been unemployed.

“Start with energy efficiency. It’s a lot cheaper to save energy than to produce it.”
—Andrew Moure, Solar Project Manager, T’Sou-ke First Nation

WHAT IS SOLAR THERMAL?

Solar thermal technology uses a solar collector to absorb the sun’s energy and convert it into heat. A solar collector consists of a metal box with a glass or plastic cover and black absorber plates inside. These collectors can be classified as low, medium, or high-temperature.

Low and medium-temperature collectors are generally used to heat water in houses and other buildings.

Cold water is pumped into the solar collector and is warmed by the sun. The hot water is then pumped back to the building (see diagram below).

High-temperature collectors concentrate sunlight using mirrors to obtain higher temperatures. This technique is called “concentrated solar power” and uses steam or gas turbines to convert heat into electricity. This is different from solar PV, which converts solar energy directly into electricity using an inverter (see What is Solar Photovoltaic (PV) below).

SOLAR THERMAL - DOMESTIC HOT WATER SYSTEM

WHAT IS SOLAR PHOTOVOLTAIC (PV)?

Solar PV technology converts sunlight directly into electrical energy using PV cells, which are made out of semiconductor materials such as silicon. PV cells can be small (like those you’ve probably seen on a calculator) or can be connected together to form large PV modules. These modules can in turn be connected to form larger PV arrays. When light strikes the PV cell, the energy in the light is transferred to the semiconductor in the PV cell. This energy distorts the electrons in the semiconductor, and moves them in a certain direction, creating an electrical current that can be tapped into for our electricity needs.

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T’Sou-ke First Nation

Energy Conservation Program, 37 Solar Hot Water Installations,
75 kW Solar Photovoltaic Installation

“We like to think of ourselves as Eco-Warriors, because we know that we have to go out and be assertive to get this message across. If we just do nothing, Mother Nature will show us where we’ve gone wrong.”—Chief Gordon Planes, T’Sou-ke First Nation

Although they have evaluated the possibility of being completely off-grid, T’Sou-ke’s administration is currently operating at “net zero”, meaning that they generate enough electricity to meet their own energy needs in the summer and sell the surplus to BC Hydro. In the winter they buy some of that energy back, for a net zero grid requirement on an annual basis. This means that they are essentially using the grid as a storage device, as opposed to using the energy that BC Hydro generates. Based on the 80.08 kW/h that BC Hydro pays for electricity, generating solar energy is not currently as cost-effective as purchasing energy from BC Hydro, since it costs T’Sou-ke approximately $0.10/kWh to generate solar energy, based on a 25-year payback. However, T’Sou-ke sees this project as an investment for an uncertain future in which energy costs are projected to continue to rise, as well as an opportunity to address energy security issues, which are both issues the community has identified as being important to them.

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**The more information you have, the better your end result will be, and the fewer costly surprises you’ll encounter.** Jamie Bassett, Director of Economic Development, Tla-o-qui-aht First Nation

Canoe Creek Hydro is a corporation with a conscience. Formed as a partnership between Tla-o-qui-aht First Nation (75%) and Swift Water Power Corporation (25%), the company’s first development was a 5.5 MW hydroelectric project on Canoe Creek. This project generates enough energy to power approximately 3,000 Vancouver Island homes. The First Nation is now looking at the projected budget, and ahead of its completion schedule. In order to maintain consistency with its sustainable development programs, it wants to rebuild dwindling salmon stocks in the area. For example, small roads, buried penstock, and strict creek level control will minimize environmental degradation. Tla-o-qui-aht First Nation’s ultimate goal is to reinvest the profits from the Canoe Creek Hydro project into other economic and social development programs. It wants to rebuild dwindling salmon stocks in the area and rehabilitate the local fish habitat, as well as explore other ways to generate clean energy. An example currently being explored is the development of a wind farm on a high plateau within the First Nation’s traditional territory. Over time, the increasing demand for clean energy will provide the opportunity and the mechanism by which the First Nation will move towards self-sufficiency.

Smart Investments

The Canoe Creek hydro project is not only a step towards energy and financial self-sufficiency for Tla-o-qui-aht First Nation. It is also a very deliberate investment in an opportunity to develop an energy project that does not deplete natural resources. In this way, the First Nation hopes to stay true to its vision of sustainability while fostering economic development within its community. In order to maintain consistency with its sustainable development ideals, significant environmental planning and research was conducted to ensure that the First Nation traditional territory is protected, including the Kennedy River watershed (within which the Canoe Creek project is located) and surrounding wildlife. For example, small roads, buried penstock, and strict creek level control will minimize environmental degradation. Tla-o-qui-aht First Nation’s ultimate goal is to reinvest the profits from the Canoe Creek Hydro project into other economic and social development programs. It wants to rebuild dwindling salmon stocks in the area and rehabilitate the local fish habitat, as well as explore other ways to generate clean energy. An example currently being explored is the development of a wind farm on a high plateau within the First Nation’s traditional territory. Over time, the increasing demand for clean energy will provide the opportunity and the mechanism by which the First Nation will move towards self-sufficiency.

**Tla-o-qui-aht First Nation Run of River Hydro**

Develop a relationship with a joint venture partner that you trust, and stick with it. If you want to move quickly, you’ll need their expertise. But make sure they’re experienced, as well as committed to the project.” Jamie Bassett, Director of Economic Development

**WHAT IS RUN OF RIVER HYDRO?**

Two types of hydroelectric projects are common: those created by storing reservoirs of water behind a dam and “run of river” hydro projects. Run of river hydro does not store large quantities of water behind a dam. It is dependent on the flow of water in a river for generating power. Hydro projects generate power by passing water that is under pressure through turbines. Run of river hydro develops this pressure by using drops in elevation.

In run of river hydro systems, a small dam or weir (about 1 to 3 meters high) is typically built across a waterway which directs the water in the river toward the “intake” point. After the water has come through the intake, it is channeled along canals, tunnels or pipelines that run both parallel to, and above the river, to a point downstream. At this point, the water is allowed to fall through a pipe or penstock down to the powerhouse where it spins turbines to create electricity. The water is then channeled out of the powerhouse so that it can rejoin the river.

Run of river projects are most cost effective when the water does not have to be channeled far from the intake before it can be used. In other words, the faster a river descends after the intake point, the better. An ideal situation would be to have a waterfall just downstream of the intake. Sometimes, in more mountainous regions, the project can dispense with the canal and simply send water down the penstock directly from the intake. In less mountainous regions, however, a canal might be built up to one kilometer before enough elevation is achieved to allow the water to drop into the powerhouse. A three to five meter drop is generally the minimum required for the smallest run of river hydro projects.

**Run of River Hydro Power Summary**

- **Description:** Diversion of part of a river’s natural water flow through pipes and turbines to generate power and return the unaltered water to the river downstream.
- **Minimum Flow:** 0.5-12 m³/s (off-grid)
- **Required:** 12 m³/s (on-grid)
- **Electricity Costs:** 3/s (on-grid)
- **Positive:** • Stable long-term electricity costs
- **Features:** • Grid connected sites can often be cost-competitive even without subsidies
- **Challenges:** • Reliability of year-round flows • Possible impacts on fish habitats • In northern regions, freezing and blockages may be a problem, especially at intakes and along slow-flowing canals

**Source:** Aboriginal Energy Alternatives, Pembina Institute

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**Tl-o-qui-aht First Nation Run of River Hydro**

“Once the decision was made as to which site to focus on, Tla-o-qui-aht First Nation began the permitting and energy purchase agreement process for the Canoe Creek hydro project. They applied to ecoENERGY and Aboriginal Business Canada for approximately $3 million as funding for the development of a business plan, as well as all the elements that negotiation of an energy purchase agreement entails, including the interconnection study. According to Jamie Bassett, Tla-o-qui-aht First Nation’s Economic Development Director, the First Nation wisely spent 15-25% on preliminary engineering studies, such as Ladar surveying (a surveying technique using laser digital technology), penstock layout, road design, geo-technical work and terrain stability analysis. These studies formed the basis of the business plan, and made future steps more fluid and reliable. Partially as a result of this up-front spending, the Canoe Creek hydro project is within 3% of the projected budget, and ahead of its completion schedule.

**Solid Partnerships**

According to Bassett, other elements that have been key to the success of the Canoe Creek hydro project have been the support from Indian and Northern Affairs Canada, and the solid partnership with Swift Water Power Corporation. The only hindrance to the process has been access to financing, which took almost a year due to the poor credit climate during the project’s stretch for financing.

Bassett remembers that the initial idea for the Canoe Creek hydro project came from one Councilor, Ray Martin, who in the early 2000’s said, “I think we should be looking at this.” “That kind of an idea to start the process is often all you need to get things moving, along with a Chief and Council who are prepared to stand behind the project from beginning to end,” Bassett says. This includes financial commitment; Tla-o-qui-aht First Nation contributed significant bridge financing to the project before long-term financing was found.

**Smart Investments**

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The Kwoiek Creek Hydropower Project began with this question, stated above by Patrick Michell, Kanaka Bar Indian Band’s Community Liaison. However, the journey from knowing that there was hydroelectric potential in the Kwoiek Creek (a tributary of the Fraser River) and wanting to harness it, to actually generating energy from a 50 MW run of river hydro project, has taken over 20 years so far. Patrick Michell says, “The band had a dream. Just not the financial resources and human capacity to execute it.”

Persistence has paid off and from that dream was born Kwoiek Creek Resources Limited Partnership, an equal partnership between Kanaka Bar Indian Band and Innergex II Power Trust Inc. Forty years after the commercial operation date of the hydro project, Kanaka Bar Indian Band will become the sole owner of the hydro project.

In order to get support from all the stakeholders involved, Kwoiek Creek Resources Limited Partnership established the First Nations Advisory Group where 7 of the 16 communities participated in a review of the hydro project and provided advice and guidance on the effects to the stakeholders of the project, especially the 80 km transmission line. Michell says, “For the communities of the Nlaka’pamux Nation, the Kwoiek Creek Hydro project represents an assertion of Indigenous rights, which is consistent with both Nlaka’pamux law and present day business practices and laws.”

Environmental Assessment
In September of 2008, Kwoiek Creek Resources Limited Partnership submitted an application for a review of the hydro project impacts and mitigation plans under existing federal and provincial legislation and the 1994 Resolution regarding Nlaka’pamux resources. A harmonized review of the project was undertaken by the Environmental Assessment Office in Victoria.

In March of 2009, a comprehensive report was produced by the Environmental Assessment Office, and an Environmental Assessment Certificate was issued by the province. A federal screening report followed in September. With the conclusion of the review and the issuance of these reports, final permitting for construction is anticipated to begin in September of 2010.

Potential Benefits
According to the Kwoiek Creek Resources Limited Partnership, the project has the potential to provide significant benefits on a local, regional, and provincial scale. These include:

- Financial benefits to Kanaka Bar Indian Band;
- Direct employment of 70-90 workers during the two-year construction period, with priority placed on employment of qualified First Nation and local workers;
- Several long-term jobs for plant operators and watershed monitors with contracted maintenance and other required services during the 40-year operational period;
- Business opportunities related to the project construction and facility operation;
- Sufficient clean energy to supply the needs of approximately 22,000 homes;
- Greenhouse gas emissions reductions equal to removing 23,000 cars from BC’s roads;
- Tax revenues for provincial and local governments.

“Communities and 2 Tribal Associations. Six of the Indigenous communities’ traditional watersheds are directly impacted by proposed new construction of civil works and the transmission line and two Indigenous communities are impacted by use of existing roads to access project work sites.”
Arviat, Baker Lake, Iqaluit, and Rankin Inlet Extension of District Heating Systems

“Energy is not just electrical power, and we have to take advantage of all of the resources that are available to us in order to safely, reliably and efficiently provide energy to Nunavut.” Kelland Sewell, Director of Engineering, Qulliq Energy Corporation

Qulliq Energy Corporation is owned 100% by the Government of Nunavut and is responsible for operating 27 diesel plants in 25 communities across Nunavut. Qulliq Energy Corporation is the only generator, transmitter and distributor of electricity in Nunavut. Qulliq Energy is responsible for providing power to all 26 communities in Nunavut that rely on diesel power for their electricity. Nunavut uses imported fossil fuels to generate electricity, heat its buildings and transport its goods and its citizens. This contributes to a situation of high fossil fuel dependency for the territory.

Identifying Efficiencies

In order to combat this CO2-heavy dependency, Qulliq Energy Corporation is trying to increase energy efficiency through the establishment of district heating systems. Currently, each community in Nunavut has its own independent electricity generation and distribution system consisting of individual diesel-generating plants. When these diesel generators burn fuel to produce electricity, they also create large amounts of thermal energy. This thermal energy is known as residual heat or waste heat. These communities include up to 10% savings on customers’ heating bills, reduced fossil fuel consumption and greenhouse gas emissions, a significant decrease in the need to upgrade fuel storage facilities, the reduction of transportation and handling of trucked fuel, and decreased boiler operation and maintenance costs due to extended equipment life.

Scaling Up Impact

Thanks to ecoENERGY funding from Indian and Northern Affairs Canada, district heating systems have been implemented in the four Nunavut communities of Iqaluit, Arviat, Baker Lake, and Rankin Inlet. Benefits to these communities include up to 10% savings on customers’ heating bills, reduced fossil fuel consumption and greenhouse gas emissions, a significant decrease in the need to upgrade fuel storage facilities, the reduction of transportation and handling of trucked fuel, and decreased boiler operation and maintenance costs due to extended equipment life.

“The next step for this project is to build on what we have learned and to see what other customers we can reach with the energy. We are also looking to improve the efficiency of our systems by improving on the combined heat and power plant to improve the quality of heat delivered.”

Kelland Sewell, Director of Engineering

WHAT IS A DISTRICT HEATING SYSTEM?

In off-grid communities, electricity is most often produced by one or more diesel generators. These are convenient but inefficient ways of providing community power. Generally speaking, more than half the fuel burned in diesel generators is changed to heat, not electricity, and is lost out the exhaust. This heat is called residual or waste heat.

There are methods to recover this heat and put it to work so that diesel fuel is used as efficiently as possible. These methods go by names such as residual heat recovery or waste heat recovery and mean that technology captures the heat of electrical generation before it can escape. This heat is channelled through pipes filled with air, water or oil and is used for space or water heating in community buildings.

Combining the production of electricity and heat for useful work is called cogeneration or combined heat and power. When heat is produced in a central location and piped to different “districts” (to different buildings in a community), it is called district heating. Off-grid diesel generated electricity can often be made more than twice as efficient through a combination of cogeneration and district heating. The diagram below shows how this can work.

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Swan Lake First Nation
Wind Monitoring and Data Analysis

“Our vision is to be completely off-grid by 2018. We know it’s ambitious, but that’s our goal.” Council Member, Swan Lake First Nation

Swan Lake First Nation’s wind development process began with an ideal—to become a more environmentally responsible community. Through hard work and perseverance, that goal is quickly becoming a reality. Swan Lake First Nation’s first step was to consult with the community to gain support from all community members. Beginning in 2002 when the green visioning process began, a number of workshops and meetings were held and the community was overwhelmingly in support of this vision. Swan Lake First Nation began experimenting with renewable energy on a small scale. They installed solar panels and a 1.3 kW wind turbine in an off-grid youth camp and geothermal heat pumps in their health center and school. When southern Manitoba’s 99 MW St. Leon wind farm development began just 10 km away, Swan Lake First Nation knew it had the wind resources required to make their vision a reality.

From Vision to Reality
In order to quantify this resource, Swan Lake First Nation undertook the task of installing anemometers, or wind towers, and collecting the necessary data over a 3-year period to develop a comprehensive wind analysis. With confirmation of the wind resource, the next step was to determine how much energy a wind farm could produce. Swan Lake First Nation determined that with a 10 MW wind farm, not only will the community be able to generate enough energy for their own use, but they also have the possibility of generating profits by selling excess energy to Manitoba Hydro.

Next Steps
Since Swan Lake First Nation is looking at this project as an investment, the next steps prior to construction are to develop a business plan and negotiate a power purchase agreement with Manitoba Hydro. These negotiations will result in the establishment of the price at which Manitoba Hydro will purchase the energy produced, and will determine the project’s economic feasibility. Environmental studies will also be conducted to ensure that all environmental impacts have been taken into consideration. Once complete, these steps will help pave the way towards the construction and commissioning of this project.

“One of the main benefits of the wind resource assessment and the installation of the solar panels and wind turbine at the youth camp has been getting the community on board with our green vision… when the wind monitors were up, I had people asking me all the time about our wind resources.” Bob Green, Director of Economic Development

Steps to Planning and Building a Wind Farm

1. Wind Assessment: Wind speeds are measured to estimate how much energy a wind farm could produce.
2. Wind Farm Design: Wind data and topographical information are used to design the optimal wind farm, taking into account things like wind flow, turbine performance, sound levels, access roads, turbine foundations and local electric network, and the connection to the electricity grid.
3. Environmental Study: Environmental assessments are conducted to identify potential impacts on landscape, plants and wildlife, soil and water, land use or other activities such as aviation and telecommunications.
4. Land Acquisition: Developers usually approach landowners to negotiate agreements to use their land.
5. Permitting and Public Consultation: Municipal, provincial and federal permits, as well as community feedback and support, must be obtained.
6. Economic and Financial Analysis: The project must be economically viable in order to raise the funds to build the wind farm. In other words, the income generated from the energy production must be more than the cost of turbines and their installation and connection, as well as roads, electrical system, operation and maintenance, etc.
7. Manufacturing: Wind turbine parts are manufactured, and then shipped to the wind farm site where the final assembly will take place.
8. Site Preparation: Crews build access roads and clear the areas where turbines will be constructed. They then prepare the foundations; do the excavating, install the formworks, and pour concrete.
9. Construction: Once all components have been received, the assembly can take place. A crane is used to erect the tower and install the nacelle and rotor with its hub and blades. On the ground, the electrical collection network is installed and connected to the grid through the substation. Currently in Canada, the construction phase presents the best opportunities for local business and jobs. Other activities related to logistics, travel, lodging and material supply also generate significant additional local revenue.
10. Commissioning: The wind farm is tested before becoming fully operational.
11. Operation and Maintenance: A variety of skill sets are required to ensure the effective operation of a wind farm. The activities that have to be performed on a regular basis throughout the project’s life include monitoring and analyzing performance, conducting environmental surveys and performing preventive maintenance and repairs on the turbines and other components of the facility.

Source: Canadian Wind Energy Association (www.cwena.ca/facts/sharing-a-bhp)
Ojibways of the Pic River First Nation

1. Run of River Hydroelectric Project
2. Wind Monitoring

“Never lose control of your own development. We sold our interests for over 20 years, further cautions First Nations, and we could have done with our money. It’s about allocating resources to create a supportive environment for the investments they make.

LeClair says that it’s also critical for the Chief and Council to have a strong vision. In 1987, Pic River First Nation’s Chief and Council decided that energy development was going to be a priority and they hired someone who knew how to execute that vision. However, he adds, it can’t all come from leadership. The community needs to be involved; they need to have a long-term source of revenue that the community itself could determine for the First Nation for the next 50 years.

“Wind Monitoring” is the vision that was adopted by Chief and Council in 1987 gave the community something to strive towards. Having maintained that commitment has resulted in the growth of the community.

Pic River First Nation’s energy portfolio today boasts seven energy projects, ranging from feasibility phase to fully commissioned. These include six hydroelectric projects (High Falls, Manitou Falls, Umbata Falls, Twin Falls, Wawatay and Kagiano River) and two wind projects (Coldwell and Superior Shores).

High Falls and Manitou Falls Hydro Projects
The High Falls and Manitou Falls run of river hydroelectric projects are the most recent additions to this impressive collection. Through a competitive site release process, the First Nation has recently obtained the development rights to these two sites along the Kagiano River. The Kagiano River is a tributary on the upper reaches of the Pic River, approximately 30 km north of Pic River First Nation.

Byron LeClair, Pic River First Nation’s Director of Energy Projects, isn’t waiting any time getting started, and the proposed projects are to be operational within five years. This takes into account two years for the environmental assessment process (to be conducted by Hatch Energy); one year for permitting and two years for construction. Site design and assessment is contracted to Chant Construction. The project has an anticipated commissioning date of April 2011, and will be owned by Pic River First Nation.

This means that the community will control project revenues from the commissioning date, making it an important economic engine for the First Nation.

Superior Shores Wind Project
Pic River First Nation is also investing in wind energy. Through a partnership with Brookfield Renewable Power, they are involved in the proposed 100 MW Coldwell wind farm located northwest of Marathon, which passed environmental screening last fall. They have also received funding from INAC’s ecoENERGY program to monitor and analyze the wind resources on Superior Shores, and thus far have completed a year’s worth of wind testing. The wind data will be analyzed and then an environmental assessment will be performed. The site design and assessment for this project will be conducted by Inrgenex, and the financial analysis of both this and the hydro projects is Crugi Consulting. The end result of this project, if all goes according to plan, is the installation of 12 wind turbines with a capacity of 2 MW each, for a total capacity of 24 MW. The construction of this site is to begin in 2011 with commissioning predicted in 2012 or 2013. When completed, this project will have the ability to generate approximately 61 GWh of electricity per year.

Types of Jobs Needed for Hydro Projects

**Types of Jobs Needed for Hydro Projects**

- **Concrete Works**
  - Batch plant operators
  - Concrete operators
  - Laborers
  - Concrete truck drivers
  - Loaders

- **Concreting Line**
  - Concrete truck drivers
  - Laborers
  - Line workers

- **Construction Management**
  - Site safety managers
  - Site security guards

- **Design/Engineering**
  - Structural engineers
  - Mechanical Design Engineers

- **Footing/Fundament**
  - Excavator/Dozer operators
  - Loader/Grader/Crusher operators
  - Operators

- **Measuring**
  - Surveyors
  - Surveyors/Gradersmen

- **Electrical**
  - Electricians
  - Linemen
  - High-voltage electricians

- **Piping**
  - Iron workers/Fiberglass installers
  - Pipe fitters
  - Plumbers

- **Powerhouse Building**
  - Millwrights/Millwrights
  - Iron workers
  - Laborers
  - Crane operators

- **Steel Fabrication**
  - Iron workers/Fiberglass installers
  - Millwrights/Millwrights
  - Iron workers
  - Laborers

- **Pumping Station**
  - Iron workers
  - Laborers
  - Crane operators

- **Construction Site**
  - Site security guards
  - Site security guards
  - Site inspection staff

- **Welding**
  - Welders
  - Pipe fitters

- **Trucking**
  - Concrete truck drivers
  - Sand truck drivers

- **Pipe Fitting**
  - Pipe fitters
  - Plumbers

- **Material Testing**
  - Material testing experts
  - Precision testers

- **Laborers**
  - General laborers

- **Mechanical**
  - Pump operators

- **Electricians**
  - Electricians

- **Supplying**
  - Supply drivers

- **Materials**
  - Concrete mix suppliers

- **Site Preparation**
  - Site clearance

- **Operation**
  - Operators

- **Maintenance**
  - Maintenance personnel

- **Environmental**
  - Environmental engineers

- **Financial**
  - Financial analysts

- **Safety**
  - Safety officers

- **Construction**
  - Construction managers

- **Engineering**
  - Engineering consultants

- **Quality Control**
  - Quality control engineers

- **Aboriginal relations coordinators**

**On-site Job Opportunities**

- **Administrative**
  - Administration coordinators

- **Site security guards**
  - Site security guards

- **Supervisors**
  - Site supervisors

- **Foremen**
  - Site foremen

- **Field staff**
  - Field staff

- **Office workers**
  - Office workers

- **Supervisors**
  - Supervisors

- **Equipment Operators**
  - Equipment operators

- **Materials Handling**
  - Materials handlers

- **Laborers**
  - Laborers

- **Supervisory**
  - Supervisory staff

- **Site Supervisors**
  - Site supervisors

- **Engineers**
  - Civil engineers

- **Technicians**
  - Technicians

- **Craftsmen**
  - Craftsmen

- **Maintenance**
  - Maintenance personnel

- **Construction**
  - Construction managers

- **Engineering**
  - Engineering consultants

- **Quality Control**
  - Quality control engineers

- **Aboriginal relations coordinators**

**Business Opportunities**

- **Construction**
  - Construction managers

- **Engineering**
  - Engineering consultants

- **Quality Control**
  - Quality control engineers

- **Aboriginal relations coordinators**

**Site Preparation**

- **Surveys**
  - Site surveys

- **Tree cutting**
  - Tree cutting

- **Earthworks**
  - Earthworks

- **Concrete**
  - Concrete

- **Walling**
  - Walling

- **Concrete**
  - Concrete

- **Transportation**
  - Transportation

- **Laborers**
  - Laborers

- **Supervisors**
  - Supervisors

- **Supervisors**
  - Supervisors

- **Equipment Operators**
  - Equipment operators

- **Materials Handling**
  - Materials handlers

- **Laborers**
  - Laborers

- **Supervisory**
  - Supervisory staff

- **Site Supervisors**
  - Site supervisors

- **Engineers**
  - Civil engineers

- **Technicians**
  - Technicians

- **Craftsmen**
  - Craftsmen

- **Maintenance**
  - Maintenance personnel

- **Construction**
  - Construction managers

- **Engineering**
  - Engineering consultants

- **Quality Control**
  - Quality control engineers

- **Aboriginal relations coordinators**

**Business Opportunities**

- **Construction**
  - Construction managers

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  - Engineering consultants

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**Business Opportunities**

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**Business Opportunities**

- **Construction**
  - Construction managers

- **Engineering**
  - Engineering consultants

- **Quality Control**
  - Quality control engineers

- **Aboriginal relations coordinators**
We’re in the middle of the Great Bear Rainforest, and there’s a sacred duty to plan for the planet and this area in particular.”

David Benton, Project Manager, Gitga’at Nation

Hartley Bay worked with a company called Pulse Energy to design an innovative system that would provide real-time energy consumption information via wireless transmission from 100 smart meters installed in homes and public buildings. This information is critical as a slight reduction in diesel energy use will lay the groundwork for pursuing a renewable energy project. If it is possible, consult with the community about the opportunity.

5. Monitor the quality of the local resource in question and ensure that it is possible to access it for a long-term period.

Key Issues When Developing Renewable Energy

1. Local Leadership and Engagement
One of the key factors in successful energy projects is that the local community is engaged early and often on its development, and that the goals of the project match the needs of the community.

2. Monitor and Understand Your Local Resource
Renewable energy resources are dependent on the amount that is available at your site. It may sound obvious, but wind turbines need lots of wind and small hydro systems need consistent flows of water. These can vary with the time of the day, the season and from year to year and will impact your economic return. Getting high quality and long-term data is essential before making decisions to invest.

3. Explore Alternatives
In every community there are many different opportunities for energy alternatives that will save money and reduce energy consumption. Often the best project may not be the one you initially pursue.

Steps in Developing Renewable Energy and Energy Efficiency Projects

1. Develop a community energy plan that examines current energy uses, costs, future needs and opportunities for conservation and renewable energy.

2. It is always cheaper to use less energy than it is to develop new sources of energy! Look for ways to reduce wasted energy and improve the efficiency of the energy that is used.

3. Ensure that new buildings (both homes and community infrastructure) will be built as energy efficiently as possible.

4. Complete a pre-feasibility study to lay the economic groundwork for pursuing a renewable energy project. If it is possible, consult with the community about the opportunity.

5. Monitor the quality of the local resource in question and ensure that it is possible to access it for a long-term period.

6. Make sure that you can access the local electricity distribution system. Set up a business structure for buyers of the electricity in order to finance the project.

7. Obtain the necessary permits, including environmental impact studies.

8. Engage in construction and commissioning. Commissioning is the process used to test and verify that a facility or plant functions according to its design objectives or specifications.


Source: The Pembina Institute
Updates on Past Energy Projects

The following pages contain updates on energy projects that were featured in our 2007 publication titled For a copy of this publication, please email ecoENERGIE@ainc-inac.gc.ca

1. Hupacasath First Nation

“A comprehensive community plan (CCP) was developed which gives this administration its mandate, to be clear. We asked what the community’s wants and needs were as part of the CCP process, so anything we do as an administration is linked to the CCP.”

Bob Duncan, CEO, Hupacasath First Nation

Hupacasath First Nation completed construction of their first hydroelectric project in 2005. Since then, not only has the project generated enough energy to power up to 4,000 Vancouver Island homes, but it also generates between $1.5 and $1.8 million per year in revenue. Over $1 million of that goes directly to Hupacasath First Nation. The venture is going so well that the First Nation is in the process of developing two new hydro projects. The first project, on the Table River, is an 8.3 MW project in partnership with Cowichan First Nation. The second, a smaller project along Robertson Creek, is 3.5 MW.

One lesson that Hupacasath First Nation learned during this project that will be applied to these next projects is to more equitably manage the venture. Bob Duncan’s golden rule is “he who has the gold, rules.” He further elaborates that although much depends on ownership participation and structures, the project is generally most beneficial to those who contribute the most equity to the project.

2. Taku River Tlingit First Nation

“Our community knows that we have geothermal that uses the Earth’s energy to heat and cool the school building, and they’re amazed by it.”

Rod Ignace, Project Manager, Skeetchestn First Nation

On September 7, 2004, Skeetchestn Community School opened. The school’s green design incorporated both passive and active energy saving technologies, most notably a ground source heat pump that keeps the classrooms warm throughout the winter. Natural gas is used to supplement the heating and cooling when necessary.

Although the community has not built any more green buildings, the focus over the last two years has been on retrofitting existing buildings with better insulation. Project manager for the school, Rod Ignace, says, “I’ll say to others First Nations thinking about something similar, to incorporate as much renewable energy as possible. There may be some upfront cost, but it’ll pay back quickly and then you’ll be saving a lot.”

3. Skeetchestn First Nation

“Using our old values in new ways to make wise choices for the future.”

Peter Kirby, President, Taku River Tlingit First Nation Corporation

Taku River Tlingit First Nation run of river hydro project has been operational since April 1, 2009. A large celebration was recently held to commemorate the project’s success and to celebrate the status of Taku River Tlingit First Nation as 100% owner of their hydroelectric projects.

Although Taku River Tlingit First Nation’s hydroelectric project is not grid connected to the rest of British Columbia, it is the energy generated from the hydro project to BC Hydro through an Energy Purchase Agreement which is distributed to the community of Atlin (pop. 500).

Peter Kirby, President, Taku River Tlingit First Nation Corporation

The Taku River Tlingit First Nation’s energy efficiency and a 12 MW run of river hydro project on the La Martre River, which they’ve called the Nailli Project.

4. Wha’Ti

“Using our old values in new ways to make wise choices for the future.”

Wha’Ti Community Energy Plan

Following the Community Energy Plan that was developed in 2003, the Wha’Ti (Dighuti) people of Wha’Ti, Northwestern Territories, determined that they wanted to reduce their dependence on fossil fuels for energy. Elders say that they have already seen changes on the land from the impacts of climate change, and the community wants to do its part to stop it. Wha’Ti decided to focus their efforts in two directions: energy efficiency and a 12 MW run of river hydro project on the La Martre River, which they’ve called the Nailli Project.

Wha’Ti: Community Energy Plan

Ongoing environmental studies are still in progress to ensure that there will be no adverse environmental impacts and Wha’Ti expects that this phase will be completed in about a year, at which point construction of the project will begin. This endeavor will provide them with ample hydroelectric energy to be 100% diesel-free. Once this is in place, all houses in the community will switch to electric heating.

Much progress has also been made on the energy efficiency front. Compact fluorescent light bulbs, hot water tank insulation, water saving faucets and motion sensor lights have been installed in all households and buildings throughout the community. Solar hot water units have been installed in a senior home as well.

According to Sonny Zoe, the project coordinator, most households have found that their average monthly energy bill has been reduced from approximately $250 per month to about $150 per month because of these energy efficiency retrofits. “This has really gotten the community on board with what we’re doing, and they want to do more,” says Zoe.
There are many potential benefits from this project. This innovative partnership will serve not only as a demonstration that Saskatchewan is a high-growth area with much potential for wind and other cutting-edge industries, but also serve as a role model for First Nations interested in energy development. The project also creates sustainable power generation that aids to the capacity of the grid without the negative environmental impacts of other energy sources. Finally, this project has the potential to create many jobs for tradepersons and construction workers during the construction phase, as well as a number of skilled technical positions during the operations phase, for which First Nations will be given priority consideration.

Ojibways of the Pic River First Nation

“For us, investing in energy projects was a priority.”
Byron LeClair, Director of Energy Projects, Pic River First Nation

Pic River First Nation currently holds over $400 million worth of renewable energy projects in various stages of development (sevens in total). This considerable portfolio includes the following three operational projects: the 25 MW Umbata Falls hydro project on the White River, the 113 MW Windaby project on the Black River, and Twin Falls, a recent 5 MW acquisition on the Pic River system. Until July of 2009, Pic River First Nation held a minority interest in Twin Falls, but they and the Union of Ottawa Indians are now 100% owners of this 10 MW project.

The First Nation started as a small minority partner in Windaby which was the first project they were involved in. Work began on the Wainwright Generating Station 20 years ago, when the provincial approached Pic River First Nation to develop a hydroelectric dam on reserve land. They then graduated to majority owner of Umbata Falls, and are now the total owner of Twin Falls as well as the two other new projects they are in the process of developing– High Falls and Maximus Falls.

The largest of these projects is the 70 MW Umbata Falls project, which began in 1991 when Pic River First Nation competed for and was awarded the right to develop the hydroelectric potential there. This project is owned by the Bagenkopf Power Corporation, a joint venture between Pic River First Nation and Innergex II, and funded in part by Indian and Northern Affairs Canada.

Construction projects like this one are good for the community’s economy. Hydro projects are labour intensive to construct, and at Umbata Falls alone, more than 50 people were employed for the two years of construction—a significant percentage of the 490-member community. Two full-time permanent jobs were also generated from the Umbata Falls project.

Over the years, these assets have generated more than just energy and jobs. According to projections, 109,000 tonnes of greenhouse gases will be reduced annually thanks to the Umbata Falls hydro project alone. Further, the revenues from these wise investments have been reinvested in the community, helping to pay for a 60-unit housing project and education programs.

Pic Mobert First Nation

“Id recommend this to any First Nation. Just don’t lose sight of what you want to do; don’t let anybody tell you different. I think that by negotiating, we can get from point A to point B. If you’re not getting what you want, step back; take a breath. Believe everything can be negotiated. You talk about it and you figure it out.”
Wayne Sabourin, Pic Mobert Councillor

In March of 2005, Pic Mobert First Nation entered into a joint venture agreement with Regional Power Inc. to facilitate the development of two run of river hydroelectric sites along the White River. The joint venture is known as Pic Mobert Hydro Joint Venture. Band Councillor Wayne Sabourin says, “It’s a long process, and not an easy process. But we’re 90% there.” The next step is the completion of the Environmental Assessment. The project will be shovel-ready by spring of 2010, followed by 18-24 months of construction. The joint ventureanticipates that Pic Mobert Hydro Joint Venture will have money to invest in other businesses, and be more credit worthy with Regional Power Inc. wants to sell as share of the venture in the future, the First Nation will have an opportunity to buy those shares.

Pic Mobert First Nation feels comfortable with its partnership with Regional Power Inc., a company 80% owned by financial giant Manulife. Sabourin cautions that when choosing a partner, First Nations should make sure they’ve done their homework and that they’re partnering with a credible developer who can sustain the first few years of up-front costs while the risk is still high. Pic Mobert First Nation also worked closely with a financial firm called Access Capital, who helped to make sure that the deal was fair and balanced, and would result in a viable project. According to Access Capital’s 40-year projections, Pic Mobert First Nation will see several million dollars in revenue over the initial contract term. The financial benefits over the life of the project, which is estimated to be 100 years, is unprecedented in the history of the First Nation. Sabourin comments that one major advantage of the hydro project is that the community will have money to invest in other businesses, and be more credit worthy with a $130 million project under its belt.

The most important things we’ve learned? you really have to use due diligence to become a developer. This is also a very competitive market, so you have to be ready to move quickly and take the challenge and do it, and don’t worry about failure.”
Lionel Sparvier, Director of Economic Development, Cowessess First Nation

 updates on Past Energy Projects continued

Beaver Lake Cree Nation

“Solar energy has worked really well for us. The heating is consistent, and it saves us money. We would do it on all of our buildings, and although capital is always an issue, the payback is very good.”
Tito Casy大道, Beaver Lake Cree Nation Controller

In 2004, Beaver Lake Cree Nation completed a community energy baseline which recommended that the community install a SolarWall™ heating system in the new community centre that was under construction at that time. The Solar Wall™ is a renewable energy technology that uses solar energy to heat and ventilate buildings.

In 2007 the system was installed, and by 2009 the cost of the project had been completely paid off. The Solar Wall™ is saving the community over $8,000 per year (or about 30 to 40 percent of the control heating bills) over the 30-year lifespan of the wall. The technology is working so well that Beaver Lake Cree Nation has applied for funding to install Solar Wall™ in the health centre and treatment centre, as well as to replace the floodlights outside the administrative, health and treatment centres with outdoor solar lights. They are also hoping to retrofit the Old Hall, which is used for community gatherings, with better insulation and weatherizing, before also equipping it with a Solar Wall™.

Cowessess First Nation

“The most important things we’ve learned? You really have to use due diligence to become a developer, and learning about the possibilities... there that are real financial possibilities.”
Lionel Sparvier, Director of Economic Development, Cowessess First Nation

Awasis Nehiyawek Energy Developments Corporation is an energy development company owned by Cowessess First Nation. A partnership with TransAlta Wind is helping Cowessess First Nation reach its goal to have an ownership stake in a renewable energy project that can generate fiscal, social and environmental returns to the community for years to come.

The timing of Cowessess First Nation’s initial year of wind data monitoring and analysis could not have been better, because it coincided perfectly with Saskatchewan’s desire to move forward with green energy. This was one main driver for Awasis Nehiyawek Energy Developments Corporation to develop a proposal for a 100 MW wind farm. In order to do this, Cowessess First Nation applied to Aboriginal Business Canada for funding to develop the business plan. The site that came under consideration for development is not the site that had been completely paid off. The Solar Wall™ is saving the community over $8,000 per year (or about 30 to 40 percent of the control heating bills) over the 30-year lifespan of the wall. The technology is working so well that Beaver Lake Cree Nation has applied for funding to install Solar Wall™ in the health centre and treatment centre, as well as to replace the floodlights outside the administrative, health and treatment centres with outdoor solar lights. They are also hoping to retrofit the Old Hall, which is used for community gatherings, with better insulation and weatherizing, before also equipping it with a Solar Wall™.
Champagne & Aishihik First Nations
Climate Change in Our Backyard 2, Haines Junction, March 9-12, 2009

“We need to build awareness of how local, traditional and scientific knowledge is incorporated into studies. Too often research and monitoring studies are viewed as being done in isolation of meaningful community involvement.” Rose Kushniruk, Champagne & Aishihik First Nations Community Lands Officer

The Yukon Government is currently in the process of building a climate change action plan for the territory. To ensure that local needs and observations are reflected in larger plans, Champagne & Aishihik First Nations (CAFN) and Alsek Renewable Resource Council (ARRC) formed a partnership to develop a series of workshops that would address these concerns. The first workshop, Climate Change in Our Backyard 1, was held in March 2006 in the community of Haines Junction. The second workshop, Climate Change in Our Backyard 2, was also held in Haines Junction in April 2009, and was attended by over 230 people. CAFN’s climate change initiatives were inspired by a climate change workshop led by the Council for Yukon First Nations (CYFN) in 2004. At the close of this workshop, the question on everyone’s mind was, “what are the next steps?” This series of local workshops attempted to provide direction and structure to climate change discussions.

Meaningful Community Involvement
This workshop brought together a wide audience and resulted in the participants having a better understanding of what current activities are underway, and how to further build partnerships with other communities. Discussions sprang from the results of Climate Change in Our Backyard 1, and focused on how to continue to develop climate change adaptation initiatives in the community, while maintaining a high level of awareness of the importance of a climate action plan. Special attention was given to the involvement of youth in both the logistical planning and workshop attendance. Says Rose Kushniruk, coordinator of the event, “It was great to see INAC supporting this community-based project, it was a real showcase of climate change actions in the community.”

Strong Local Content
The workshop brought in experts with scientific, local and traditional perspectives on current issues related to climate change, as well as presenters on future scenarios that were specific to CAFN traditional territory. Presentations and discussion topics included: the sparse bush/bark beetle infestation, changes in local hydrology and glaciers, health risks, changes in animals, food sources, and flora/fauna, as well as traditional stories of the area. With more information on these issues, decision-makers will be better equipped to assess and identify risks and opportunities these changes may bring, and will be better informed when making operational decisions. The information will also assist them in building on existing local emergency response plans as they experience changing landscapes.

Strength in Numbers
This event combined forces with other Yukon First Nations, as well as non-First Nation partners. An easy-to-read final report was produced to provide information to CAFN and others so that they can begin to shape their own climate change planning processes. Kushniruk says, “We need to prepare the best we can. Community-based decision making is a must when establishing priorities for action. Who else knows this place better than us, the people who make the CAFN Traditional Territory their home?”

Kushniruk’s impetus for developing this workshop stemmed from her previous role as Chairwoman for the ARRC. This role, which she held from 2000 to 2004, gave her the perspective that although a lot of us grew up around each other, there was still a need for First Nation and non-First Nation communities to truly come together. Today, it is everyone’s backyard, regardless of where we may come from. My ancestors were here for thousands of years and that is important, but today... our ancestral homeland is shared with others.” Kushniruk realized that there are many diverse values towards the land and our communities need to come together, from commercial logging to cultural and spiritual beliefs. She summarizes the initiative by saying simply that “climate change has no borders, it is an issue that affects us all regardless of who we are. This is a common issue that brings people together, regardless of... anything.”

“This is our home, our backyard, all of us, we need to ensure that we all work together to understand what is happening to it. We need to coordinate our efforts for future projects. Having local people, managers and political leaders all under the same roof will add clarity.”

Rose Kushniruk, Champagne & Aishihik First Nations Community Lands Officer

INDICATOR CHANGE COMMENTS
Ocean temperature Increased 0.74°C 1906-2005 Rate (last 50 years)
Sea level Rose 1.8 mm/ Rate (1961-2003)
Snow cover Declined Northern Hemisphere
Mountain glaciers Widespread retreat Since 1900
Arctic sea-ice extent Decreased 2.7% per decade Rate (1978-2005)
Permafrost extent Decreased by 7% Since 1900
Heavy precipitation events Increased in frequency
Droughts Increased in intensity and duration Since 1970s
Heat waves Increased in frequency
Tropical cyclones Increased in intensity Since 1970s

Pop Photo by: Tessa MacIntosh
Photo by: Tanuja Kulkarni

INDICATOR
Air temperature
Ocean temperature
Sea level
Snow cover
Mountain glaciers
Arctic sea-ice extent
Permafrost extent
Heavy precipitation events
Droughts
Heat waves
Tropical cyclones

CHANGES IN CLIMATE AND WEATHER INDICATORS (COMPILED FROM INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE. 2007)
Old Crow
Climate Change Risk Assessment and Adaptation

“Climate change is having an unequivocal impact on the Arctic environment.”
(Intergovernmental Panel on Climate Change, 2007)

The citizens of the Vuntut Gwitch’in First Nation and other residents of Old Crow, Yukon, are experiencing changes in temperature, water, flora, fauna and permafrost. These impacts, observed through both local and scientific methods, have affected people’s way of life, culture, health, socio-economic structure and environment. The Old Crow Climate Change Risk Assessment and Final Agreement Analysis project attempts to address the community’s concerns about a changing climate.

One tool that was examined as a potential framework and mandate for climate change adaptation planning was the Vuntut Gwitch’in First Nation Final Agreement. It was analyzed to determine if it was an appropriate instrument to address the risks of climate change and enable the community to design an adaptation plan.

The project examined how eleven communities have responded to climate change by performing targeted interviews, reviewing community strategic plans and current projects. Climate change was determined to be important at the discussion level, but did not yet have specific community policy developed around it.

The main focus of this project was to conduct the initial stages of a climate change risk assessment and adaptation project for a single Yukon First Nation, Old Crow.

Dramatic Impacts

Cindy Dickson, Council of Yukon First Nations member and project manager, says, “Climate change is going to have an effect on our self-government and final agreements. It is making it difficult for us to hunt, fish, trap, gather plants and medicines; how is that going to affect our rights under our treaty? We decided to look at our umbrella final agreements to see what type of language might be in there to help the federal or territorial government realize that we were being affected by climate change and what, if there was anything, we could do in partnership to reduce those effects in our cultures.”

Community-Led Research

The Vuntut Gwitch’in First Nation (Old Crow, Yukon) was the first to respond and support the call for a partnership with CYFN to pilot this study. With the assistance of the members of the Hunters and Trappers Association, a questionnaire was developed that resulted in the identification of 14 indicators for climate change. The results were further discussed in a workshop. The participants used several methods to understand and group the ideas; and prioritize the issues, including funny cognitive mapping that relied heavily on participant input. Existing adaptation measures used in the community were shared, as well as discussions on adaptation priorities for the future. The information was used to make recommendations for adaptation measures for the community. Dickson explained, “The difference with our risk assessment is that if we are affected by climate change and what, if there was any thing we could do in partnership to reduce those effects in our cultures.”

The next step in the project, according to Dickson, is the implementation of some of the recommendations laid out in the assessment.

Yukon College
Building Regional Climate Change Scenarios

Development of climate change scenarios in the North is coordinated through the Yukon Climate Change Research Centre of Excellence; and partners Yukon College, Council of Yukon First Nations, and Government of Yukon, with the Canadian Climate Change Scenarios Network.

Climate information for the Yukon has been difficult to collect. To date, information on average temperature, precipitation, snowfall, lake and river ice, and sea level has not been synthesized into a complete database available to governments, academia, industry and the public. Without this information, it is difficult to develop accurate climate change scenarios that can help Yukon decision makers make informed choices regarding adaptation to climate change. This project will provide a foundation for the development of regional climate change scenarios for the Yukon.

Bringing Stakeholders Together

According to Clint Sawicki, Coordinator of the Yukon College’s Northern Research Institute, the most critical element in the project has been the development of the partnership. “The communication is there, so we know we’re all working together towards the same end goal. Everyone’s doing something different related to climate change, so it’s important for everyone to start talking about what the potential is for getting all this data in the same place. People are starting to see the value of more regional level data,” says Sawicki.

Historic and present climatic data will be collected to build essential knowledge required to develop accurate scenarios. Stakeholders, researchers, and industry will be contacted to build an inventory of raw data to be inputted into available scenarios. A working group, including the three project partners and Yukon stakeholders, will be created to ensure that the scenarios developed address scenario users’ adaptation issues and priorities.

Accurate and meaningful indicators will be created and used to develop Yukon regional scenarios, based on available information and adaptation needs. The indicators used for scenarios will be decided both by the inventory of Yukon climatic data and by the needs of Yukon communities. These adaptation needs will be identified by synthesizing previous work, identifying community priorities, and working with potential scenario users.
Tlicho Communities
Climate Change Adaptation Planning

“Climate change planning is not something you can do once every five years and then forget about. If we don’t try to manage impacts of climate change in our communities, they will surely manage us.” Doug Ritchie, Program Director, Ecology North

NWT communities are already feeling the effects of climate change. The Tlicho government and Ecology North are partnering to develop individual climate change action plans for the communities of Wekweeti, Whati, Gameti, and Behchoko. These community plans will be knit together to develop a regional plan for the Tlicho.

“Tlicho communities are ideal candidates to do this groundbreaking work on climate change because of the self-government agreement they signed in 2005”, according to John Hazenberg, Tlicho Government. As a result of this agreement, the Tlicho Government has more autonomy, control, and ownership of traditional lands, flexibility to be involved in this type of initiative, and ability to add to the body of knowledge that will assist in developing a regional climate change plan.

Community consultations were the first step in the development of the action plans. This grassroots work on climate change because of the self-government agreement they signed in 2005, according to John Hazenberg, Tlicho Government. As a result of this agreement, the Tlicho Government has more autonomy, control, and ownership of traditional lands, flexibility to be involved in this type of initiative, and ability to add to the body of knowledge that will assist in developing a regional climate change plan.

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Community profiles were developed for each of the four communities that outline basic statistics like demographics, language, employment, and geography, as well as infrastructure information on water, transportation, education, housing, electricity, food, and water.

Community consultation was the first step in the development of the action plans and included Elder interviews and public meetings to identify concerns of the communities, current observations of climate change impacts, priorities for adaptation measures, and capacity. This information, coupled with relevant scientific research, informed the priority areas for their plans: water, invasive species, forest fires, and hazardous waste disposal.

Forest fires and hazardous waste disposal were identified as areas that should be acted upon immediately because they are currently detrimental to the communities’ welfare, and are problems that will likely be magnified by climate change. For example, controlling the hazardous waste that goes into the Tlicho landfill is already a major issue for those communities. With increased temperatures, permafrost will become less stable, increasing the risk of hazardous waste leaching into water sources.

Regionally-specific information required to prepare strategies for water and invasive species is currently not available for Tlicho, but they are both important issues that resonate with the communities. Water will be monitored for quality and stream flow, and trends will be identified and tracked. A community-based monitoring program will be developed for invasive species identification, which may include encouraging hunters and trappers to document the changes they see.

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Everyone hears about climate change, and we decided that we wanted to know more.

Nancy MacDonald, Project Coordinator, Wagmatcook First Nation

Wagmatcook First Nation (WFN) recognized the need to understand, prepare for, and be proactive in adapting to the expected impacts of climate change, especially those that will impact the infrastructure, resources, economy, and social conditions in WFN. As a result, the community decided to take action to incorporate adaptation planning into its community development strategy.

Through the increasing recognition of the applicability of the concept of ‘two-eyed seeing’ in addressing ecological-based issues, the community sees an opportunity to use the combination of Indigenous and western scientific knowledge to address adaptation to climate change in a more holistic manner than what has been demonstrated thus far.

This project describes the potential impacts of climate change on Cape Breton, including changes in temperature, precipitation variation (including floods and droughts), sea level rise, salinity changes, extreme weather patterns, unpredictable wind speeds and storms, wildlife, habitat changes affecting wildlife and aquatic life, ecosystem changes and resilience, as well as socioeconomic impacts.

The Role of Traditional Knowledge

In the Cape Breton region, there is limited historical weather monitoring data. Therefore, traditional knowledge has particular importance in filling knowledge gaps, as well as providing insights into potential impacts and adaptive strategies that First Nations have experienced and used in the past. With that in mind, this study drew on oral knowledge, and contributed to the process of collaboration between western scientists and Indigenous communities to understand and address climate change issues. According to MacDonald, the community was highly involved, with Elders’ committee meetings held every month to talk about the project. Elders’ voices played such an important role in this project, that a community documentary was produced highlighting the elders discussing climate-related changes that they have witnessed in recent years.

Raising community awareness on the climate change issue, with a special focus on long-term adaptation planning and monitoring has begun in earnest. MacDonald reiterates, “To me the real benefit of the project has been the learning experience, knowing more about the whole concept of climate change, how it affects the water, our traditional foods, our fish stocks. The community now really understands these concepts. They were talking about these things before, but maybe they were calling it something else. People have been seeing these changes; it just hadn’t been called climate change*.

The study also sought to better understand the impacts of climate change on community infrastructure. This process included identification of the appropriate adaptation for each class of structure, identification of building codes that need to be revised due to climate change, analysis of planning strategies used for adapting to sea level change, and an inventory of vulnerable structures and natural features with adaptive strategies identified.

The project analyzed the current community plan and capital plan, and identified several points of potential revision in order to incorporate adjustments to climate change.

Community Support

The process relied on the strong working relationship that formed between the Centre for Indigenous Environmental Resources (CIER) and the two First Nations that worked on this project, Wagmatcook First Nation and Deschambault Lake community of the Peter Ballantyne Cree Nation. The three partners worked closely to develop this tool, and the books were drafted parallel to the preparation, participation and follow up from community visits. CIER, together with the First Nations partners, developed community engagement approaches to the various steps in the planning process. Based on discussions with community members, activities were developed in working groups, schools, and with Elders, to come up with a six stage process which was tested in the two communities. The First Nations were then called upon again as a critical sounding board in the review and editing process of the guidebooks.

Since their development, CIER has presented the guidebooks at various conferences and workshops to increase awareness of the tool. This project has increased CIER’s own capacity in the field of climate change adaptation and comprehensive community planning, and follow-up projects in both adaptation and planning have drawn heavily from this valuable experience.

These guidebooks provide communities with a user-friendly tool to get started planning for climate change. Lisa Hardess, Project Manager, Centre for Indigenous Environmental Resources

This series of six guidebooks outlines a planning process and framework for decision-making related to climate change adaptation. Not only is this a valuable tool for First Nations, the process used in the development of this project is an example of the power of innovative partnerships.

The tool helps them to build their understanding and awareness of the steps to take action, and guides them through the process.

Lisa Hardess, Project Manager, Centre for Indigenous Environmental Resources
Adaptation Success Story 7

Atuliqtuq: Action & Adaptation

The Nunavut Climate Change Partnership

“...this partnership supports planning in Nunavut and has been a great way to continue territory-wide adaptation planning discussions. The information that has been collected has significantly strengthened the ability of communities to plan for change.”

Frooydis Reinhart, Climate Change Coordinator, Government of Nunavut

A Multi-Faceted Approach Leading to a New Partnership

Nunavut continues to face acute climatic changes that have a direct and lasting impact on Nunavut communities. Advancing the knowledge of climate change in the territory and building community capacity is a priority.

The need for a multi-faceted approach to the changing Nunavut resulted in the formation of an innovative partnership. The Nunavut Climate Change Partnership integrates the local knowledge and overall vision of the Government of Nunavut, the planning expertise of the Canadian Institute of Planners, the cutting-edge geoscientific knowledge of Natural Resources Canada, the resources and management of Inuit and Northern Affairs Canada, and the on the ground presence of community researchers.

The different partner organizations worked collaboratively to support climate change adaptation in seven Nunavut communities: Clyde River, Hall Beach, Arviat, Cambridge Bay, Iqaluit, Whale Cove, and Kugluktuk. The series of projects and initiatives encompassed scientific knowledge, such as watershed and drinking water supply analysis and arctic sea level rise assessment, but also emphasized the importance of working with elders and other local knowledge holders to identify and prioritize climate change impacts and adaptation actions, and has provided a working group to support community-based and Inuit research projects.

Building Community Capacity

“Working with the different partners has been a great experience because they’ve been so open to listening to us and taking our lead. This partnership has been very dedicated to doing this in as much of a participatory way as possible. Capacity has been created, and a certain level of awareness has been created that now leads to other spin-off projects and will impact the community in ways that are difficult to even predict right now”, says Jacob Gearheard, Executive Director of Iliamnaq Society, Clyde River.

In addition to community adaptation plans and climate change planning tools, a climate change teaching module will be developed to assist other Nunavut communities and organizations with adaptation planning. This will result in training and employment opportunities for Nunavut youth in climate change projects, as was demonstrated in several of the communities.

Gathering Regional and Local Knowledge

A critical component to this project’s success was the inclusion of, and respect for, all types of knowledge, including both scientific and Inuit knowledge. Says David Mars, Natural Resources Canada, “Respect for other peoples’ cultures and skills is an important aspect of working in such a diverse group, and that seemed to go a long way in making this partnership work. People took the time to listen to each other.” The deliverables for this project encompassed scientific knowledge, such as watershed and drinking water supply analysis and arctic sea level rise assessment, but also emphasized the importance of working with elders and other local knowledge holders to identify and prioritize climate change impacts and adaptation actions, and has provided a working group to support community-based and Inuit research projects.

Disseminating Knowledge and Best Practices

Perhaps most important to the project’s success is the dissemination of the knowledge that was generated and gathered through this initiative. Outreach strategies included the development of participatory climate change forums for Elders and youth throughout Nunavut, engaging Nunavummiut on locally relevant science and planning, and sharing information beyond the seven communities.

Toolkits will be created to engage additional Nunavut communities in adaptation planning and will support territorial initiatives. These will provide a model for communities who are at the beginning of their planning processes and offer relevant, useful examples.

Achieving Impact

The partnership used a broad spectrum of skills and expertise to make this project a success. Scientists worked at local and regional scales on such topics as permafrost monitoring, community permafrost and landscape hazards mapping, community watershed assessments, and sea-level rise and coastal erosion. Planners worked with the scientists to incorporate scientific data into their planning processes, and with the Government of Nunavut and local communities to develop community adaptation plans.
The impacts of climate change can be felt in the environmental, social and economic well-being of a community. Robin Sidneysmith, University of British Columbia Project Manager

Climate Change Adaptation Research Initiative
Centre for Indigenous Environmental Resources

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Community decision making plays an important role in how the impacts are managed, and to what extent the community can prepare for those impacts. Successful adaptation is making decisions that consider the most appropriate option for a specific situation, and attention must be paid to feasibility, likelihood, and ability to apply the decision.

“There is considerable research being carried out in the North to understand climate change impacts and adaptation in Aboriginal communities, but very little is taking place South of 60° latitude. Aboriginal communities South of 60° are at risk to climate change impacts and this lack of attention may increase their vulnerability,” says Amanda Karst, CIER Research Associate.

Natural resource dependent and Aboriginal communities are particularly vulnerable to climate changes, as agriculture, forestry, fisheries and hunting activities are affected by changes in temperature and precipitation. The economic impacts of climate change are significant, and subsistence lifestyles can be seriously affected. Compounding the problem, the adaptive capacity of many Aboriginal communities is eroded by social, cultural, political and economic changes taking place in response to stresses beyond climate change.

Understanding Adaptation

This project seeks to understand the social elements of a community that determine resilience or vulnerability in the face of any kind of change, whether it be environmental, political, economic, or social. CIER/UBC will work directly with Aboriginal communities South of 60° latitude through case study research to understand these elements. Little information is available about existing environmental impacts of climate change on southern communities or the ability of these communities to effectively respond to the impacts. This research gap increases the uncertainty about existing and future climate change impacts, which may put southern communities at greater risk.

The literature, methodologies and existing tools were reviewed and case studies will build on the information gathered. The First Nations of Chippewa Island (Fort Smith), Swan Lake and T’Sou-ke will be the focus of most of the CIER and UBC teams, while work in ten other communities: The Blood Tribe, Shuswap Lake, James Smith, Lafarge, Haida Gwaii, Tataskwea, Alert Bay (NanAIMS), Textilsh First Nation and Montreal Lake First Nation will be completed in collaboration with other researchers.

Risk Management Framework

Adaptation Success Story 8
Centre for Indigenous Environmental Resources Climate Change Adaptation Research Initiative

Aboriginal and northern communities have recognized the importance of adaptation for dealing with climate change impacts. Many examples of current adaptation initiatives have been highlighted in the previous pages. These examples are promising indicators of the ability of Canadians to adapt to their behaviour, activities and thinking to meet the challenge of climate change. They also demonstrate that adaptation encompasses a wide range of possible responses; and illustrates how individuals, community groups, the private sector and all levels of government can all play important roles in building a more resilient Canada.

Building Partnerships

Adaptation to climate change is a complex task that requires cooperation and support from many players. Building partnerships has been an effective way to address the multiple issues faced by communities. By training unique skills and perspectives brought by community members, government and science, decisions that incorporate adaptation issues can be made.

As demonstrated in several of the projects, involving the time to build an effective partnership is time well spent, and will make adaptation efforts more successful.

Planning

Managing for a changing climate is an ongoing task that requires re-evaluation of decisions as the environment changes. It is important for communities to recognize that planning is only effective if the plans are regularly used and updated to include new and emerging information. Long-term planning exercises and decision making that considers how the conditions and priorities of the community evolve will result in stronger, more comprehensive community plans.

Using Communities Effectively

Successful adaptation to climate change engages communities as early as possible, and maintains their attention and input throughout the process. Braiding traditional knowledge and scientific information into community plans will provide a clear and balanced view of how climate change will impact communities. Planning processes need to facilitate continued community support and input in order to be as effective as possible.

Climate change planning is an important exercise, and benefits of larger scale planning activities can be felt at local levels. Aboriginal and northern communities are gaining the skills, knowledge and resources to adapt to climate change and are continuing to build adaptive capacity. These communities are addressing the challenges of climate change, and the path forward on adaptation will build upon current successes, strengthening and growing partnerships, engaging communities and continuing to plan effectively.

Adaptation Conclusions

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