

**Special Report on Energy Efficiency Initiatives of the Yukon
Government**

Prepared for the Canadian Energy Efficiency Alliance

**Department of Energy, Mines and Resources
Government of the Yukon**

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Introduction

This report has been prepared by the Yukon government on its ongoing work to promote energy efficiency. The emphasis is on projects conducted during the past two years, in response to questions posed by the Canadian Energy Efficiency Alliance. The Alliance compares the policies and programs of each Canadian government (federal, provincial or territorial) and ranks its performance accordingly.

The Yukon government recognizes that energy efficiency is an effective tool that can contribute to an overarching goal of sustainable development. It has made energy efficiency a cornerstone of its energy strategy for the past two decades.

On April 1, 2003 the Yukon government took on responsibility for the delivery of many programs and services formerly delivered by the federal government. Although the structure of several departments was altered, the Yukon government's energy programs continued to be delivered and enhanced, although in some cases the name of the agency delivering the service was changed.

The Yukon remains a leader in the development of wind energy in sub-arctic conditions and continues to address problems associated with rime icing. Yukon Energy, the Energy Solutions Centre and Yukon Development Corporation are continuing to monitor wind at various locations throughout the Yukon. This includes work to assess wind resources near communities, particularly those that are served by diesel generation.

Efforts to stabilize the price of electricity in the long-term include the Green Power Initiative to replace diesel-generated power in communities with renewable energy. In 2003, Yukon Energy completed a transmission line that sends surplus hydro power from the Mayo hydroelectric station to Dawson City. Before that time, Dawson City had been served by diesel-generated power.

Throughout the next year, the Yukon government will conduct an overall review of its energy strategy. It also plans to release a climate change strategy to accompany a memorandum of understanding on climate change that it has negotiated with the federal government.

1. Programs and Public Outreach

The Yukon government continued to make significant progress in efficiency and renewable energy solutions through successful partnerships with governments, businesses, communities and non-profit organizations. Several Yukon government agencies are involved in delivering a variety of programs to the public.

The Yukon Housing Corporation is responsible for delivering most of the Yukon government's residential energy management programs. The Yukon Housing Corporation has implemented and augmented programs including EnerGuide for Houses, R-2000, Green Mortgages and changes to the Home Repair programs to encourage residential energy conservation. The Rental Rehabilitation Program encourages landlords to upgrade energy efficiency in leased accommodation.

The local market for energy efficient housing is encouraged through the Green Home Certification and Mortgage Programs, EnerGuide for Houses, and R-2000. YHC is

actively involved with upgrading these efficiency programs to further improve residential energy levels, indoor air quality, and occupant comfort.

The Yukon Housing Corporation provides certified training for heating and ventilation contractors, as well as courses for residential and commercial energy auditors. Further programs and demonstrations are being developed to educate the public and contractors about energy efficiency.

A survey of housing in the Yukon released in 2001 reviewed approximately 20 per cent of the dwelling units in the Yukon. The survey established a broad database for determining areas of need and optimum program design, including the design of energy efficiency programs. The Yukon Housing Corporation intends to conduct this survey every five years.

The Canada/Yukon Energy Solutions Centre has been open as a storefront operation in downtown Whitehorse since March 2001 thanks to a partnership between the Yukon Development Corporation and Natural Resources Canada. Its purpose is to increase public awareness of the potential for energy efficiency, and to facilitate access to the expertise and capital required to take advantage of the opportunities. The Centre currently delivers a number of energy efficiency programs on behalf of the Yukon and federal governments. The Energy Solutions Centre is also responsible for the delivery of the Yukon government's Green Power and wind energy initiatives.

The Northern Climate Exchange is a partnership of the Yukon government, the Government of Canada and the Northern Research Institute at Yukon College to document and disseminate research being done in the area of climate change.

Energy Month

For the past several years the Yukon government has declared November as Energy Month and promoted energy efficiency through newspaper articles, brochures, workshops and advertising. Our November month is dedicated to promoting energy awareness, building the groundwork for the realization of a sound energy business plan. Citizens are becoming aware through newspaper articles, brochures, and workshops, that it is essential to work together under an all-encompassing energy plan to become increasingly energy efficient.

Energy Efficiency Initiative

Energy efficiency makes economic and environmental sense, especially where a utility has to burn diesel fuel to produce electricity. Diesel is expensive and it produces greenhouse gases, which contribute to climate change.

One objective of the Energy Efficiency Initiative is to reduce demand for electricity to a level that can be met by existing hydroelectric facilities. Another objective is to reduce overall demand in communities which rely exclusively on diesel.

This initiative looks at how and when buildings use electrical energy and develops programs to address three specific goals:

- improving consumers' electrical energy efficiency
- shifting peak electricity use to periods of lower demand

- reducing electricity demand during winter peaks

Residential Electricity Management Program

The Residential Electricity Management Program was established in 1997 as a response to an increase in power rates that occurred due to the closure of the Anvil Range mine. The mine, which consumed more than 40 per cent of the electricity generated on the main power grid, was Yukon Energy's largest single customer. The program offers homeowners low interest loans to install new non-electric heating systems. The initiative has helped 300 households save approximately \$500,000 a year. The program continues to be available through Yukon Housing Corporation.

Home Repair Program

The Home Repair Program provides low-interest loans of up to \$35,000 per house to assist homeowners in making necessary repairs, including energy efficiency improvements. The program also provides courtesy technical inspections and suggestions for upgrade and repair. This initiative has assisted with improvements on approximately 1200 households since its inception in 1991. The Home Repair Enhancement Program can make a further \$20,000 available at market interest rates to assist with necessary repairs costing beyond \$35,000.

Green Mortgage Program

The Green Mortgage Program encourages building or upgrading houses to meet high energy standards and indoor air quality (for Green Home Certification) through a long-term reduced lending rate for homes that meet the program criteria, essentially the R-2000 program energy budget.

EnerGuide for Houses Program

In partnership with Natural Resources Canada, Yukon Housing delivers the EnerGuide for Houses Program to encourage efficiency improvements in existing dwellings. Homeowners pay \$99 to have a certified energy auditor visit the residence and provide a list of options for cost-effective efficiency improvements to help save money and make the home more comfortable. Financing for the improvements is available through the other programs offered by Yukon Housing. This program also provides technical support for the Green Mortgage Program for new housing.

The Yukon Housing Corporation certifies private-sector businesses to conduct residential EnerGuide energy audits. EnerGuide "A" audits provide high-tech information that can help a homeowner to decide on appropriate repairs and energy upgrade options. Follow up "B" audits show how the home's energy efficiency has improved after the repairs and upgrades have been completed.

Participation in this program has grown exponentially in recent years, with activity doubling every year. From May 1999 to March 2002 approximately 200 Yukon households received an EnerGuide audit. The following year 349 households participated and during the year from April 2003 to March 2004 an additional 713 homes received EnerGuide audits.

R-2000 Program

The federal R-2000 Program is delivered in the Yukon by the Yukon Housing Corporation in partnership with the federal government. R-2000 provides the standard for all staff and social housing built by the Housing Corporation.

The R-2000 program sets a new standard in comfortable, healthy, low-maintenance, energy efficient housing, and promotes improved air quality and the use of recycled building materials. In the past three years, four new Yukon homes have received R-2000 certification and over 80 residential contractors, architects and home builders have been trained in R-2000 principles.

Commercial Energy Management Program

The Commercial Energy Management Program assists businesses, municipalities and First Nations to reduce energy demand by conducting technical audits and recommending practical, integrated solutions that provide tangible cost-savings based on a sound business case. Participants are offered financial incentives for equipment and lighting upgrades, and technical and project management advice related to project implementation. To date, this program has provided assistance to 22 clients.

Training Programs

The Yukon Housing Corporation delivers a number of training courses for trades people and owner/builders.

Self Help Course

For home buyers, home owners and owner/builders, the Self-Help Course offers practical information on how to manage a construction or renovation project, from land selection to costing and contracting. This course is co-sponsored by Yukon College.

Training for Industry Professionals

A number of courses are offered on an as needed basis for industry professionals. These include:

- R-2000 Builder Updates and Workshops that cover the principles of building high quality, energy efficient, healthy homes.
- A series of heating and ventilation certification by the Heating, Refrigeration and Air Conditioning Institute of Canada. These include: ventilation system design; heating system design; integrated combo system design; and heating, ventilation and air conditioning commissioning. The courses are offered to designers, installers and service specialists in the residential building industry.
- A week-long EnerGuide auditor training certification course that covers the principles and techniques of conducting energy efficiency audits under Natural Resources Canada's EnerGuide program. Each student must also successfully complete a practicum involving audits of three houses. Yukon Housing Corporation conducts its own pre and post audits of these initial three homes, followed by spot audits on three of the next ten houses the new auditor has rated. Thereafter, Yukon Housing Corporation conducts random checks of the auditor's work to ensure the rigorous standards of the EnerGuide program are being upheld.

Hands-on training and certification courses have assisted architects, engineers, building and environmental regulators, facility owners, contractors, appliance and energy technology retailers, and trades people to enhance their marketability and competitiveness. The courses introduce new efficiency and renewable energy technologies to the Yukon while improving the private sector capability to design and install these integrated energy solutions.

Infrared Thermography (Level I Certification)

The Level I Certification Infrared Thermography course conducted in November 2002 taught participants how to operate an infrared camera, use thermographs to establish a maintenance program and understand thermal data collection theory. The curriculum included a hands-on workshop for participants to find and quantify heat-related problems.

The course was ideal for energy auditors, building designers and contractors, inspectors and electrical utilities. The training can be applied to a wide variety of areas including building insulation void detection, electrical overheating, roof moisture surveys, leaking valves and radiant heating.

Students who obtained certification may rent the infrared camera from the Centre.

Professional Development for Yukon Engineers

The Energy Solutions Centre is cooperating with the Association of Professional Engineers of the Yukon to identify and expand training and development opportunities in the area of sustainable energy development.

Commercial Energy Auditor Service

This initiative of the Yukon Development Corporation, the Energy Solutions Centre and the Yukon Housing Corporation trains and certifies local commercial energy auditors based on the Canadian Institute for Energy Training.

Establishing a pool of qualified auditors is fundamental to the success of efficiency and renewable energy programs. Audits provide essential baseline information for determining integrated energy solutions that are technically and financially appropriate for improving building energy management.

In addition, the Energy Solutions Centre uses a consortium of Yukon architects and mechanical and electrical engineering firms to audit more specialized projects.

Renewable Power Sales Incentive Program

Currently, Yukon Energy has the ability to produce more hydro-generated electricity than it needs. To take advantage of the economic and environmental benefits of this surplus power, the Corporation has developed a Renewable Power Sales Incentive Program, also known as the Secondary Sales Program. The initiative gives eligible Yukon businesses the option of using hydro power to heat their facilities instead of diesel fuel or propane, both of which are more expensive. There are some stipulations: the business must maintain a back-up fossil fuel heating system that can be re-activated on 24 hours notice. This program helps customers save 10-percent or more on their heating bills and it lowers the Yukon's greenhouse gas emissions. The total secondary energy consumed by customers in 2003 reduced greenhouse gas emission by about 5,417 tonnes.

The initiative also benefits consumers by expanding the demand for surplus power to increase utility revenue and reduce pressure for electrical rate hikes.

Since 2002, the number of secondary sales customers has grown from 3 to 17.

First Nations Energy Management Service

The Energy Solutions Centre delivers a First Nations Energy Management Service to proactively develop and implement locally-based and supported energy initiatives in the Yukon's aboriginal communities.

The primary focus of the service is to improve the energy performance of First Nations building stock, thereby lowering operating costs and reducing greenhouse gas emissions. There is also a need to identify and assess the long-term potential of renewable energy sources in or near aboriginal communities that depend on diesel-generated electricity.

Tackling these challenges means respecting the cultural differences and way of life within each aboriginal community. For this reason, the Centre has contracted a First Nations energy technician to promote, design, coordinate and facilitate the delivery of integrated energy solutions.

This position acts as a catalyst to enhance local technical capacity and to increase the uptake of federal and territorial energy programs by First Nations communities and to stimulate joint energy ventures between aboriginal and other governments and the private sector.

Green Building Design Initiative

The Energy Solutions Centre provides the Green and Appropriate Northern Design Service on behalf of Yukon Development Corporation and in cooperation with the Office of Energy Efficiency, Natural Resources Canada. Proper building design that employs integrated design practices is critical to reducing ongoing operation and maintenance costs and can help to keep capital costs down as well. To that end, the Green and Appropriate Northern Design Service seeks to work with design professionals and contractors to:

- facilitate the design and construction of new facilities that have the lowest operating costs and exhibit environmental responsibility;
- optimize the use of integrated energy solutions, particularly renewable energy technologies using local and sustainable energy resources;
- maximize use of appropriate local materials and northern-experienced builders and labour; and
- make green and appropriate design and construction the preferred choice for all new Yukon buildings.

Through client requests and proactive initiatives, the Energy Solutions Centre's Green and Appropriate Design Service provides training, information, energy modeling assistance, access to Yukon-specific design data, local considerations and case studies, sample proposal documents and guidelines and coordinated access to available national and territorial assistance where appropriate. The service also provides general and project-specific advice to building and community developers,

architects, project managers, construction company personnel, inspectors, municipal planners and sponsors of new facility and subdivision projects.

The long-term goal of the service is to help transform the local market so green and integrated building design becomes the conventional option for new facilities.

In the context of the Green Building Program, the Energy Solutions Centre has become an active participant in the development of the facilities required for the Canada Winter Games to be held in Whitehorse in 2007. Specifically, the Solutions Centre is involved in helping to ensure that both the athlete's village and the multiplex sporting facility incorporate the design concepts of sustainability and energy efficiency.

The Energy Solutions Centre has provided input through the Green Building Program to the Village of Carmacks as it works towards developing a new community centre, as well as the First Nation in Mayo as it plans a new administration building, a community centre and additional residential development.

House Calls Energy Efficiency Program

The House Calls Energy Efficiency and Climate Change Education Program (known as House Calls) began as a pilot project in 1999 by Yukon Development Corporation, Yukon Energy and the Yukon Conservation Society.

The purpose of the program was twofold:

- To reduce residential electricity demand, primarily in rural communities dependent on diesel-generated power, by informing households about practical and affordable measures; and
- To illustrate residential energy efficiency solutions and to demonstrate the link between energy use and climate change.

Through the program, a local energy technician provided a free hot water tank wrap and a low-energy compact fluorescent light bulb to 100 homes in Whitehorse and 25 residences in Dawson City. The technician also provided information to residents on energy efficiency and climate change via a home maintenance poster, tips on lifestyle choices and a demonstration of residential energy efficiency technologies available locally.

Due to the overwhelming success of the pilot program, the scope of the program was broadened and the original partnership was expanded to include Natural Resources Canada, the Yukon Electrical Company Limited, Yukon Housing Corporation and the City of Whitehorse.

The program ended on schedule in 2002, but in 2003, Yukon Development Corporation, Yukon Energy and the Yukon Conservation Society were awarded a national energy efficiency award for outreach for our efforts in the House Call program.

In the end, more than 1,600 Yukon households in 18 communities were served through the program. As a result of changes made, consumer savings on annual

electrical bills are forecasted at more than \$320,000 and average annual savings per household are estimated at more than \$215.

The program also trained 20 energy technicians throughout the Yukon, creating a capacity to deliver future demand side management initiatives.

Energy Efficiency Appliance Initiative (Fridge Exchange)

Results of a consumer survey commissioned by the Yukon Development Corporation and Natural Resources Canada showed that many major appliances in the territory were old and less energy efficient than more recently manufactured models. The Fridge Exchange Program, which started in June 2002 and ended in March of 2004, provided incentives to more than 200 Yukoners to replace refrigerators that were over 10 years old with significantly more efficient ENERGY STAR® rated models. The incentives included:

- in hydro-power communities, free delivery of new refrigerator and removal of old one.
- in diesel-power communities, free delivery of new refrigerator and removal of old one plus a \$200 rebate.
- safe freon removal and recycling of old refrigerator.

A conservative estimate is that as a result of this project, overall greenhouse gas emissions have decreased annually by 50 tonnes. This project is now being used as a template for other jurisdictions in Canada

One of the most notable effects of the program occurred on the supply side of the market. At the beginning of the program, there was a very small variety of qualifying appliances available, which slowed initial uptake on the project. However, by working with all Yukon appliance retailers and demonstrating the viability of providing greater choice in the ENERGY STAR® line of appliances, the choice expanded significantly to meet growing demand. Due largely to consumer education efforts made through this program, demand for ENERGY STAR® rated appliances of all kinds increased significantly. More than 650 ENERGY STAR® units sold between April and November of 2003.

Energy Efficient Appliance Initiative

This joint venture between the Energy Solutions Centre and Natural Resources Canada was separate but closely related to the Fridge Exchange. It provided retailers and the public with education and awareness regarding ENERGY STAR® products and included rebates to retailers willing to promote the sale of these energy efficient appliances.

GreenHog Information and Coupon Handbook

As a follow-up to the House Calls Energy Efficiency Program, the Energy Solutions Centre and Natural Resources Canada produced a GreenHog handbook. It includes energy saving tips, discount coupons for a various energy saving devices, and some free items including low-flow showerheads, a kitchen faucet aerator, tire gauge and plug-in timer. The handbooks have proven to be very popular - six hundred were produced and they have almost all been distributed.

Woodstove Replacement and Education Pilot Project

The goal of the Woodstove Replacement and Education Pilot Project is to improve residential wood heating efficiency. The project is a collaboration of the Yukon Development Corporation, Natural Resources Canada, the City of Whitehorse, and the Yukon Conservation Society. It is one of seven pilot projects in the country and the only such initiative in Northern Canada.

The program allows residents in the Riverdale subdivision of Whitehorse to exchange old, inefficient woodstoves with new models. This neighborhood was selected due to the wood smoke visibility and air quality problems it experiences in winter from inefficient wood burning during periods of thermal inversions.

Consumers save money by reducing wood consumption and benefit also from improved stove safety and air quality. Old woodstoves are disabled and collected in a central location for future scrap metal recycling. The combination of these efforts helps to ensure that wood is a more cost-effective and sustainable energy source for space heating.

Consumer participation has been encouraged through information, rebates, retail promotions and special prizes, as well as public workshops to promote better burning practices. Wood heating remains popular in the Yukon with about one in five households using it as their primary source.

The pilot project also held certified wood energy technology training for installers, suppliers and inspectors according to national standards. Safe, effective wood burning practices were promoted, retailers encouraged to supply efficient woodstoves to shift market demand, and strategic alliances developed between energy and environmental agencies to support a larger scale initiative.

Rural Electrification Program

This program is administered by the Yukon government's Department of Community Services, in cooperation with Yukon Energy. Through affordable and flexible loans, the initiative allows rural residents to obtain electricity either by connecting to the power grid or by producing their own power from renewable alternative energy systems including wind, solar or microhydro. In the last fiscal year, almost 125 Yukon property owners have benefited from this program.

Green Power Initiative

The Green Power Initiative was established through a \$3 million contribution from the territorial government to develop and improve the competitiveness of alternative energy to meet new electrical demand and displace existing fossil fuel sources. The goal of the Green Power Initiative is to increase the production and sale of small-scale renewable energy to meet the electrical service requirements of Yukon communities and industry and reduce green house gas emissions. The Green Power Initiative is a companion program to other energy measures, such as the Energy Efficiency and Wind Research and Development initiatives.

The Green Power Initiative has a number of components, including public awareness and education, research and development, green power production, and green power marketing.

Public Awareness and Education

The objectives of the public awareness and education component are to:

- provide consumers with a green power option and the challenge to take action to contribute to sustainable development; and
- expand the technical capability to develop green power alternatives in the territory through skills training and development.

Research and Development

The research and development program supports resource assessments and refines existing technologies to function more effectively in northern climates and remote communities. The focus is on wind, solar and micro-hydro, with emphasis of late on geo-thermal technology.

For example, the Energy Solutions Centre has partnered with two Yukon communities to investigate the potential for community heat systems, using the heat from artesian wells. Other projects include investigating the feasibility of ground source heat pump technology at a Whitehorse school, and using a heat pump at Yukon Energy's Whitehorse Fish Hatchery to capture excess heat from groundwater to warm the hatchery building. The new pump helps save money, increase comfort and reduce greenhouse gas emissions.

The research and development program also includes the Community Wind Resource Assessment Program, which provides technical assistance for Yukon individuals and communities to assess the wind resource in their area as a potential alternative power source to fossil fuels such as diesel.

Green Power Installation

This program component is designed to ensure that independent power producers have viable opportunities to participate in the energy supply sector. It is also designed to ensure that power rates are not affected by green power purchasing and that the transition to green power is scoped and staged to minimize any impacts to existing utilities and their operations. Program elements include green power purchase targets, production incentive/avoided cost off-sets, and long-term green power purchase agreements.

Green Power Marketing

The Green Power Marketing initiative can be broken down into four main components:

1. Voluntary Green Power Purchase Program – There has been some discussion about allowing Yukon electricity consumers to contribute a fixed amount through monthly billing to support green power installation. It's been suggested that all proceeds from this program be re-invested in the Green Power Production Incentive Fund. While there is interest in this idea, to date there have only been preliminary discussions on this topic.
2. Net Metering for Residential and Commercial Green Power Customer-generators – Net metering allows a customer to connect their own power generating system to the grid and to feed excess energy from a home or business-based generating unit, back through an electricity meter into the utility supply system. If more power is generated than is

used, it can be stored on the system and drawn out later. Customer bills could be adjusted to reflect only the net amount of energy purchased from the utility over a specified period of time, in addition to standard service charges. This is something else that is in the early stages of discussion and there are some obstacles to be overcome before this could be put in place.

3. Rural Electrification Program - The existing Rural Electrification Program will continue to provide Yukoners living in remote locations with opportunities to install and utilize green power to meet their needs. Options for extending this program to Yukoners who do not currently have access will be explored with key planning and delivery partners.
4. Publicity (Public Awareness and Education) The publicity component of the Green Power Program is designed to ensure that consumers are fully informed about green power choices and program accomplishments.

Community Wind Resource Assessment Program

The Community Wind Resource Assessment Program is delivered by the Yukon Development Corporation through Yukon Energy. It is a service that is offered free of charge to homeowners and businesses in remote areas of the territory. The initiative helps customers make informed decisions about the appropriateness of using wind power. In 2003 Yukon Energy assessed several sites, including the Eagle Plains Lodge on the Dempster Highway, the Champagne and Aishihik First Nations' Aishihik airport location, and a site near Teslin. Since 2000 an average of five sites a year have been assessed.

In order to assess the potential for wind generated power, Yukon Energy also does its own wind monitoring. Yukon Energy typically operates about three monitoring stations per year throughout the territory. In 2003, Yukon Energy had monitoring stations located at Haeckel Hill near Whitehorse, Fox Ridge on the South Klondike Highway and Ferry Hill, near Stewart Crossing.

2&3. Energy Efficiency Act and Building Codes

Currently in the Yukon, building codes mirror the National Building Code of Canada, and as such do not specifically include energy efficiency requirements. When the national code adopts the proposed Model National Energy Code of Canada for buildings and for houses, these codes will be endorsed in the Yukon.

Prescriptive compliance is just one tool to increase energy efficiency. When it comes to promoting energy efficiency in buildings, the Yukon government has chosen to pursue a course of action focused on public education, incentive driven change and leadership by example.

Promoting the benefits of energy efficiency through education is achieved through programs such as the self-help course for home buyers, home owners and owner/builders, and courses for industry professionals.

Incentive programs aimed at improving the efficiency of existing buildings as well as new buildings include EnerGuide for Houses, Home Repair Program, Green Mortgage Program and R-2000.

The Yukon government is leading change and recognizing the importance of incorporating energy efficiency into buildings, by having set corporate policy that

requires all new construction starts of government (institutional) buildings to conform to CBIP or higher efficiency standards. Additionally, The Yukon Housing Corporation has set policy whereby all new residential construction it undertakes will be to R2000 standards.

Successes achieved through voluntary compliance can be seen by the statistics. The Yukon has the greatest uptake of the EnerGuide for Houses Program nation wide (raw number of energy audits done). The Yukon has the highest per capita R2000 homes in Canada and local architect and design firms have won national and international awards for energy efficient building designs.

For new construction and renovations, Whitehorse residents are required to install only certified low-emission woodstoves under the City of Whitehorse Plumbing/Building Bylaw. This bylaw also requires low-flush toilets, and provision for water meters.

The Yukon government requires that its design guidelines be followed for all new Yukon government buildings. Designers are required to evaluate potential savings through energy efficiency measures such as solar orientation and heat recovery, and to specify the use of environmentally friendly materials.

New facilities must be constructed to Yukon government standards, which approach those in the Model National Energy Code for Buildings. The requirement for energy efficiency in government buildings ensures a trained workforce capable of providing these same measures in private buildings, and serves as a demonstration of their efficacy and cost-effectiveness.

The standard for new construction in dwellings owned by the Yukon Housing Corporation is R-2000, and the Housing Corporation encourages contractors and homeowners to build to R-2000 standards through its incentive programs. The Green Mortgage Program requires that homes be constructed to the R-2000 energy efficiency standard. Yukon Housing Corporation encourages owners of existing homes to upgrade to R-2000 standards through the Green Mortgage financing program.

The Energy Solutions Centre is assessing the development of a regional energy performance code for new commercial and institutional buildings. This is being done in conjunction with the Association of Professional Engineers of the Yukon, the Yukon government, local architects and aligned building trades as another tool to improving energy management. This work has involved reviewing the federal government's model national energy code to determine an approach most relevant to the Yukon.

4. Energy Business Plan

In 1998, the Yukon government of the day endorsed a 56 point plan regarding energy issues. That plan has been supported by three consecutive governments since then. Under a larger 'energy plan' umbrella, the Yukon government has also drafted a strategy to guide actions on climate change and to reflect the Yukon realities, and has negotiated a Memorandum of Understanding with the federal government to address measures that reduce greenhouse gas emissions.

The Yukon government is currently working to develop a new energy strategy which will incorporate specific targets, milestones and goals for energy efficiency activities.

More and more resource management and planning are integrated at the municipal, territorial, federal and industry levels.

At this time a multi-departmental committee led by the Department of Energy, Mines and Resources has embarked upon an energy sector planning process that will coordinate action on energy related initiatives.

The larger energy strategy will consist of a number of branches of initiatives. This will allow people to begin to envision the intricate energy system that already exists and that depends on vision and teamwork of many people in order to grow and succeed.

There are currently a number of initiatives and programs active in the Yukon.

One example is the “Energy Solutions in Building Design”, which targets working with the private and public sectors to incorporate energy efficiency and renewable energy concepts and technologies in the design of new commercial and institutional buildings, as well as for major re-developments. The objective is to shift the market to incorporate energy solutions as a standard practice. This initiative can be paralleled with the “Green Buildings Design Initiative”, which promotes and facilitates opportunities for green buildings that address the challenges of the northern environment by engaging, stimulating, and challenging Yukon architects to create innovative designs. (Note that part of the energy business strategy is to see that projects are managed successfully until completed). There also exists a “Green and Appropriate Northern Design Service”, which facilitates the design/construction of new facilities that have the lowest operating costs and exhibit environmental responsibility as well as optimize the use of integrated energy solutions using local and sustainable energy resources.

Yukon Development Corporation and Energy Solutions Center developed and signed a Yukon Municipal Energy Solutions Partnership MOU with community and government partners to facilitate community energy management planning and initiatives that will reduce energy costs and greenhouse gas emissions.

There are also current efforts focusing on geo-thermal technologies to determine the feasibility of using geo-thermal technologies to heat buildings and municipal water systems. The Energy Solutions Centre has partnered with the Municipality of Haines Junction, the Champagne and Aishihik First Nations and others to investigate the potential for a community heat utility, using the heat from the warm water in the new community well. The Energy Solutions Centre has also entered into agreements with Mayo and Teslin to do audits of existing buildings. The Mayo agreement includes a study of the potential for a community heating system.

There is work ongoing on First Nation energy issues, including conducting micro-hydro assessments and examining wind power options. In 2003, the Energy Solutions Centre worked with the Council of Yukon First Nations to assist in a territory-wide workshop for First Nations on climate change and energy efficiency. The Solution Centre is assisting in micro-hydro assessments with Selkirk First Nation, Kluane First Nation and Carcross-Tagish First Nation (Four Mountains Resort project).

Yukon Development Corporation, Yukon Energy and the Energy Solution Centre are involved in a number of wind monitoring activities with First Nations. Last year their work included:

- Continuing a joint venture with the Vuntut Gwitchin to monitor wind regimes for potential wind power development in the Old Crow area;
- Continued monitoring of wind power options for the Kluane First Nation in the Burwash & Destruction Bay area;
- Utilizing the Yukon Development Corporation Community Wind program to monitor the Tatla Mun camp site for the Selkirk First Nation for 2003/2004; and
- Wind monitoring for the Champagne & Aishihik First Nations concluded at Aishihik.

Other activities included:

- preliminary discussion with the White River First Nation on energy efficient designs for their planned cultural centre;
- Involvement in development of Kwanlin Dun's planned waterfront cultural centre;
- Discussion of heating system alternatives for Carcross/Tagish First Nations new administration building;
- Presentations at the Carmacks Alternative Energy community workshop; and
- Involvement in planning an energy efficient community greenhouse for the Little Salmon/Carmacks First Nation.

Through its Rural Electrification Program, the Yukon government offers loans to put in power, either by hooking to the grid or by installing stand alone small hydro wind or PV power systems. A Yukon Development Corporation Power Sales and Incentive Program, promotes the sale of surplus hydro by identifying prudent business cases and facilitating the implementation of energy saving recommendations.

Yukon Development Corporation has a five year corporate plan, with specific business plans, that include establishing specific greenhouse gas emissions targets. The target is to reduce greenhouse gas emissions by 36 per cent from 1990 emissions.

Due to the Yukon's high dependence on refined petroleum products, the Yukon government has purposely developed and implemented efficiency and renewable energy programs for residential, commercial, municipal and government customers. The Yukon has won national recognition and has leveraged additional investment due to the effectiveness of these initiatives.

Research and development activities focus on commercializing existing energy efficiency and renewable energy technologies to reduce the use fossil fuels for heating and electricity generation. Many potentially effective technologies are simply not known, are not available or are not used in the Yukon, for example, heat pump technology. Past experience has also demonstrated that these products are not always suited for the extremes of the sub-arctic climate.

Pilot Projects

Testing to determine if new technologies can provide a practical solution in field conditions was conducted for the domestic hot water timers and parking lot timers. Both initiatives tested Canadian technologies that seek to reduce electricity use through structural change (as opposed to altering consumer behaviour) and save consumers money without compromising reliability or living comfort.

The testing involving parking lot timers showed that there could be significant power bill savings for clients who choose to invest in what are known as ‘six pack’ parking lot controllers. However in some cases, the time needed to recover the initial cost varied widely from two to 59 years.

The purpose of the piloting the Penguin hot water tank timers was to determine if shutting off residential hot water tanks during winter peaks would interfere with daily hot water use. The results of this project suggest that such a schedule causes minimal interference and is acceptable to most people. However to achieve a significant decrease in peak demand on the hydro-electric system, it would require installation of many more timer controls than were used in this experiment.

Solar Demonstration Unit

A portable solar-hybrid unit, created by Yukon Energy and funded by the Yukon Development Corporation as a demonstration project, tests the feasibility of supplying electricity to remote locations and familiarizes consumers with solar power and its potential applications.

The unit was constructed locally and is sized for small-scale residential use. It provides enough electricity to run well pumps, power tools and common household items, with the exception of heat loads. Installation involves simply positioning the unit on a level, south facing area, grounding the system and starting the inverter. Maintenance requires an occasional cleaning of the solar modules and keeping proper water levels in the batteries. An additional charging source would be needed for extended use during winter months and during periods of high-energy usage. The solar-hybrid is provided to non-government organizations free-of-charge to demonstrate and promote this technology under local conditions. Since its inception, the unit has helped meet the power requirements at numerous community events.

Mayo-Dawson City Transmission System

In 2003, Yukon Energy completed and began operating the Mayo-Dawson City transmission line. It was the largest capital project ever undertaken by the Corporation. The project involved building a 232 kilometer long transmission line and related infrastructure to connect the City of Dawson to the Mayo hydroelectric station. With the line in operation, Yukon Energy is now able to meet all of Dawson City’s electricity demands with clean surplus hydro electricity. By replacing diesel with clean hydro power, this project will reduce greenhouse gas emissions by 10,000 tonnes each year. The new power line also provides reliable electricity to residences and businesses along the transmission route – enhancing the potential for new or expanded local business opportunities. It will also save ratepayers some \$20 million in diesel related costs over the 40 year life of the line.

5. In-House Programs

Internal government housekeeping addresses three main areas: building construction and maintenance, fleet vehicle purchases and maintenance, and government purchasing. The Department of Highways and Public Works is responsible for all government buildings (leased or owned), all government fleet vehicles and all government purchasing.

As part of the purchasing decision process, points are awarded based on the energy efficiency of the goods or services under consideration. The Department is also seeking to develop a revolving fund or leasing arrangements that would remove or lessen the barrier of higher initial capital outlays for more energy efficient products and services.

The Department's Property Management Agency (PMA) is responsible for ensuring that government buildings are energy efficient. PMA has established policy that requires all new government buildings to be built to the Model National Energy Code for Buildings (MNECB) standards or higher. As part of its maintenance and inspection procedure, PMA evaluates the energy efficiency of buildings and identifies circumstances where it makes sense to invest retrofit capital dollars to increase energy savings.

6. Regulation of Utilities

The crown-owned Yukon Development Corporation and its subsidiaries Yukon Energy and Energy Solutions Centre are the delivery agents for many of the energy efficiency initiatives of the Yukon government.

Yukon Energy is a publicly-owned electrical utility that operates as a business, at arms length from the Yukon government. It is the main generator and transmitter of electrical energy in the territory and it works with its parent company Yukon Development Corporation to provide Yukoners with electricity and related energy services.

The Energy Solutions Centre, supported through contributions by Yukon Development Corporation and Natural Resources Canada, operates a storefront operation that helps Yukoners implement projects that will save energy and reduce greenhouse gas emissions.

7. Access to Government Information

There are many activities and resources supporting public access to energy related government information. These include Web sites, targeted advertising, and public meetings. In addition, as we have seen in previous sections of this paper, there are many outreach programs that link individuals to Government information. There are other examples noted here, such as:

Vehicle Emissions Clinics

The Yukon government, Environment Canada and the City of Whitehorse sponsor annual vehicle emission clinics to acquaint motorists with the relationship between transportation use, local air pollution, and greenhouse gas emissions. These clinics provide motorists with advice on getting better mileage and reducing greenhouse gases and other air pollution. Since 1998, the program has inspected an average of 200 vehicles per year.

Community Events

Consistent with its mandate, the Energy Solutions Centre plays an active role in community events and with non-profit organizations. It participates regularly in the annual Lions Club Trade Show and sponsors the Yukon Science Fair in association

with the Yukon-Stikine Science Fair Committee, Innovators in Schools and the Yukon Science Institute.

The Energy Solutions Centre designs, coordinates and co-funds the Yukon Energy Fairs, which feature as keynote speakers such well known radio and television personalities as David Suzuki, Bob MacDonald and Jay Ingram . Over the last few years, staff of Science World B.C. have also been also on hand to perform educational demonstrations for students throughout the week-end.

A range of other public communication activities was conducted over the past year to showcase local energy solutions and services and boost the Energy Solution Centre's profile. Presentations were made at the Association of Yukon Communities Annual General Meeting, Aboriginal Housing Conference, Skills Canada Careers Fair, Tourism Industry Association of Yukon Annual General Meeting, Yukon Business Summit, Dawson City Chamber of Commerce and the Yukon Chamber of Commerce Annual General Meeting.

The Yukon Development Corporation promoted renewable energy through its ongoing support for the Experiential Science program at the Wood Street Centre to test solar panels and an in-stream generator under the Green Power Initiative.

Wind Power

Yukon Energy's two wind turbines on Haeckel Hill near Whitehorse continue to be a source of great public interest. Public awareness and information videos were produced showing the installation of both the turbines and the value of wind energy. As well, two educational booklets have been published that promote wind energy. (see enclosures.)

Publications

The Energy Solutions Centre co-sponsored the Yukon Energy Solution articles that appeared in the *Yukon News* in late fall of 2002. The articles focused on local stories that described the consumer benefits of different efficiency and renewable technologies, and their relationship to combating climate change. Other outreach activities included media interviews and the issuance of program brochures, progress updates and news releases.

Beyond these activities, the Yukon Development Corporation partnered with Yukon Energy to commission publications on wind energy (*The Winds of Change*) and hydro development (*The Power of Water*) to broaden public awareness about the important role of renewable energy in the territory. These are just two of the many educational booklets and brochures produced over the last few years by Yukon Development Corporation and its subsidiaries (see Appendix 1).

8. Related Policy Developments

A multi departmental energy planning committee is addressing the development of a consistent and integrated approach to energy management.

Since the energy crises of the 1970s the Yukon government has been working to reduce the leakage from the Yukon economy due to expenditures for imported refined

petroleum products. For the last two decades policy development has targeted sustainable energy initiatives.

Rate Stabilization Initiative

The [Rate Stabilization Fund](#) was established in 1998 after the Faro mine closed to protect customers from substantial rate increases. It was initially funded through a one-time grant of \$10 million from the Yukon government to the Yukon Development Corporation. The fund was later extended to April 2005.

The Rate Stabilization Fund subsidizes customer bills so that first block consumption (1000 kWh for residential and 2000 kWh for commercial) for eligible customers is maintained at nine per cent above rates established in January 1997. The annual cost of this program is approximately \$3.5 million and it reduces Yukoners' electricity bills by about 20 per cent.

Yukon Climate Change Action Plan

The Yukon government recognizes the serious impact that climate change is having in the Yukon, and supports the principles of the Kyoto accord. The Yukon government is an active participant with the federal government and the other territories and provinces in the national process to address climate change. It is also taking action on its own to minimize greenhouse gas emissions and to adapt to the environmental impacts of a changed climate, independent of the federal government's decision regarding Kyoto.

Work is underway to complete a Yukon Government Climate Change Strategy to guide Yukon Government actions in adapting and mitigating measures for reducing greenhouse gas emissions. The Yukon government also actively participates in national forums and the development of a Canadian climate change strategy, and reports on greenhouse gas reduction measures through that process.

Northern Climate ExChange

The Northern Climate ExChange is a non government organization, with a mission to provide independent and credible information while promoting positive action on climate change. The NCE is host to the public education and outreach program that support, amongst other things, One Tonne Challenge initiatives, school programs and energy efficiency programs. The NCE is a resource for the public, northern researchers, policy makers and industry.

The Northern Climate ExChange maintains a database on the impacts of climate change on the North, and provides a key role in coordinating research on the impacts of climate change in the north, and in educating the public on the need for action. It supports the development of resource efficient technologies and practices that contribute to mitigating climate change impacts, and facilitates the exchange of scientific, traditional and local knowledge, technology and expertise in circumpolar jurisdictions.

The Web site at <http://www.taiga.net/nce> can provide more detail on the programs of the Northern Climate ExChange.

School Outreach Program

In partnership with the departments of Education and Environment in each of the three northern territories, the Northern Climate ExChange conducts a School Outreach program, and is developing curriculum for use in northern schools. Partners provide coordination and support, in-service teacher training, assistance in developing presentation materials, and technical expertise. On behalf of the department of Energy, Mines and Resources, the Northern Climate ExChange visits schools in conjunction with the national Energy and Environment Calendar contest and helps teachers and students to understand the relationship between sound energy management and a healthy environment.

Canadian Climate Impacts and Adaptation Research Network

The Northern Climate ExChange co-ordinates the operations of the northern offices of the Canadian Climate Impacts and Adaptation Research Network. The Northern Climate ExChange serves as the lead agency in documenting climate change impacts and adaptation in the Canadian North, in partnership with governments and research institutes in the Northwest Territories and Nunavut.

Gap Analysis

Beginning in 1999, in partnership with Environment Canada, the Northern Climate ExChange has coordinated a gap analysis to assess the current state of knowledge of climate change and its impacts in northern Canada. The purpose of this analysis was to identify research, technological, and policy priorities and to improve coordination among research agencies and residents of northern Canada.

Public Education Program Hub

The Northern Climate ExChange is responsible for outreach, communication and project management for the Yukon Hub of the National Climate Change Public Education Program. It is responsible for enhancing awareness and understanding and encouraging action on climate change through print, portable displays and by maintaining information on the Northern Climate ExChange Web site.

The goals of the Climate ExChange include promoting local economic opportunities in the development of resource efficient technologies and practices that contribute to mitigating climate change impacts and facilitating the development of a circumpolar “trade route” to share knowledge, expertise and technology. Further information on the Northern Climate Exchange is available through their annual reports, which are published on their Web site.

Voluntary Challenge and Registry

For the third consecutive year, the Yukon Development Corporation and its subsidiaries have been awarded the Gold Level Reporter award for tracking, reporting and reducing carbon dioxide emissions. This is an honor they share with only about 100 other companies across Canada. The award is from the National Voluntary Climate Change Registry, a non-profit industry/government national partnership that works to address climate change.

The recognition came after the Yukon Development Corporation submitted a report to the registry that calculated total greenhouse gases for itself and its subsidiaries since 1990, and established clear performance indicators including projected future

emissions, target setting, measures to reach these targets and results currently achieved. Carbon dioxide emissions decreased by 65 per cent or 23,630 tonnes between 1990 and 2000. With the commissioning of the 69 kV transmission line from Mayo to Dawson City, diesel generation in Dawson was eliminated, representing a nearly 50 percent overall decrease in diesel generation in the Yukon.

The Yukon Development Corporation also received the 2003 Leadership Award for Utilities from the Voluntary Challenge & Registry Inc. (VCR Inc.) for its climate change action plan for the company and its subsidiaries.

9. Performance

Activity in the Yukon government's energy programs for the two year period from April 2002 to March 2004 is summarized in the table below:

Program	Description	Number of Clients
EnerGuide for Houses	Provides energy audits and advice on increasing energy efficiency	1062
Home Repair Program	Encourages energy efficiency and other upgrades in existing housing	337
YHC Self-Help Course	Provides advice on managing home construction	53
Residential Energy Management Program	Provides low-interest loans to encourage conversion from electric heating to other energy sources.	37
Mobile Home Upgrade Program	Similar to Home Repair, specially adapted for mobile homes	28
Green Mortgage Program	Encourages energy efficiency in existing housing through reduced mortgage rates.	23
Home Repair Enhancement Program	Covers necessary repairs in excess of \$35,000	11
Rental Rehabilitation Program	Encourages landlords to upgrade energy efficiency in rental units	11
Green Mortgage Yukon Builders Program	Encourages energy efficiency in new construction through reduced mortgage rates. 75% of materials and labour must be provided by Yukon suppliers. Must meet energy budget (EnerGuide for Houses 80 or better)	9
Commercial Energy Management Program	Assist commercial sector (including non-profit, municipal and First Nations governments) with energy management.	
Community Wind Resource Assessment	Determine the potential for commercial scale wind development	20

Program	Description	Number of Clients
Energy Efficiency House Calls	Visits to homes with information and energy saving products.	
Energy Efficiency Pilot Programs	Promote and demonstrate energy efficient hot water tanks and parking lot timers, as well as the Energy Efficient Appliance Initiative and the GreenHog information and coupon handbook	200+
Energy Solutions Centre	To engage Yukoners in the challenge and potential of energy efficiency and green power.	
Green Building Design	To promote energy efficient and environmentally friendly building in the Yukon	
Northern Climate ExChange	To facilitate the exchange of scientific, traditional and local knowledge of climate change in circumpolar jurisdictions	
Rate Stabilization Initiatives	Promote energy efficiency in diesel communities. This includes the Fridge Exchange Program.	211+
Renewable Power Sales Incentive Program	Sell discounted, surplus hydroelectricity for heating to businesses, municipalities and government agencies and departments	19
Rural Electrification Program	Assist off-grid residences to connect to power grid or to install renewable alternative electricity generation on-site.	124 (in 2003)
Wind Energy Research and Development	Install and evaluate commercial-scale wind turbines; modify off-the-shelf equipment to suit Yukon conditions.	
Woodstove Replacement and Education Pilot Program	Information campaign to improve awareness of wood burning safety health and environment issues	
Yukon Government Internal Energy Management Program	Improve energy management in government facilities	

10. Evaluation

As was mentioned earlier, the Yukon Development Corporation received Gold Level Reporter status for submitting a climate change action plan for the company and its subsidiaries to the Voluntary Challenge & Registry (VCR Inc.).

The Minister of Energy Mines and Resources is responsible through legislation for the Yukon Development Corporation. The Minister and the Corporation are required to outline performance expectations. The Minister reports to the Yukon Legislative Assembly on the progress of the Yukon government in implementing the measures that make up its energy commitments.

Over the next year the Yukon government will undertake the development of an updated energy strategy to clearly articulate the roles to be played by each of the agencies responsible for the delivery of energy programs, to determine energy priorities, to coordinate efforts, and to provide political guidance on energy policy.

Appendix 1

Energy Related Program Material Available from the Energy Solutions Centre and the Yukon Housing Corporation

- Yukon Development Corporation, 2003 Progress Report for Canada's Climate Change Voluntary Challenge and Registry Program, October 2003
- Yukon Green Building Design Competition, Final Report
- Building Green and Beyond
- People Power
- The Power of Water: the Story of Hydropower in the Yukon
- The Lure and Lore of Wood: A Look at the Yukon's Natural Fuel
- The Winds of Change: the Story of Wind Generation in the Yukon
- Energy Solutions Centre Annual Report 2002
- Yukon Energy 2003 Annual Report
- Yukon Development Corporation Annual Report 2002
- Six Pack Parking Lot Controller Pilot Project
- Penguin Pilot Project
- Rural Electrification Policy and Guidelines
- Pushing the Envelope: Making Yukon Homes Green
- REMP Residential Energy Management Program, Information and Application Brochure
- EnerGuide for Houses, residential energy audit, information and application
- Self-Help course: information and application
- Go Green with our Green Home and Green Mortgage Programs
- Accommodating Home Mortgage Program
- Thinking of Energy Efficiency? (describes Yukon Housing Corporation programs)
- Interest Rate Notice (Yukon Housing programs)