

YUKON GOVERNMENT CLIMATE CHANGE ACTION PLAN

DECEMBER 2015

PROGRESS REPORT



TAKING ACTION ON CLIMATE CHANGE

Yukon
Government



Lowell Glacier, Kluane
National Park



MINISTER'S MESSAGE

This *Climate Change Action Plan Progress Report 2015* tells the story of a government that recognizes the magnitude of changes to our northern climate and our willingness to respond in a coordinated, informed and timely manner.

In 2009, the Government of Yukon identified climate change priority actions that would help us better understand the challenges we face and adapt to changes already underway. In 2012, we presented a progress report on what had been done to date.

This document details how we have taken steps to achieve the ambitious agenda set out in the original action plan. It documents the Government of Yukon's strategic climate change approach—its successes, its challenges, its growth and learnings—and the lessons we have all learned.

Moving forward together, the government will keep climate change in mind as we make strategic investments in infrastructure, protect our environment and make Yukon the best place to live, work, play and raise a family.

Hon. Wade Istchenko
Minister of Environment

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EXECUTIVE SUMMARY

Since developing the *Climate Change Action Plan* in 2009, the Government of Yukon has demonstrated leadership and commitment to addressing climate change. Six years into the plan, the majority of the government's original priorities are either complete or underway. The Government of Yukon approach is guided by the following goals:

1. enhancing knowledge and understanding of climate change,
2. adapting to climate change,
3. reducing greenhouse gas emissions, and
4. leading Yukon action in response to climate change.

The *Climate Change Action Plan Progress Report 2015* describes actions undertaken to date and identifies 28 new initiatives to support our climate change goals moving forward. It highlights the Government of Yukon's actions to reduce greenhouse gas emissions and adapt to the impacts of our changing climate.

In particular, the report details the numerous adaptation efforts to protect the integrity of our water, forests, food security, infrastructure and public health, among others. These initiatives are supported by the research, monitoring and outreach activities which help to provide increased understanding of climate change impacts in northern Canada. More information on adaptation efforts can be found in the Goal 1 and 2 sections of the report.

The section detailing progress on Goal 3, reducing greenhouse gas emissions, highlights progress made on our greenhouse gas emissions targets, both internal to the Government of Yukon and Yukon-wide; 28 new initiatives identified to ensure that we are constantly moving toward achieving these targets are also presented throughout the report.

Adaptation and greenhouse gas reduction efforts are supported by the ongoing leadership of the Government of Yukon to improve the capacity of all Yukoners in addressing climate change. Key training initiatives, youth engagement and effective partnerships at local, regional, national and international levels are detailed under the Goal 4 section: leading climate change action.

Though there is still work being done on initiatives set out in 2009 and 2012, the *Climate Change Action Plan Progress Report 2015* provides a comprehensive overview of progress made to date while also highlighting the continuing efforts by the Government of Yukon to remain current, responsive and innovative in our approach to addressing climate change.

INTRODUCTION

This document, the *Climate Change Action Plan Progress Report 2015*, is a comprehensive review of the Government of Yukon's efforts to address the challenges and opportunities of climate change over the six years since the original *Climate Change Action Plan* was released. This report not only provides updates on actions committed to in that plan but also an overview of the accomplishments that reach beyond its original scope. In addition, this report identifies new activities and commitments to help achieve the government's existing targets.

The Government of Yukon recognizes that climate change is happening, that human behaviour is a major contributor, and that a coordinated response is needed.

The government remains proactive in its planning, responsive to current needs and research and relevant in its response to climate change. It has learned from its successes and challenges while planning for the future. The government has demonstrated its commitment by leading, partnering and supporting a collaborative approach to address climate change in the territory.

LINKS TO THE ENERGY STRATEGY

Releasing this year's progress reports on the *Climate Change Action Plan* and the *Energy Strategy for Yukon* at the same time demonstrates that climate change and energy are inextricably linked. Many of the actions set out in the climate change report complement the goals of the energy strategy, and vice versa. For example, new green building standards will not only increase energy efficiency but also reduce greenhouse gas emissions from heating.

The Intergovernmental Panel on Climate Change (IPCC) released its 5th assessment report in 2014, a comprehensive assessment of current scientific, technical and socio-economic knowledge about the risk of global climate change, its causes, potential impacts, and possible options for adapting to or mitigating the effects. The 195 member countries of the IPCC approve the summary reports line-by-line. The IPCC report concludes that:

- Human influence on the climate system is clear; recent human caused emissions of greenhouse gases are the highest in history.
- Warming of the climate system is unequivocal. Many of the observed changes since the 1950s are unprecedented. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen.
- Human caused greenhouse gas emissions, driven largely by economic and population growth, are now higher than ever. Atmospheric concentrations of carbon dioxide, methane and nitrous oxide are the highest they have been in at least the last 800,000 years.

GOVERNMENT OF YUKON CLIMATE CHANGE ACTION 2009-2015

A snapshot of Government of Yukon efforts to advance its four climate change goals.



2009 CLIMATE CHANGE ACTION PLAN: PRIORITY ACTIONS AND TARGETS

GOAL #1 - ENHANCE KNOWLEDGE AND UNDERSTANDING OF CLIMATE CHANGE

- Establish a Research Centre of Excellence
- Establish climate change research study areas
- Develop climate scenarios

GOAL #2 - ADAPT TO CLIMATE CHANGE

- Complete a Yukon infrastructure risk and vulnerability assessment and determine adaptation strategies in response
- Develop an inventory of permafrost information for use in decision making
- Complete a Yukon water resources risk and vulnerability assessment
- Create a tool to facilitate the collection and distribution of water quantity and quality data
- Conduct a Yukon forest health risk assessment
- Conduct treatments to reduce forest fuel loads and protect communities
- Conduct a Yukon forest tree species and vulnerability assessment

GOAL #3 - REDUCE OUR GREENHOUSE GAS (GHG) EMISSIONS

- Government of Yukon's internal operations:
 - cap GHG emissions in 2010
 - reduce GHG emissions by 20 per cent by 2015 and
 - become carbon neutral by 2020
- Report on Government of Yukon operations through 'The Climate Registry'
- Develop a carbon offset policy for internal operations
- Incorporate environmental performance considerations in the government's procurement decisions
- Government-funded new residential construction will meet GreenHome energy efficiency standards

- Government-funded commercial and institutional, construction and renovation will meet or exceed the LEED Certified Standard for energy efficiency
- Improve energy efficiency and reduce the greenhouse gas emissions of the government's light vehicle fleet
- Implement an Environmental Stewardship Initiative for the Department of Education and Yukon schools
- Establish 'green action committees' in all departments
- Conduct an energy analysis of all Government of Yukon buildings and complete energy saving retrofits
- Develop best management practices for industry to reduce GHG emissions
- Undertake an extensive study of the transportation sector and recommend options to reduce emissions
- Develop incentives for fuel efficient transportation
- Develop pilot projects to demonstrate home and commercial energy efficiency and heating technology
- Improve access to home energy evaluations by providing evaluator training
- Develop wood energy opportunities for residential and institutional heating

GOAL #4 – LEAD YUKON ACTION IN RESPONSE TO CLIMATE CHANGE

- Forecast potential future GHG emissions for Yukon
- Work with federal partners to ensure national GHG Inventory is accurate and consistent for Yukon
- Set a Yukon-wide emissions target within two years
- Create a Climate Change Secretariat
- Determine the potential of a Yukon carbon economy
- Incorporate climate change considerations into government decision making
- Create a community engagement forum for taking action on climate change



2012 CLIMATE CHANGE ACTION PLAN PROGRESS REPORT: SECTOR-SPECIFIC TARGETS

ELECTRICITY SECTOR

- By 2020, reduce the emission intensity of on-grid diesel power generation by 20 per cent
- By 2016, reduce on-grid electrical energy use through demand-side management programs by five gigawatt hours

BUILDING SECTOR

- By 2016, increase the average energy efficiency of new residential, commercial and institutional buildings constructed outside of Whitehorse by 25 per cent when compared to buildings constructed to 2011 energy efficiency standards
- By 2020, reduce the emission intensity of existing residential, commercial and institutional buildings across Yukon by five per cent
- By 2020, meet 20 per cent of government buildings' space heating needs with clean energy sources

INDUSTRIAL OPERATIONS SECTOR

- By 2016, reduce the electrical energy intensity of industrial operations, including mines, which were operating in 2011 by 15 per cent
- By 2014, establish reporting protocols for stationary facilities emitting over 2.5 kilotonnes of GHGs per year

TRANSPORTATION SECTOR

- By 2015, reduce emissions from Government of Yukon light fleet operations by five per cent
- By 2015, reduce emission in the transportation sector by 10 per cent



2015 NEW ACTIONS TO SUPPORT CLIMATE CHANGE GOALS

New items will be indicated throughout the rest of the document with a ✦

GOAL #1 - ENHANCE KNOWLEDGE AND UNDERSTANDING OF CLIMATE CHANGE

- Develop a Government of Yukon Science Strategy companion document to increase investment in research, catalogue current projects, and develop a pan-territorial approach (Page 6)
- Conduct a study on short lived climate pollutants' sources and recommend option to address these emissions (Page 8)
- Develop a cross-sector made-in-Yukon energy use and GHG emissions report (Page 8)
- Continue to support updates and development of the *Yukon Climate Change Indicators and Key Findings* report, including enhanced inclusion of Traditional Knowledge (Page 9)
- Host skill building sessions to enhance the communications capacity of Government of Yukon science staff to improve the government's ability to raise public awareness and interest about climate change issues (Page 12)
- Support development of Yukon College's Post-Degree Certificate in Climate Change Policy (Page 12)

GOAL #2 – ADAPT TO CLIMATE CHANGE

- Use road construction methods designed to preserve permafrost on Yukon highways (Page 15)
- Explore the development of publicly-accessible flood hazard maps to enable a better understanding of possible flood risks (Page 22)
- Explore development of a standardized approach for researchers modelling climate changes to enable easier comparison of trends and projections (Page 22)
- Develop guidelines for mine sites to include projected effects of climate change on retaining infrastructure, including tailings storage facilities, for the 50 years following a mine's closure (Page 22)
- Release a summary report of the Interdepartmental Food Security Working Group's findings on enhancing food security in the territory (Page 23)
- Implement a climate change survey of Government of Yukon employees to identify key issues, barriers, and opportunities for enhanced government action (Page 24)
- Complete a climate change adaptation project gap analysis to inform possible future study areas and action (Page 24)

GOAL #3 – REDUCE OUR GREENHOUSE GAS (GHG) EMISSIONS

- Accelerate the replacement of old vehicles with more fuel efficient vehicles (Page 28)
- Install Fleet Management Information Systems in select heavy and medium-duty Government of Yukon equipment as a pilot project to identify efficiencies to reduce costs and GHG emissions (Page 28)
- Develop an information campaign targeting Government of Yukon staff to increase energy literacy and reduce energy use in government buildings (Page 29)
- Transfer budgets and billing for utility payments to departments and agencies as an incentive to reduce energy consumption (Page 29)
- Install energy efficient lighting in schools that have not yet replaced their inefficient T12 fluorescent tubes (Page 30)
- Develop a building construction best practices manual of Yukon appropriate energy efficient measures for government buildings (Page 31)
- Re-introduce the “Secondary Sales” program in four government buildings to optimize the use of hydro generation during low-use periods (Page 31)
- Undertake a formal process to solicit market interest in supplying biomass heat to select Government of Yukon buildings (Page 31)
- Replace old boilers in schools with more efficient models as required, using renewable fuel sources where appropriate (Page 31)
- Implement a waste diversion program in all of Yukon’s 28 schools by the end of 2017 (Page 32)
- Launch an online ride sharing program in 2016 with the City of Whitehorse to support reduced GHG emissions associated with commuting in single occupancy vehicles (Page 35)
- Deliver an employee survey and toolkit options to Government of Yukon and City of Whitehorse staff to examine options for alternative transportation action within government staff (Page 35)
- Design regulatory directions for flaring, venting and leaks to minimize GHG emissions in the oil and gas sector (Page 41)
- Develop Best Management Practices for resource development projects that deal with reducing the environmental impact of exploration and development (Page 41)

GOAL #4 – LEAD YUKON ACTION IN RESPONSE TO CLIMATE CHANGE

- Provide materials on climate change issues, responsibilities, and support services to new Government of Yukon employees (Page 43)

GOAL 1

ENHANCING KNOWLEDGE AND UNDERSTANDING

The Government of Yukon recognizes that an effective response to climate change is one that is well informed. Its efforts towards this goal support not only research but also communicate new ideas through educational outreach programming.

RESEARCH

Research is integral to promoting a better understanding of climate change. Since 2009, the Government of Yukon has expanded research capacity and dedicated resources towards emerging study areas. In addition, support for both new and existing monitoring networks provides baseline information that helps scientists determine the scope of future activities.

The government released its *Science Strategy* in November 2015 to support growth of Yukon's scientific capacity in the long term. The strategy supports partnerships with the science community, jurisdictions and circumpolar nations to enable effective pooling of resources, capabilities and expertise in broad research subject areas, including climate change. ✦ Next steps include working within the Government of Yukon to develop a companion research strategy to increase investment in research, catalogue current research projects, and work with the Northwest Territories and Nunavut on a pan-territorial approach to science.



COMPENDIUM OF YUKON CLIMATE CHANGE SCIENCE 2003-2013

This overview of climate change work highlights scientific journal articles, government publications, workshop reports and conference proceedings. Each entry describes the local relevance and includes details of the research location, keywords and online availability. It is published by the Yukon Research Centre's Northern Climate ExChange.

www.yukoncollege.yk.ca/research/abstracts/compendium

YUKON RESEARCH CENTRE

In 2009, the government helped establish the Yukon Research Centre in partnership with the Council of Yukon First Nations and Yukon College. The centre supports research, innovation and outreach, explores northern research questions, advances local innovation, and provides research services to visiting academics. It also enables scientists and academics to train, study and make discoveries in Yukon.

From 2009 through 2015, the Government of Yukon provided over \$11 million to the centre for its three key project areas: innovation, research, and outreach.



The Yukon Research Centre laboratory at Yukon College was completed in 2012. (Archbould.com)



Stay-A-Day program held for grade 7 students at Yukon College as part of Science Adventures. (Yukon Research Centre, 2015)

YUKON RESEARCH CENTRE KEY AREAS

1. **Innovation:** **Cold Climate Innovation** focuses on the development of sustainable cold climate technologies and solutions.
2. **Research:** The **Northern Climate ExChange** focuses on the study of climate change in Yukon and the North. It provides a credible and independent source of information and promotes action and research coordination on climate change in Yukon.
3. **Outreach:** **Science Adventures** engages K to 12 students, teachers and communities in fun, hands-on science exploration, including climate change related topics.

CLIMATE CHANGE STUDY AREAS

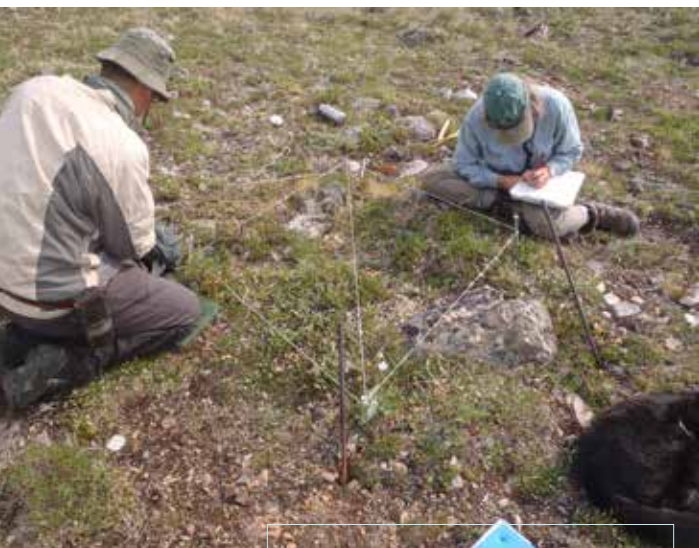
The 2009 *Climate Change Action Plan* focussed research efforts into four subject areas: water, forests, building infrastructure, and the development of climate change scenarios. After 2012, Government of Yukon research efforts expanded to include biodiversity, emergency response planning, the impacts of thawing permafrost on agriculture, transportation infrastructure, and human health. Descriptions of the research projects can be found in the “Adapting to Climate Change” section on page 13.

Additional areas that will be researched in future include:

- **◆ Short Lived Climate Pollutants:** The Climate Change Secretariat will lead a study on short lived climate pollutants (SLCPs) such as methane and black carbon. The study will identify and examine SLCP sources, as well as recommend options to reduce SLCP emissions within Yukon. (For more details on SLCPs, see sidebar on page 25)
- **◆ Greenhouse gas emissions:** The Climate Change Secretariat, Yukon Bureau of Statistics and the Energy Branch of the Department of Energy, Mines and Resources are working to develop a cross-sector, made-in-Yukon energy use and greenhouse gas emissions report, using accurate data collection to better inform policy decisions and climate action.



Researchers use a dual frequency penetrating radar on the Fantail Glacier to determine ice mass.



Studying plant growth composition in the Wolf Creek alpine as part of the International Tundra Experiment.

MONITORING

The Department of Environment leads four projects that involve long term monitoring – a crucial aspect of understanding the impacts of climate change:

- examining changes in the diversity and abundance of bats in the Government of Yukon’s campgrounds and territorial parks,
- monitoring the impact of climate change on snowshoe hare survival,
- monitoring collared pika populations in Tombstone Territorial Park, and
- monitoring keystone boreal species trends.

Other monitoring projects underway include:

- permafrost temperature monitoring by the Department of Energy, Mines and Resources and local students in Whitehorse, Watson Lake, Beaver Creek, Ross River, Faro and Dawson City,
- the International Tundra Experiment,
- Arctic Borderland Ecological Knowledge Co-op, and
- glacial monitoring work by the Yukon Research Centre.



MONITORING COLLARED PIKA POPULATIONS IN TOMBSTONE TERRITORIAL PARK

These small rabbit relatives have been deemed “harbingers of climate change” due to their sensitivity to climate patterns. Collared pika may be adversely affected by high snowfall and late snowmelt. Recently assessed as a species of Special Concern, collared pika may be the first species listed on the federal *Species At Risk Act* due to the threat posed by climate change.



Collared pika.

The *Yukon Climate Change Indicators and Key Findings* report, a cross-sector, structured, evidence-based assessment of climate change knowledge, will be released in early 2016. Developed through the Northern Climate ExChange and reviewed in partnership with the Council of Yukon First Nations and the Climate Change Secretariat, the report will provide objective measures of Yukon’s climate, along with high-level conclusions of current research. ✦ For future iterations, the Government of Yukon will support updates and development of the report, including enhanced inclusion of Traditional Knowledge.



Project funders external to the Government of Yukon are referenced in parentheses and abbreviated as follows: Indigenous and Northern Affairs Canada (INAC), the Canadian High Arctic Research Station (CHARS), Natural Resources Canada (NRCan), the Natural Science and Engineering Research Council of Canada (NSERC), the Northern Strategy Trust Fund (NST), Public Health Agency of Canada (PHAC), the Social Sciences and Humanities Research Council (SSHRC), and Transport Canada (TC).

Outreach activities seek to connect individuals, organizations and communities who may be affected by or have an interest in climate change issues.

The Government of Yukon worked with local, territorial, provincial, national and international partners on adaptation initiatives to both build capacity to cope with the negative impacts of climate change as well as to embrace the opportunities that may arise.



Examples include:

- The **Arctic Adaptation Exchange** Information Portal: This one-stop online resource (www.arcticadaptationexchange.com) for climate change adaptation information resources is specific to the circumpolar north (NRCan).
- The **Adaptation Practitioners' Forum**: Since 2012, this Yukon Climate Change Consortium (YC3) event has brought together those involved with and interested in climate change adaptation actions to network, gain a broader understanding of current adaptation practices and identify areas for future efforts. (YC3 comprises the Council of Yukon First Nations, the Northern Climate ExChange and the Climate Change Secretariat).
- Pan-territorial **outreach activities**: This website highlights adaptation efforts across the three territories (northernadaptation.ca) and easy-to-read information notes communicate adaptation projects in each jurisdiction (INAC).



The Yukon Adaptation Practitioners' Forum, May 2012.

The Government of Yukon recognizes the importance of engaging with youth. It has held information exchange events, provided opportunities for youth training and leadership development, and organized forums to engage youth in open dialogue on climate change issues and concerns. Outreach activities to date are:

- Youth forums, including the 2012 **Youth Eco Forum** and the **Yukon Youth Outside the Box Forums** (2007 to 2010), aimed at developing youth leadership,
- An annual **Youth Climate Change Conversations** event, led since 2011 by the Climate Change Secretariat's summer interns, to engage older youth in climate change dialogue and provide a leadership opportunity for the youth intern.
- A **Climate Change Youth Ambassador** has accompanied Government of Yukon officials to the United Nations Framework Convention on Climate Change, Conference of the Parties (COP) each year since 2013. This opportunity both deepens the youth ambassador's knowledge of climate change issues and international negotiations, and allows her/him to share this knowledge with other Yukoners.

ARCTIC ADAPTATION EXCHANGE

The Arctic Adaptation Exchange provides online access to information resources specific to the circumpolar north. Launched in April 2015, its goals are to enhance the capacity of northerners to understand and adapt to climate change, and to foster innovation and the development of best practices in climate change adaptation. The Government of Yukon took a leadership role in this project, the first time it has co-led an Arctic Council initiative. Project partners are: Canada (Government of Yukon and Natural Resources Canada); U.S. (University of Alaska — Fairbanks and U.S. State Department), Gwich'in Council International, and Aleut International Association.
www.arcticadaptationexchange.com

COMMUNITY NEEDS ASSESSMENT SURVEYS

Using information collected from 13 Yukon communities (2009-11), climate change issues and priorities were compiled to inform future programs and decisions. Key results included:

- 75 per cent of respondents said that climate change is having a direct impact on their lives.
- Education/training and information management are barriers to individual and organizational participation.
- Climate, wildlife and food security are areas of key and current concern.
- Energy-related initiatives are deemed a priority.

This in-depth project was led by the Council of Yukon First Nations with participation from the Northern Climate ExChange and the Climate Change Secretariat.

Outreach supports the effort to effectively communicate climate change information to policy makers and the public. Getting information to those who need it is advanced by creating training and delivery opportunities to help researchers meaningfully dialogue with public. Examples of outreach training and delivery opportunities, past and future, to enable an effective information exchange include:

- The **Communicating Climate Change Adaptation film and lecture series** held in 2014 to share knowledge about the adaptation projects funded by Indigenous and Northern Affairs Canada's Climate Change Adaptation Program from 2012-16 (INAC). This project was co-ordinated by the Yukon Beringia Interpretive Centre.
- ♦ Knowledge sharing and skill building sessions to enhance the communications capacity of Government of Yukon science staff. Supported by the Science Community of Practice group, this initiative will improve the government's ability to raise public awareness and interest about climate change issues.
- ♦ The Climate Change Secretariat is supporting Yukon College and its School of Liberal Arts in the development of a Post-Degree Certificate in Climate Change Policy. As the first made-in-Yukon post-graduate certificate for the college, the secretariat will work with the program coordinator by providing content and practical expertise in the development of climate change policy in Northern Canada.



YOUTH AMBASSADORS AT COP

Scott Bradley, originally a Dawson City resident with a background in trades, was the first Climate Change Youth Ambassador in 2013 in Warsaw, Poland. His experience included a thorough grounding in climate change data and issues before the conference. At COP 19 he got to shadow the negotiation proceedings, connect with other youth groups, and attend side events most relevant to the Yukon context. Scott is now an active participant in local and Arctic climate change initiatives.

Aletta Leitch of Whitehorse attended the 20th session of the Conference of the Parties to the UNFCCC (COP 20) in December 2014 in Lima, Peru as the Youth Ambassador.

Whitehorse resident Sabrina Clarke was selected to be the Climate Change Youth Ambassador to attend COP 21 in Paris, France. It is expected participating countries will create a new international climate agreement by the conclusion of the event.

Aletta Leitch attended COP 20 as Youth Ambassador in Lima, Peru in 2014.

GOAL 2

ADAPTING TO CLIMATE CHANGE

Yukoners can see and feel the effects of climate change. Thawing permafrost is damaging buildings and highways, while changing wildlife migration patterns are affecting traditional ways of life.

Adaptation involves initiatives which aim to:

- cope with the negative impacts of climate change, and
- embrace the opportunities that may arise.

Adaptation actions complement the efforts by government and others to reduce their greenhouse gas emissions. Yukoners need to be prepared for current and upcoming changes so they can remain safe and healthy while continuing to flourish.

The Government of Yukon has undertaken adaptation actions both directly and through partnerships with the federal government and non-government organizations. Using federal funding, it has co-ordinated a comprehensive approach to adaptation.

Initially, the Government of Yukon focused on four study areas: permafrost impacts on building infrastructure, water, forests, and development of climate change scenarios to help future planning. Over time, additional areas were added, such as transportation infrastructure, planning for land use, and public health.

Permafrost issues are a common theme in many of the adaptation projects. Recognizing that this is pervasive across Canada's north, the governments of Yukon, the Northwest Territories and Nunavut held the **Pan-Territorial Permafrost Workshop** in 2013 to bring together Traditional Knowledge-holders, scientific experts and decision-makers from all orders of government to share information and explore potential responses to permafrost thaw (INAC). Results of this workshop and project information notes are available online at www.northernadaptation.ca



Buildings impacted by permafrost thaw in Dawson City.

PERMAFROST BASICS

Permafrost is a layer of ground that remains at or below 0°C for more than two consecutive years. Permafrost is widespread in Yukon, generally colder and thicker as one moves northward. Thawing permafrost can cause landslides and create hazards for communities and infrastructure which makes it an important area of study and planning in the north. Permafrost thaw can be rapidly initiated by natural (fire or river erosion) and human disturbances that alter surface cover or groundwater flow.

permafrost.gov.yk.ca/permafrost101

Research into adaptation is helping to strengthen the resilience of communities, organizations and individuals to climate change impacts. Practical and innovative adaptation solutions are coming forward.

INFRASTRUCTURE

At the start of its adaptation program in 2009, the Government of Yukon concentrated on the impact of permafrost on buildings. As research capacity grew, the impact of a warming climate on transportation infrastructure, specifically related to permafrost thaw, became an important focus.

Buildings

The **Infrastructure Vulnerability to Permafrost Degradation** project involved a risk assessment to determine baseline permafrost impacts on government-owned buildings. It was completed in 2011 by the departments of Highways and Public Works and Energy, Mines and Resources. This project spurred the creation of the **Yukon Permafrost Knowledge Network** to encourage cooperative relationships between those active in permafrost related work and research activities. For more information see permafrost.govyk.ca (INAC).

In addition, the Northern Climate ExChange conducted a risk assessment of key buildings managed by the Department of Highways and Public Works in Ross River, specifically looking at risks resulting from permafrost degradation. **The Permafrost and Risk Assessment of Key Buildings and Infrastructure in Ross River** project will be completed in late 2015 and is expected to influence best practices for the maintenance and design of existing and new infrastructure in northern communities (NRCan).



Permafrost researchers monitor the impacts of permafrost thaw on Ross River School. (Yukon Research Centre, 2015)

THE COST OF ADAPTATION

A new field of research has emerged that looks into the cost of adaptation. By analyzing the costs of **preparing** for climate change impacts versus the costs of **responding** to climate change impacts such as extreme weather events, decision-makers can make the most cost efficient decision. Projects exploring the cost of adaptation include:

- **Identifying adaptation costs for at-risk building stock in Old Crow, Yukon, and Arviat, Nunavut:** This Northern Climate ExChange project explores the potential costs of climate change impacts on buildings and houses as well as the costs associated with adaptive modifications for buildings exposed to different levels of risk. Work will be complete in 2016 (CanNor).
- **Vulnerabilities of a winter ice road:** The project, completed in 2015, examined key climate change vulnerabilities of the Tibbitt to Contwoyto winter ice road. The Northern Climate ExChange analyzed potential adaptations that could be used to modify the road and completed a financial cost-benefit analysis. The methods used for the *Economic Implications of Climate Change for Mine Access Roads in Northern Canada* report may provide a foundation for similar studies across Canada's north (TC).



Cracks along the North Alaska Highway, 2013.

Highways

Thawing permafrost contributes to more frequent landslides and slumping that create significant road maintenance costs. Repairs to the Alaska Highway in the Kluane region average \$30,000/km or \$6 million/year—about seven times higher than average. The Alaska Highway from Destruction Bay to Beaver Creek is critical for distributing food, supplies and medical necessities to not just Yukon communities but also the interior of Alaska.

The Government of Yukon is actively researching adaptation techniques to reduce maintenance costs, increase safety and address the impact of permafrost warming on highway networks. The [Vulnerability of the North Alaska Highway to Climate Change](#) project (2012-2016), led by the Department of Highways and Public Works and the Northern Climate ExChange, is analysing permafrost characteristics in a 200 km length of highway in the Kluane region. The project's recommendations for adaptation strategies are informing the development of policies, engineering designs and maintenance plans (INAC).

The Department of Highways and Public Works is working to evaluate the effects of climate change and permafrost degradation on strategic locations, including the Dempster Highway, Mayo Airport, North Canol Road and near Beaver Creek. The [Examining Geophysical Data along Transportation Infrastructure in Permafrost Regions](#) project is leading to the development of adaptation technologies, tools and best practices. Transport Canada is contributing up to \$944,000 of a total estimated project cost of approximately \$1.3 million, under the Northern Transportation Adaptation Initiative (TC).

The Department of Highways and Public Works and the Northern Climate ExChange completed an assessment of the effectiveness of light-coloured surfacing as an adaptation to preserve permafrost along Dawson City's Front Street in 2014. Using permafrost data from the Department of Energy, Mines and Resources, the assessment will inform development of monitoring, maintenance and management decisions (TC).

The Department of Highways and Public Works has decades of experience in managing permafrost under transportation infrastructure, but changing climate has rendered some common practices less effective. ✦ Research and analysis conducted since 2009 has prepared the department to proceed with full-scale construction that includes adaptation methods to preserve permafrost. This will help limit or eliminate the highway distress currently observed in many areas as a result of permafrost thaw. This initiative will work to save money and preserve permafrost integrity.

Water

Yukon's water resources are vulnerable to climate change. Melting glaciers, thawing permafrost and other impacts are affecting water and energy systems, fish habitat and traditional ways of life.

The **Adaptive Management for Water Users** project (2009-2011) examined gaps in the collection, amalgamation and sharing of water information among water managers in responding to climate change (INAC). The publication *Yukon Water: A Summary of Climate Change Vulnerabilities* details key issues, available from www.env.gov.yk.ca/brochures.

The online service yukonwater.ca facilitates the collection and distribution of water data, including information to help water managers adapt their water programs to a changing hydrologic regime (Government of Yukon).

Since 1992, the Wolf Creek Research Basin near Whitehorse has been the base for hydrological and multidisciplinary studies conducted between the Department of Environment and various universities. Researchers recently completed a sensitivity assessment of hydrological response to climate warming and precipitation change using the Cold Regions Hydrological Model (INAC). The model is now being used to study the effect of climate change elsewhere in the territory. The **Sensitivity of Dempster Highway Hydrological Response** project (2013-2016) involving the departments of Environment and Highways and Public Works, is evaluating the response of stream crossings under different future climate scenarios (TC).

Since 2011, the Department of Energy, Mines and Resources has supported a project to increase understanding of the role of snow, glacier and permafrost thaw in Yukon River runoff. The **Characterizing Hydrological Processes in the Headwater Region of the Yukon River** project identifies significant changes in the hydrology of the headwaters as well as implications for downstream energy generation, e.g., the Whitehorse rapids hydro station. The Northern Climate ExChange, University of Alberta, Yukon Energy Corporation and the Department of Energy, Mines and Resources are collaborating on this project (NSERC).

Meteorological stations at the Llewellyn Glacier. (Yukon Research Centre, 2013)





1972

2009

St. Elias Glacier melt comparison, 1972 to 2009

YUKON WATER

Yukon's six major watersheds contain frozen water sources such as glaciers and permafrost as well as wetlands and groundwater resources. Water provides habitat for fish, plants and animals. It is also of cultural and spiritual importance, enables hunting, fishing and trapping, and supports wildlife viewing, travel, recreation, business activities, and hydroelectricity. For more information see the *Yukon Water Strategy and Action Plan*, yukonwater.ca/water-and-you/yukon-water-strategy.

FORESTS AND BIODIVERSITY

The forestry sector is not only an essential part of Yukon's economy, but forests themselves provide a carbon sink and support biodiversity. Climate change affects forest health, however. The Government of Yukon has completed several forestry research projects and is undertaking further research including:

- The **Assessing the Vulnerability to Climate Change and Adaptive Capacity of Yukon Forest Tree Species and Ecosystems** project (2008-2011) examined how forests in Yukon are vulnerable to climate change to inform effective responses.
- **Forest Vulnerabilities and Developing Resilience Enhancement Strategies through Long-Term Community Partnerships in Yukon** (2012-2016) is a community research project based in Teslin. Community members designed the objectives and methodologies. The project's results will inform climate change adaptation strategies while the process will develop new partnerships and economic possibilities for the community. As well, the project will also yield an engagement framework that can be used by other communities in future.



The FireSmart program in action.

CARBON SINK

The removal of carbon from the atmosphere occurs through natural and artificial methods. In the natural process of photosynthesis, for example, plants absorb carbon dioxide from the atmosphere and store the carbon as biomass.

- To date there are three projects looking at mountain pine beetle impacts: **Mountain Pine Beetle Pest Risk Analysis** (2012), **Mountain Pine Beetle Monitoring Plan for Yukon Lodgepole Pine Forests** (2013-2018), and **Mountain Pine Beetle in Novel Habitats: Predicting Impacts to Northern Forests in a Yukon's Warming Environment** (2012-2016). The novel habitats work seeks to better understand the vulnerability of Yukon pine trees to mountain pine beetle and provide foresters with management steps to decrease the impacts and mitigate the spread of the beetle northwards. Project work is led by the Department of Energy, Mines and Resources and the University of British Columbia (INAC).
- The Government of Yukon uses the **FireSmart** program to protect communities by reducing forest fuel loads. An estimated 1100 hectares of land has been treated since 1999. In 2014 alone, \$830,000 was spent on clearing brush and thinning trees around communities. This Department of Community Services program increases the resilience of community residents at risk of wildfire events, which are increasing as a result of a warming climate. Firesmart also promotes awareness of the shared role of homeowners, communities and governments to lessen the potential effects of wildfire.



Forest affected by spruce beetle, Kluane region.

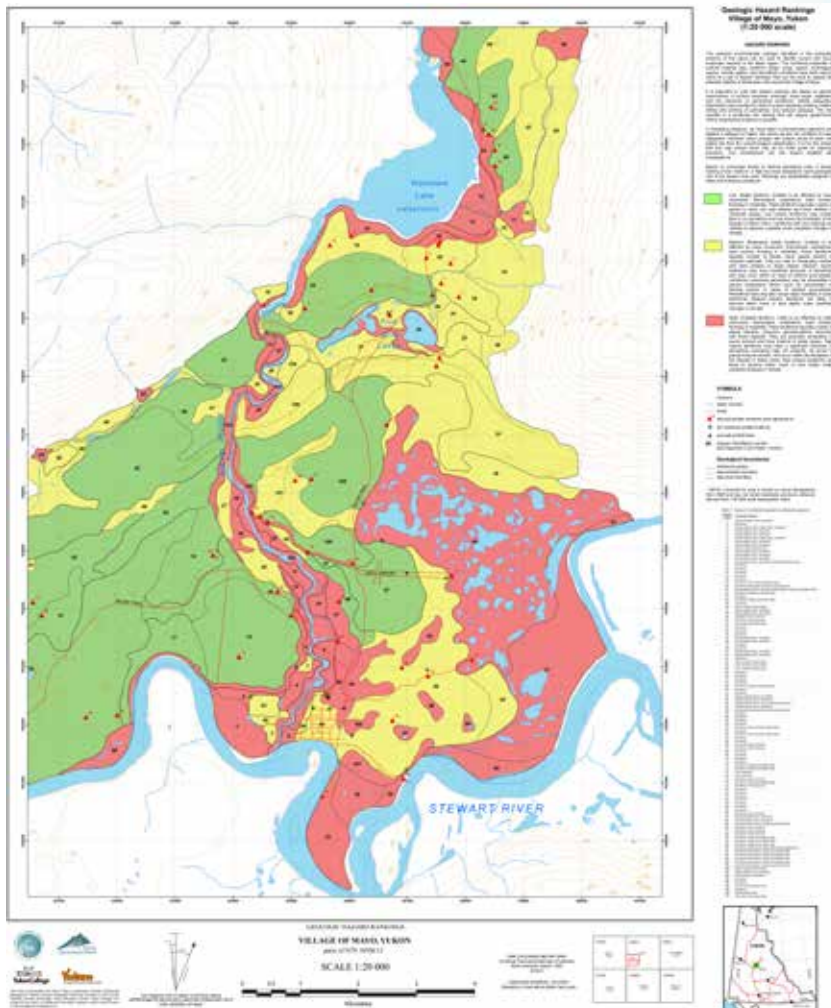
- Bioclimatic ecosystem classification is a fundamental tool for creating projections of future ecosystem changes. The Department of Environment's **Development of Bioclimate Envelopes** project (INAC) described and mapped the climatic variables that drive contemporary (modern day) ecosystem development within a particular Yukon landscape. This data informs resource and land use planners in dealing with ecosystem changes.
- The Canadian Council of Forest Ministers, with input from many partners including the Government of Yukon's Forest Management Branch, developed a guidebook for forest practitioners to help them integrate climate change considerations into their management practices. *Climate Change and Sustainable Forest Management in Canada: A Guidebook for Assessing Vulnerability and Mainstreaming Adaptation into Decision Making* was released in June 2015. The publication is available at www.ccfm.org.



Digging a soil pit to help characterize a grassland site in the Southern Lakes subzone of the Boreal Low.

PLANNING

Climate change affects how we manage land, plan for community challenges and opportunities and respond to possible emergencies. Exploring the development of a standardized approach for climate change modelling will assist with planning efforts to help Yukoners respond to climate change.



Hazard map illustrating the state of permafrost in Mayo. (Yukon Research Centre, 2014)

Mapping Hazards

The Department of Energy, Mines and Resources is working with the Northern Climate ExChange and other partners to complete landscape hazard maps in Yukon communities. Hazard maps help community members understand how their land may respond to environmental change and where risks might exist, which in turn can inform their future decisions. Hazard maps have been completed for Mayo, Pelly Crossing, Burwash Landing, Destruction Bay, Dawson, Faro and Ross River. Hazard maps for Old Crow will be completed in March 2016 (INAC). More information is available at yukoncollege.yk.ca/research.

LANDSCAPE HAZARD MAPPING

Surficial geology, permafrost and water data, combined with future climate projections, allow natural hazards present across the landscape to be categorized according to risk level. The maps and accompanying reports can be used by anyone and support community adaptation strategies and emergency response planning.

Community Adaptation

Community adaptation plans provide information to residents about the climate change risks specific to their area and can inform decisions that aim to reduce those risks. The **Community Climate Change Adaptation Project** and associated reports evaluate challenges and opportunities, identifies adaptation options and creates pilot projects. Led by the Northern Climate ExChange, researchers, scientists and community members, community adaptation plans were completed in 2006-2012 for Atlin, Dawson City, Mayo and Whitehorse (NST). Pilot projects that resulted from these plans include Whitehorse homesteading workshops, the Dawson City community greenhouse and the Mayo farmers' market.

The **Our Towns, Our Future** initiative aims to better understand and address the challenges of municipal sustainability. Following a Yukon-wide consultation in 2010, communities identified climate change as one of their priority issues. Building on this work, the Department of Community Services is exploring opportunities to address this issue including:

- Encouraging municipalities to engage with the Government of Yukon's Energy Branch to develop community energy plans. These involve calculating energy use, evaluating potential energy generating opportunities, projecting energy consumption and costs 20 years into the future, and proposing a strategy to balance costs while benefiting from possibilities.
- Encouraging municipalities to participate in a workshop on municipal climate change adaptation to be delivered by the Northern Climate ExChange.



Permafrost core held up to the sky.
(Yukon Research Centre, 2013)

HUMAN DIMENSIONS OF PERMAFROST THAW

Understanding how permafrost thaw may affect traditional and cultural activities can help communities develop appropriate responses. From 2015-18, the Northern Climate ExChange and the University of Saskatchewan will work with community partners in Old Crow, Yukon, and Jean Marie, Northwest Territories, to identify how traditional land use activities may be affected by permafrost thaw. Together they will identify community concerns related to landscape change and identify potential adaptation options. Community members and researchers will co-develop a process for incorporating Traditional Knowledge and science into northern Aboriginal community planning (SSHRC).



Flooding at Marsh Lake in 2007.

Emergency Preparedness

Climate change is increasing the risk of catastrophic flood events. The **Yukon Flood Risk Mapping** project uses elevation modelling to identify where and how Yukon communities may be at risk for flooding. Using light detection and ranging (LIDAR) surveys, the Department of Community Services acquired detailed digital elevation data around lakes and rivers for 13 communities throughout 2014-15 (INAC).

◆ The Emergency Measures Organization along with Department of Environment are engaged in a pilot project to evaluate the use of LiDAR and historic water level data for community flood hazard mapping. It is envisioned that the methods and standards developed through this pilot will lead to publicly accessible flood hazard maps for Yukon communities at-risk of flooding.

Another emergency response initiative saw the Department of Community Services facilitate emergency management planning for municipal and First Nation governments. Started in 2014, the **Rural Disaster Resiliency Planning** pilot project with the Little Salmon/Carmacks First Nation and the Village of Carmacks incorporates planning for climate change related hazards such as forest fires and floods.

Climate Change Modelling and Projections

Examining the important drivers of climate—such as atmosphere, oceans, land surface and ice—helps researchers develop potential climate scenarios to assist with future planning work. To enhance its modelling capabilities and ability to use the results, the Government of Yukon is taking the following actions:

- ◆ The Department of Environment will work with partners to explore and develop a standardized approach to modelling climate changes. Currently, researchers are using different modelling services which makes it challenging to compare trends and projections.
- ◆ The Department of Energy, Mines and Resources will work to develop guidelines for mine sites that will require long-term climate modelling. Information on changes in precipitation, temperature and permafrost degradation will help determine the projected effect on retaining infrastructure, including tailings storage facilities, for the 50 years following a mine's closure.

PUBLIC HEALTH

A warming climate has a variety of implications for the physical, emotional, and cultural well-being of Yukoners. There are direct and indirect health risks associated with extreme weather events, natural hazards (such as forest fires, flooding and ice instability), and shifting ecosystems and natural landscapes. The **Climate Change and Public Health** project identified current and future health impacts that could result from climate change in Yukon, along with priorities and gaps in knowledge and resources. The project, developed by the Climate Change Secretariat in 2013-2014, was reviewed in partnership with the Northern Climate ExChange and the Council of Yukon First Nations (PHAC).

FOOD SECURITY AND AGRICULTURE

Changes in climate can affect food production areas and food supply methods. The impacts of climate change on food security and agriculture can be both positive (increased length of the growing season) or negative (increased risks to food transportation networks). Long-term ecosystem shifts may also affect access to hunting and fishing, along with the availability of fish and country food.

★ The Government of Yukon's Interdepartmental Food Security Working Group was established as part of its *Wellness Plan for Yukon's Children and Families*. The group is currently identifying departmental interests in food security and identifying next steps. In 2016, this group will release its summary report. The following departments are represented on the working group: Environment, Health and Social Services, Economic Development, Community Services, Energy, Mines and Resources, and Education.



WHAT IS FOOD SECURITY?

Access to sufficient, safe and nutritious food is critical in order to maintain a healthy and active life. *The Whitehorse Community Adaptation Project Plan (2011)* identified food security as a major community risk that could result from changes in climate.



Community greenhouse
in Dawson City.

The Department of Energy, Mines and Resources regularly invests in agricultural infrastructure and efforts to support production of Yukon-grown food. Climate change-related initiatives include:

- Developing a draft *Local Food Strategy* to encourage production and consumption of Yukon-grown food in response to vulnerabilities associated with depending on outside food sources.
- Conducting the **Effects of Melting Permafrost on Agriculture Capacity** project (2012-2016) to identify and model permafrost affected agricultural areas around Dawson City, central Yukon, Haines Junction and Whitehorse/Southern Lakes. The information gathered will help current and future Yukon farmers adapt their agricultural practices to changes in permafrost conditions. The Department of Energy, Mines and Resources is doing this work in partnership with Agriculture and Agri-Food Canada (INAC).
- Supporting increased local food production by creating and/or expanding community markets, purchasing specialized farm equipment and funding efficiency upgrades for irrigation systems. Program funding was provided by the Canada-Yukon Growing Forward Agreement. The goal is to decrease the need to transport food directly from other jurisdictions.
- Developing a school resource to help students look critically at sustainable agriculture in Yukon, adaptable for Grades 8 to 12 science, geography, environmental or social studies curricula.

The Government of Yukon has advanced its adaptation work since 2009 by increasing the variety of government departments involved and the number of subject areas studied. The government continues to focus on partnership development, while enhancing its ability to reach out to citizens and decision makers most impacted by climate change.

As part of its ongoing efforts to improve adaptation efforts in Yukon, the government will undertake the following actions:

- ✦ The Climate Change Secretariat, in collaboration with the Yukon Bureau of Statistics, will undertake a survey of Government of Yukon employees to: understand employees' organizational awareness on climate change; determine the current level of implementation on adaptation needs; and gain insights into the key issues, barriers, and opportunities for enhanced action.
- ✦ The Climate Change Secretariat will conduct a gap analysis to better understand how the government is responding to Yukon's adaptation needs. It will explore potential new subject areas, partnerships, funding opportunities, and best practices from other jurisdictions.

GOAL 3

REDUCING GREENHOUSE GAS EMISSIONS

The impacts of local, national and international greenhouse gas (GHG) emissions are acutely felt in northern regions. Reducing greenhouse gas emissions— both from government internal operations and from key sectors across the territory— is one of the Government of Yukon’s four climate change goals. Efforts to reduce GHG emissions are also known as “mitigation”.



As of 2013, Yukon accounts for less than one per cent of Canada’s overall GHG emissions. According to high-quality local data, per capita emissions in Yukon in 2013 were 16.1 tonnes per person.

Greenhouse gas emissions are just one of the pollutants driving climate change. The most well-known GHG, carbon dioxide (CO₂) accounts for the majority of the human caused emissions. Because CO₂ lasts for decades to centuries in the earth’s atmosphere, lowering CO₂ emissions now will help to reduce long-term negative impacts.

But emissions of short lived climate pollutants (SLCPs) also contribute to climate change. These have a relatively short lifetime in the atmosphere—a few days to a few decades. SLCPs are methane, black carbon, hydrofluorocarbons (HFC) and tropospheric ozone. SLCPs are generally much more potent than CO₂; methane, for example, is 25 times more harmful than CO₂ over a 100 year lifespan, or 56 times more potent over 20 years. A reduction in SLCP emissions has the potential to significantly impact the rate of changes we see in Yukon. SLCP mitigation activities include:

- Rebate programs for efficient woodstoves or pellet burners (reducing black carbon from wood smoke),
- Reducing diesel use in vehicles or fueling generators (black carbon),
- Rebate program for building energy efficient new homes and improving the energy efficiency of existing homes (black carbon)
- Addressing leaks from oil and gas activity (methane), and
- Retiring old fridges properly (HFCs).

More information is needed both on the sources of SLCPs in Yukon as well as ways to reduce them. See page 8 for more information about SLCP research in Yukon.

© REDUCING EMISSIONS FROM GOVERNMENT OF YUKON OPERATIONS

Since 2009, when the Government of Yukon first set out its mitigation approach, the focus has been on reducing emissions from its internal operations, in part to demonstrate leadership. Government operations account for approximately six per cent of total GHG emissions in Yukon.

The following targets were set in both the 2009 *Climate Change Action Plan* and the 2012 *Progress Report* for government internal operations:



By 2015, reduce emissions by 20 per cent below 2010 levels



Work toward becoming carbon neutral by 2020



By 2015, reduce emissions from government light fleet operations by five per cent



By 2020, meet 20 per cent of government space heating needs with clean energy sources

The government has been working hard not only on mitigation actions but also on tracking, measuring, and reporting on the outcomes of those actions.

TRACKING, MEASUREMENT, AND REPORTING

The Government of Yukon measures and tracks not just its energy use but also fugitive and biogenic emissions from landfills, refrigeration, mobile air conditioning and other sources. This work is neither fast nor easy as it involves dozens of projects across many departments, and in a wide variety of subject areas. It is important, however, because it allows the government to realize which projects are succeeding and better understand which areas need further attention—all in an objective and measurable fashion. Systems that help track government energy use include:

- **Public Building Energy Tracker:** The PBET helps measure the fuel and electricity consumption associated with Government of Yukon buildings. The heating of buildings is a major source of GHG emissions for both government and residents/businesses, so understanding current fuel usage helps inform efficiencies.
- **Inter-Departmental Project Energy Tracker:** The iPET database was developed in 2014 with the aim of improving energy efficiency in all government projects. The database allows the impact of these projects to be calculated as well as determine if and how they're helping government reach its targets. It also prevents duplication of effort and encourages work in areas that are not being addressed.
- **Energy and Water Meters:** Tracking systems are being installed in four schools – Selkirk Elementary, Hidden Valley Elementary, Holy Family Elementary, and Robert Service School in Dawson. Data will be available to building managers, students and teachers to inform them about areas for potential improvement.
- **The Climate Registry:** TCR is an independent organization that helps the Government of Yukon track and report GHG emissions from its own operations. TCR verified data is available for 2010, 2011 and 2012. theclimateregistry.org

Definition

“Biogenic” means produced by living organisms or biological processes. The term “fugitive”, when applied to emissions, refers to unintended release of gases from equipment.

The Government of Yukon will know if it has reached its 2015 internal GHG emissions goals in 2017. It typically takes about 18 months to complete the work of gathering annual energy and fuel consumption data, calculating the associated GHG emissions, inputting to TCR's reporting system, working with a third party verifier to ensure accuracy, and seeing the data published by TCR. This work has been completed for 2010 to 2012.

For 2012, the government reported 40.7 kilotonnes of calculated and verified GHG emissions via TCR; this represents a 2.3 percent reduction from 2010 emissions (41.6 kilotonnes).

Due to changes in government's GHG inventory and reporting system, updated reporting for 2013 is still underway. Preliminary analyses show that, when compared to 2010, 2013 emissions from government operations have increased by 0.3 kilotonnes to 41.9 kilotonnes¹. This data is subject to revision.

As part of its mitigation goal, the Government of Yukon committed to work toward becoming carbon neutral by 2020. Efforts have begun on developing options for achieving carbon neutral government operations.

¹ Despite procedural rigours, 2013 estimates are not strictly comparable to 2010 figures due to changes in the inventory and reporting system. Estimates by department and emission source may exhibit variability from year to year due to these changes.

GOVERNMENT OF YUKON GREENHOUSE GAS REDUCTION ACTIVITIES

This section details the progress made on the government's original mitigation commitments as well as additional actions undertaken in response to evolving needs. Finally, new actions are set out that will further the Government of Yukon's efforts toward cleaner and greener government operations.

The government's GHG emissions arise mostly from transportation activity and building operations. Focusing attention in these areas will yield the best mitigation results.

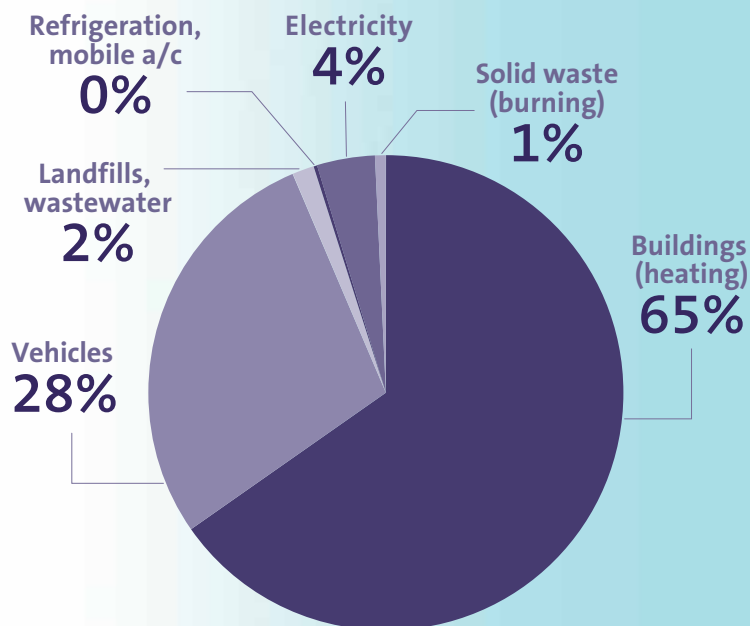
Reducing Emissions from Transportation Activity

Government of Yukon fleet vehicles (light, medium, and heavy) constitute approximately 28 per cent of total government GHG emissions.

In 2012, the government's Fleet Vehicle Agency (FVA) implemented an internal policy for purchasing light fleet vehicles that emphasises environmental stewardship in purchasing decisions while ensuring fiscal responsibility. Anticipating the effects of this policy, the following target was set: by 2015, reduce emissions from Government of Yukon light fleet operations by five per cent.

Since 2012, the government's light fleet has become more fuel efficient through procurement decisions within FVA's vehicle replacement program; between 2012/2013 and 2013/2014, there has been a two per cent decrease in the volume of fuel consumed per 100 km; this equates to a two per cent reduction in GHG emissions intensity for light fleet operations. However, total fuel consumption increased three per cent over the same period of time, due to a five per cent increase in kilometers driven; this equates to a three per cent increase in total GHG emissions from government's light fleet operations since 2012.

Yukon Government GHG Emissions 2012
TOTAL VERIFIED EMISSIONS



✦ The Fleet Vehicle Agency is replacing old and inefficient vehicles with more efficient vehicles, enabled by an increase in the 2015/16 capital spending limit from \$1.2 million to \$3.9 million. This initiative will lead to a reduction in GHG emissions.

✦ The Department of Highways and Public Works will also move forward on a pilot program to install a new monitoring system in a sampling of its heavy and medium-duty fleet. The Fleet Management Information System will ensure vehicles are properly maintained and operated for optimum performance and efficiency, the system will track routes, maintenance needs, speed, and idle time. Other jurisdictions have reduced fuel use and GHG emissions based on data from the monitoring system.

Reducing Emissions from Buildings

Reducing GHG emissions from over 550 government buildings requires a broad spectrum of measures. The Government of Yukon's approach includes the following:

- tracking energy use and GHG emissions to understand if, how, and where progress is being made,
- reducing energy use through new information technology,
- performing energy audits on specific buildings to identify how performance can be improved through energy efficient retrofits,
- establishing modern building practises to enable energy efficient builds for new facilities, and
- studying, developing and implementing efficient heating system technologies, including renewable energy sources.



New high-efficiency standards for Government of Yukon construction projects will significantly reduce greenhouse gas emissions.

◆ In addition to the approaches above, the Department of Highways and Public Works (HPW) will be developing an information campaign targeting government staff to encourage energy literacy and reduced energy use in Government of Yukon buildings. ◆ To support employees' effective understanding of their department's emissions trends and opportunities for GHG reductions, HPW will transfer budgets and billing for utility payments to individual departments and agencies.

Tracking energy use

The government uses the Public Building Energy Tracker to monitor and report fuel and power consumption of each government building, which in turn determines GHG emissions. In addition, HPW is now using new portfolio management software and is assessing the condition of buildings over 100 m² in size. The resulting database can be utilized to identify projects within the building portfolio with potential energy efficiency benefits.

Reducing IT energy use

HPW's Information Communications and Technology Division is working to "virtualize" 80 per cent of the government's desktop computers, which will reduce their electricity consumption by approximately 50 per cent. HPW has already moved 95 per cent of government's server infrastructure to a virtual, central "cloud" thereby reducing the number of physical servers needed. The new servers are shared and more efficient, resulting in an energy savings of approximately 1.14 GWh/year (or about 0.3% of total electrical demand).

Energy audits and energy efficient retrofits

In the 2009 *Action Plan*, the government committed to conducting an energy analysis of all government buildings and complete energy savings retrofits. Detailed energy audits were performed on seven buildings with high energy consumption: Copper Ridge Place, Andrew A. Philipsen Law Centre, Main Administration Building, Education Building, Yukon College (Ayamdigut Campus), Elijah Smith Elementary School, and Porter Creek Secondary School.

Energy conservation measures prompted by the audits at Copper Ridge Place and the Law Centre are nearly complete. Copper Ridge retrofits include enhanced heat recovery and more efficient fan ventilation in the day care, kitchen and administration areas. Law Centre retrofits include chiller unit replacement, lighting upgrades and fan operation adjustments. These conservation measures are anticipated to reduce GHG emissions by 538 tonnes and save approximately \$220,000 in energy costs per year. The Main Administration Building will undergo upgrades to its windows and wall insulation in 2015/2016 and planning is underway for upgrades at Yukon College (Ayamdigut Campus).

One way the Department of Education is increasing energy efficiency in Yukon schools is by replacing old windows with more efficient triple pane ones, including at Teslin School, planned for 2016. ♦ As well, lighting retrofits are planned for those schools that have not yet replaced their inefficient T12 fluorescent tubes.

While it's too early to measure the full outcome of these projects, the departments of HPW, Education and others are committed to continue to assess and implement energy efficiency improvements that will reduce the Government of Yukon's environmental footprint.



Building standards for government buildings

When designing and constructing new buildings, the government aims for levels of energy efficiency that meet or exceed the National Energy Code of Canada for Buildings 2010, which is not yet a mandatory standard in Yukon.

In the 2009 *Action Plan* and 2012 *Progress Report*, the government committed to having government funded commercial and institutional construction and renovations meet or exceed the Leadership in Energy and Environment Design (LEED) Certified Standard for energy efficiency. LEED is a globally recognized brand for energy performance. As a result of this commitment, several very high energy efficiency buildings have been built: the Tombstone Interpretive Centre, the Whitehorse Correctional Centre, the Emergency Response Centre and the new FH Collins High School.

The \$70 million Whitehorse Correctional Centre was designed to LEED certification as a high efficiency commercial building. A pellet boiler system has been operating in the centre since November 2011. This large scale (950 kW) biomass heating system is estimated to produce approximately 10 TJ (Terajoules) of renewable energy per year. The new FH Collins school building has been built with the goal of achieving LEED Silver Certification. It features many energy efficiency and



The new FH Collins high school building was completed in 2015, incorporating many energy efficiency features and environmental improvements.

environmental improvements over a standard building including:

- An estimated 28 per cent less energy use than the Ashrae standard (the minimum building energy performance allowed in low rise commercial buildings in many jurisdictions),
- Covered, secure bicycle storage,
- Water efficient landscaping,
- Low water use fixtures,
- Dedicated recycling collection area, and
- Use of recycled content and low volatile organic compound-emitting materials.

The new (2014) Emergency Response Centre was also built to LEED standards.

◆ HPW is now developing a building construction best practices manual that will incorporate Yukon appropriate energy efficient design and performance and, where feasible, the application of LEED standards for future government projects. The new manual will support energy efficient building construction practices that are most appropriate for Yukon's remote and northern setting, including the use of LEED standards where appropriate.

Energy efficient buildings through clean energy sources

In the 2012 *Progress Report*, the Government of Yukon committed to meet 20 per cent of its space heating needs with clean energy sources by 2020.

Clean energy sources such as hydro-electric, biomass, solar, wind, and geothermal are available in Yukon in varying capacities to heat buildings. Examples of clean energy in government buildings include the installation of biomass boilers at the Dawson City district heating plant in 2011 (750 kW) and at the Whitehorse Correctional Centre in 2013 (950 kW).

Moving forward, the following projects will increase the use of clean energy in government buildings:

- ◆ Using the "Secondary Sales" program to optimize the use of hydro generated power during low-demand periods. Commercial/institutional buildings equipped with a second, electric boiler system use secondary sales to offset conventional fuel heating, resulting in both cost savings and reduced GHG emissions. This project is led by the Department of Highways and Public Works in partnership with the Yukon Energy Corporation. Four Government of Yukon facilities have potential to re-commence energy purchases through secondary sales starting in winter 2015/16: Yukon College (Ayamdigut Campus), including the Arts Centre and Archives buildings; JV Clark School; the Yukon Law Centre; and Holy Family Catholic School.
- ◆ Consistent with the government's proposed *Biomass Energy Strategy*, the Departments of Energy, Mines and Resources and Highways and Public Works will undertake a formal process to solicit market interest in supplying biomass heat to selected Government of Yukon buildings.
- ◆ Old boilers in Yukon schools will continue to be replaced with more efficient models as required. Where appropriate, boilers operating on propane or oil will be replaced with heating systems utilizing renewable fuel sources.

Government of Yukon Green Procurement

“Green procurement” refers to the sourcing and purchasing of environmentally sustainable goods and services. In 2010, the government established a Green Procurement Policy to incorporate environmental performance considerations into goods and services procurement decisions. Resulting “green” purchasing actions include:

- choosing fuel for heating, driving and aircraft that complies with federal government environmental standards,
- ensuring all Government of Yukon departments use printer/photocopy paper containing 30 per cent post-consumer fiber,
- ensuring 90 per cent of all Government of Yukon print orders use recycled paper with vegetable based inks,
- having highway marking paint meet new environmentally preferred standards,
- stocking environmentally preferred janitorial and cleaning products, and
- implementing Fleet Vehicle Agency’s internal policy for vehicle procurement that weights fuel efficiency at 58 per cent and lowest price at 42 per cent.

Departmental Green Action Committees

Green action committees help identify, develop and implement actions that reduce the Government of Yukon’s environmental footprint, including reduced GHG emissions and increased waste diversion. The committees also foster interdepartmental cooperation, information sharing, and support. Examples of recent “green team” projects include:

- bike lockers installed at 100 Hanson Street to encourage bicycle commuting to work,
- development of a battery recycling program,
- lighting retrofits at HPW’s Policy Branch, and
- a compost and recycling program at the Main Administrative Building.

Battery recycling bin installed at the main government administration building foyer in Whitehorse.

Waste Diversion

The waste sector, which includes solid waste disposal and wastewater treatment, accounts for 0.7 per cent of Yukon’s overall GHG emissions and one per cent of the Government of Yukon’s emissions. While these are small amounts compared to emissions from the transportation and building sectors, waste diversion is an important activity.

The Government of Yukon is reducing waste from its own operations by:

- Implementing in 2013 a four-stream waste diversion system at the Main Administration Building, which has resulted in a reduction of a six-yard container of garbage each week. The departments of Justice and Environment also have their own department-wide waste diversion programs.
- Implementing a waste diversion program in 18 of Yukon’s 28 schools as well as the Department of Education administration building. ♦ Programs in remaining schools will be implemented by the end of 2017.
- Creating a battery recycling pilot program in 2015, in partnership with Call2Recycle.



REDUCING EMISSIONS FROM YUKON-WIDE SECTORS

The 2012 *Progress Report* established emissions targets for the key sectors of transportation, building, electricity, and industrial operations. Sector-specific targets are a powerful tool to coordinate action toward reducing emissions.

It is challenging to set a target because even the most sophisticated efforts to envision the future can give only a general sense of what may happen—planning exercises are never an exact science. Population growth and weather trends, for example, can influence the achievement of a mitigation target.

What targets can do is inspire and mobilize action within a sector. Targets create a tension to achieve. While many of the sector-specific targets set in 2012 are to be achieved in 2016 or 2020—beyond the date of this publication—this report tells the story of progress that may not have been made without a target to aspire to.

Transportation and building sector targets that refer specifically to Government of Yukon reductions are set out in the “Reducing Emissions from Government of Yukon Operations” section.

TRACKING, MEASUREMENT, AND REPORTING

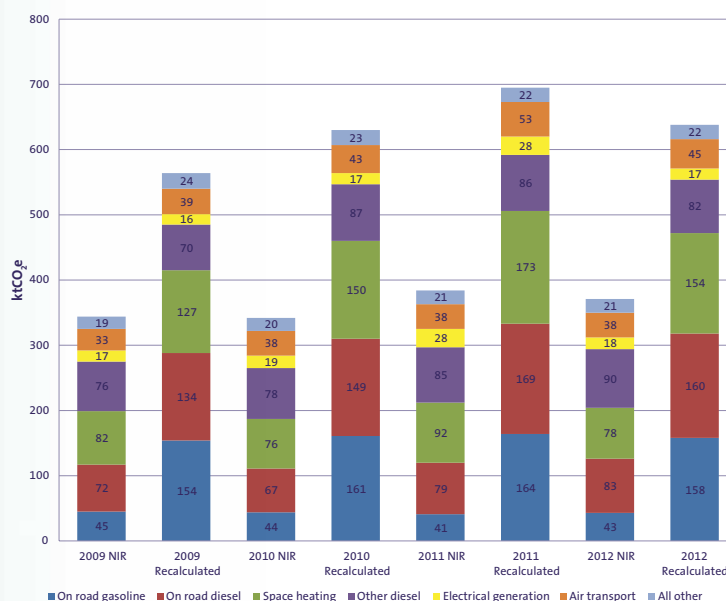
In 2013, the Climate Change Secretariat commissioned a study to identify options to reduce GHG emissions from transportation. The *Yukon Transportation Sector Study* examined all available data, including Statistics Canada data used in Environment Canada’s National Inventory Report, fuel tax data from the Department of Finance and weigh station data from the Department of Highways and Public Works.

The study found that Statistics Canada data does not accurately capture fuel imports from Alberta, as well as imports from and through Alaska. As a result, Yukon GHG emissions were considerably underreported in Environment Canada’s analysis for the period 2009 through 2012.

The Yukon Bureau of Statistics is working with Statistics Canada to address these data issues. Until Environment Canada’s analysis accurately reflects Yukon’s fuel usage, the Climate Change Secretariat, Yukon Bureau of Statistics and Energy Branch of Energy, Mines and Resources will work together to produce energy use and GHG emission reports.

Data assertions used in this Progress Report are based on the more accurate data available in Yukon, not the data used by Environment Canada.

Figure 1: Comparison of Overall National Inventory Report Yukon Emissions with Re-Calculated Yukon Overall Emissions, 2009 through 2012



Sources: 2014 NIR, Yukon Department of Finance, special data request November 21, 2014, Statistics Canada, CANSIM 405-0002 and 128-0012, and Yukon Bureau of Statistics



Winter commuting

YUKON-WIDE GHG REDUCTION ACTIVITIES

Many of the efforts related to the government's internal operations that were described earlier in this report also contribute to GHG reduction within Yukon's key sectors. These are not noted below to avoid repetition. The baseline year for all Yukon-wide targets is 2012 unless otherwise noted.

Transportation

2012 *Progress Report* target: By 2015, reduce emissions in the transportation sector by 10 per cent.

In 2013, the most recent year for Yukon-wide data, transportation emissions were 9.74 per cent lower than 2012 levels. As noted earlier, the government will not know whether the 2015 target is reached until 2017 due to the time lag associated with gathering data. However, data show that emissions from all methods of transportation have been decreasing since the peak in 2011. Based on significant decreases in on-road gasoline and diesel activity, there is one kt CO₂e to go to reach the 2015 target.

Figure 2. Yukon transportation emissions 2009-2012 and target for 2015



Sources: Yukon Department of Finance, special data request November 21, 2014, Statistics Canada, CANSIM 405-0002 and 128-0012, and Yukon Bureau of Statistics

The *Yukon Transportation Sector Study* found that in Yukon in 2012:

- Transportation activity accounted for 57 per cent of total GHG emissions.
- On road gasoline use was responsible for 25 per cent of total GHG emissions.
- On road diesel use was responsible for another 25 per cent of total GHG emissions.
- When combined, on road gasoline and on road diesel use sources accounted for 87 per cent of sector GHG emissions.
- Jet fuel, aviation gasoline and off-road gasoline contributed to 13 per cent of Yukon's transport emissions, or seven per cent of total emissions.

These findings are supported by Canadian Census data, which shows that the majority of Yukoners use personal single occupancy vehicles as their means of transportation to and from work.

Definition

kt CO₂e stands for “kilotonnes of carbon dioxide equivalent”. This measurement helps us measure and communicate a variety of greenhouse gases using one measurement. CO₂e compares the emissions from various greenhouse gases based upon their global warming potential. For example, one million metric tons of methane is equivalent to emissions of 25 million metric tons of carbon dioxide.

Completed, ongoing or planned activities to reduce transportation emissions territory-wide include:

- **✦ Ridesharing:** The Department of Environment is partnering with the City of Whitehorse on a Yukon ridesharing program that will start in Spring 2016. The service will let registered users connect online with others interested in saving on fuel and vehicle maintenance costs, as well as reducing their GHG emissions.
- **✦ Research:** In 2014, the Government of Yukon and the City of Whitehorse conducted a pilot survey to identify trends in and options for alternative transportation action with municipal and territorial government staff. The data will be used to develop a toolkit of actions most relevant to those staff. Once this toolkit has been developed, a full-scale survey can be launched.
- **Free transit for high school students:** The Department of Education provides free bus passes to Whitehorse high school students. By taking transit to/from school, they become familiar with public transport.
- **Free transit for college students:** Yukon College, the Yukon College Student Union, and the City of Whitehorse started providing free transit passes in 2013 to full-time students as part of the Yukon College Transit Initiative. The program is still in operation.
- **Emission Controls:** The *Environment Act* prohibits tampering with motor vehicle air emission control systems.

Buildings and Energy Efficiency

2012 *Progress Report* target: By 2016, increase the average energy efficiency of new residential, commercial and institutional buildings constructed outside of Whitehorse by 25 per cent when compared to buildings constructed to 2011 energy efficiency standards.

Energy efficiency changes to the National Building Code of Canada are expected to be adopted soon. The increased insulation requirements for residential, small commercial and small industrial buildings under Section 9.36 will help to lower emissions associated with heating buildings. After an extensive review of the impacts of the new standards on residential construction, and recommendation of amendments appropriate to the Yukon circumstances, it is anticipated that section 9.36 of the National Building Code will be readopted in April 2016.

2012 *Progress Report* target: By 2020, reduce the emissions intensity of existing residential, commercial and institutional buildings across Yukon by five per cent.

Based on fuel consumption data for existing buildings in Yukon between 2012 and 2013, total emissions (kt CO₂e) were reduced by three per cent while the total number of buildings increased by four per cent. Combining both the heating fuel and electrical energy used, the average intensity decreased from 0.093 kt CO₂e/building to 0.074 kt CO₂e/building (a 20 per cent reduction), surpassing the 2020 target of 0.088 kt CO₂e/building.

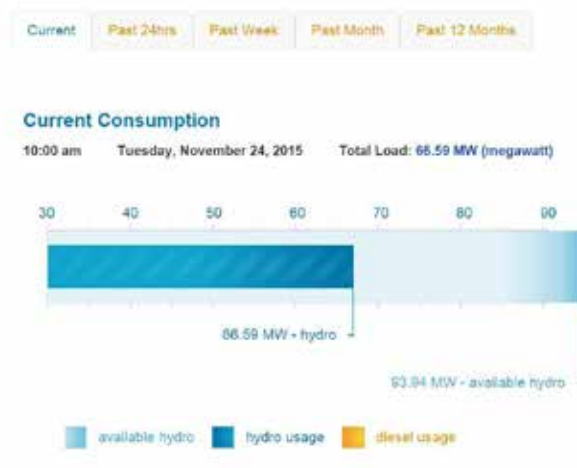
Actions to address energy efficiency in both new and existing buildings across Yukon include:

- **Energy efficient home construction:** The Yukon Housing Corporation continues to conduct research, train builders, and build high energy efficiency homes. The corporation has built 172 new highly energy efficient housing units since 2012, bringing the total number of EnerGuide 85 (or better) rated units to 224. This work not only reduces the Government of Yukon's energy costs and GHGs for new buildings but also improves occupant comfort and indoor air quality, reduces maintenance costs, and has set a new standard (and examples) for industry to follow.

- **Mandatory labelling:** The Yukon Housing Corporation with the City of Whitehorse developed a mandatory energy labeling system for new houses. As of January 2015, all new houses must include an information label communicating performance measures such as total expected energy use and fuel consumption by fuel type. It is anticipated that this initiative will become a standard tool for real estate professionals, home owners, and builders.
- **Residential Incentives:** The Government of Yukon's new **Residential Energy Incentive Program** encourages homeowners, homebuilders and general contractors to design, construct, and retrofit homes to a high standard in energy efficiency. Between January and July 2015, the program saw 34 new homes built to EnerGuide 85 or better. Estimated annual energy savings are 176,800 kWh with an annual cost savings of \$30,600.
- **Commercial Incentives:** The Government of Yukon's **Commercial Energy Incentive Program** is aimed at improving energy use in multi-family dwellings and commercial buildings. Launched May 1, 2015, the program helps building owners retrofit their buildings to improve energy performance and reduce energy consumption, costs and emissions. It also encourages owners to upgrade to energy-efficient and long-lasting LED lighting systems. In its first summer, the program has led to upgrades to LED lighting in 10 commercial buildings and should result in future annual energy savings estimated at 1,188,000 kWh and annual cost savings estimated at \$142,500.
- **Wood Energy:** In 2009, the Government of Yukon committed to develop wood energy opportunities for residential and institutional heating. Work is underway on a draft *Biomass Energy Strategy* to examine and optimize the use of Yukon-harvested wood as a heat source to offset GHG emissions from fossil fuel derived sources of heat.

Yukon Energy's electricity consumption chart, found on their website www.yukonenergy.ca, indicates the sources of electricity being consumed at any given time.

Current Energy Consumption



Electricity generation – emission intensity

2012 *Progress Report* target: By 2020, reduce the emission intensity of on-grid diesel power generation by 20 per cent.

Although more than 95 per cent of Yukon's on-grid demand is met by renewable hydro-generated electricity, peak periods are supplemented by diesel generators, especially in winter. Yukon still has seven off-grid communities (Watson Lake, Upper Liard, Beaver Creek, Old Crow, Destruction Bay, Burwash Landing and Swift River) that use only diesel to light and heat their homes and businesses.

TEMPERATURE TRENDS AND IMPACT ON ENERGY DEMAND

The Department of Energy, Mines and Resources and the Yukon Energy Corporation have identified potential risks and opportunities for Yukon's energy sector as a result of moderating winter temperatures. The report identifies reduced heating demand despite a growing population as a central outcome, but one that will depend on effective management of energy consumption (NRCan).

Since 2012, the emissions intensity of on-grid diesel power generation has decreased by nearly five per cent. This decrease is in part due to the unusually high diesel use in the baseline year of 2011/2012 during major capital works in Mayo and Aishihik, which subsequently fell as the work was completed. Since 2012, the average consumption rate for diesel (L/kWh) has also decreased, leading to an associated decrease in emission intensity.

Liquid natural gas (LNG) is a new fuel source for electrical power production in Yukon. At point of combustion, natural gas produces fewer GHG emissions than diesel when fugitive emissions are carefully managed. Current LNG activity in Yukon includes:

- The Yukon Energy Corporation replaced two diesel generators with LNG generators in 2014. Currently, LNG is sourced from British Columbia.
- Off-grid mines in development, such as the Casino project, are looking to LNG as their source for both electrical energy and heavy equipment operation.
- ATCO Electric Yukon had an LNG facility licensed in Watson Lake but has not yet proceeded to construction.

Electricity generation – demand-side management

2012 *Progress Report* target: By 2016, reduce on-grid electrical energy use through demand-side management programs by 5 GWh.

In October 2014, the Yukon Energy Corporation and ATCO Electric Yukon launched their “inCharge” Demand Side Management Program. Demand side management encourages consumer energy efficiency behaviours through, for example, financial incentives and educational programs. The inCharge program offers rebates for energy efficient LED lighting and block heater timers, as well as energy saving kits. Estimates prepared for the Yukon Utilities Board suggest that by 2016, net savings from the current demand side management programming will amount to 1.1 GWh. The introduction of additional Demand Side Management program elements would achieve even greater savings.



Wind turbine, Whitehorse.

Ongoing efforts to reduce electricity sector emissions include:

- **Diesel Task Force:** The Government of Yukon is part of a Pan-Canadian Task Force trying to reduce the use of diesel fuel to generate electricity in remote communities. The task force will release a joint report outlining current efforts, initiatives under consideration (e.g., grid connection), opportunities for collaboration and next steps.
- **Improved hydro capacity:** Since 2009, hydro-generated electricity has increased by about 184 TJ (about 22 per cent) as a result of both the Mayo B hydro facility and the addition of a third turbine at the Aishihik hydro facility. These systems have the potential to add an additional 13 TJ of renewable electricity to the grid, as required.
- **Planning new hydro:** The Yukon Development Corporation is examining long-term electrical energy demand for the 20-50 year horizon through the Next Generation Hydro project. It is anticipated that potential sites for consideration will be proposed by the end of 2016.
- **Switch to solar:** Northwestel installed a remote station solar/diesel hybrid power generation unit as a pilot at its microwave site by Engineer Creek in north Yukon in summer 2013. Since then, it has installed three more 10 KW solar power systems at similar remote locations and plans to add more in future.
- **Wind research:** The Department of Energy, Mines and Resources continues to explore wind options through its **Wind Prospecting Service**. Now in its sixth year, the service provides valuable data that contributes to the development of wind power opportunities.

- **Wind power:** The Kluane First Nation is planning to install three wind turbines to provide about one third of Burwash Landing and Destruction Bay's electricity needs. The Government of Yukon is committing \$1 million to the project through the Kluane Community Development Corporation.
- **Large scale power producers:** The Government of Yukon has adopted the **Independent Power Production Policy** which aims at enabling independent, non-utility electricity producers to sell electricity to Yukon's two public utilities through renewable energy technologies, such as wind power, micro-hydro, biomass and solar electric (or photovoltaic) systems.
- **Small scale power producers:** The Government of Yukon's **Microgeneration Policy** enables individuals and businesses to install electrical generating systems and connect them to the grid. The electricity generated is consumed on site and any surplus can be sold into the grid. Since it was announced in October 2013, 12 microgeneration systems have been installed which are expected to generate 41,000 kWh per year.
- **Energy efficiency incentives:** The **Fridge Retirement Program** offered through the Energy Solutions Centre and Yukon Energy has retired 697 appliances as of March 2015, realising an estimated 1,157,000 kWh in lifetime energy savings and \$139,000 in lifetime client energy cost savings.
- **Heating incentives:** The Government of Yukon's Good Energy Rebate Program offers rebates for energy and resource efficient wood stoves, wood pellet boilers, and solar domestic hot water systems. Since 2009 a total of 594 rebates were issued, with the wood and pellet heaters representing an estimated 35 TJ of renewable energy produced.

- **Energy Plans:** EMR's Energy Branch is working with Yukon communities to develop Community Energy Plans. The process inventories the energy use of the administrative and residential sectors, projects energy consumption and its cost 20 years into the future, evaluates potential energy generating opportunities, and proposes a strategy to balance costs while benefiting from new economic possibilities. Faro's plan was prepared in 2013 and Old Crow's plan is well underway.
- **Solar heating:** New solar heating systems were installed at five community pools throughout the territory in 2015. They are expected to produce up to 70 per cent of the core heating requirements for the pools, displacing fuel costs and reducing GHG emissions.

Solar panels installed as part of the Government of Yukon's Microgeneration Policy.



Industrial Operations – Energy Intensity

2012 *Progress Report* target: By 2016, reduce the electrical energy intensity of industrial operations, including mines, which were operating in 2011 by 15 per cent.

This target is expected to be met. The electrical intensity of both on-grid and off-grid mines that were in operation in 2011 has been reduced by over 15 per cent. Based on the latest available data from 2013, overall mining production went up between 2011 and 2013, while electricity use went down, and as a result, electrical intensity was reduced. The most significant decreases are seen in off-grid mining operations, with estimated fuel use reductions of over 50 per cent. The approximately 15 per cent reduction in electrical intensity for on-grid mines is partly the result of the suspension of operations at Alexco's Keno Hill (specifically the Bellekeno Mine) in August 2013.

The target was established in conjunction with the introduction of an energy audit service, an initiative led by the Yukon Energy Corporation (YEC). In 2011 and 2013, respectively, YEC established an energy audit partnership with Alexco (Keno Hill) and Minto to help these mines realize energy efficiencies that both saved money and contributed to greener operations. Although there are no additional energy audits planned in the near future, this initiative has helped to pave the way for increased coordination with mining and other industrial partners in the future.

Industrial Operations – Reporting emissions

2012 *Progress Report* target: By 2014, establish reporting protocols for stationary facilities emitting over 2.5 kilotonnes of GHGs per year.

The departments of Environment and Energy, Mines and Resources (EMR) have developed a voluntary reporting protocol for large stationary facilities, i.e., electrical generators emitting over 2.5 kilotonnes of GHG emissions per year, equivalent to approximately one million litres of fuel. The protocol will be rolled out to industry in Spring 2016. Reporting will help identify conservation opportunities, helping to reduce both GHG emissions and electricity generation expenses.

Additional initiatives to reduce GHG emissions by the industrial operations sector are:

- **★ Oil and gas emissions:** EMR's Oil and Gas branch is designing regulatory directions for flaring, venting and leaks to minimize GHG emissions in the oil and gas sector. The directions are being reviewed by the Canadian Flaring and Venting Regulators Forum.
- **★ Best Management Practices:** EMR is developing Best Management Practices for resource development projects that deal with reducing the environmental impact of exploration and development.

- **Research and data collection:** The Government of Yukon accepted all 21 recommendations made by the Select Committee Regarding the Risks and Benefits of Hydraulic Fracturing in 2013. The recommendations related to GHG emissions and air quality concerns are:

- o That air quality baseline data be collected for an appropriate period of time, in order to ensure that comprehensive data is available.
- o That research be done to develop a method to effectively measure and monitor GHG emissions over the full life cycle of natural gas.
- o That research be conducted regarding fluid and gas leakage specific to the unique permafrost conditions in Yukon.
- o That steps be taken to ensure that volatile organic compounds are not released during development and production.

The government is now developing an action plan for gaining a greater understanding of the impacts and benefits of oil and gas development in Yukon. The plan, which will deal with existing activities as well as new projects, is expected to be released in 2015.

GOAL 4

LEADING CLIMATE CHANGE ACTION

The Government of Yukon showed leadership when it developed and implemented the 2006 *Climate Change Strategy* and the 2009 *Climate Change Action Plan*. It has committed to and effectively fostered collaboration at local, national, and international levels. Government leadership will help strengthen the capacity of Yukoners to address climate change. By setting clear goals and identifying desired outcomes, the government has moved forward with achieving its climate change goals.

🌀 CLIMATE CHANGE SECRETARIAT

The Government of Yukon created the Climate Change Secretariat in 2009. Its role is to lead, promote and coordinate government actions that support a healthy and resilient Yukon in a changing climate. The secretariat works with departments within the government as well as with external partners to:

- identify needs, opportunities and priorities,
- promote and support action, and
- monitor and report on progress.

Guided by the goals set out in the *Climate Change Action Plan*, the secretariat coordinates action on adaptation and mitigation activities, while enhancing knowledge and understanding.

🌀 DECISION MAKING

Decision making that incorporates climate change considerations supports a multidisciplinary approach to climate change response. Government strategies such as the *Yukon Water Strategy and Action Plan* (2014), *Yukon Forest Health Strategy* (2009), *Energy Strategy for Yukon* (2009) and *Solid Waste Action Plan* (2009) reflect climate change considerations made across several departments.

Since 2010, the **Climate Change Information and Mainstreaming Program** (CCIMP) has helped government staff and others learn how to incorporate climate change considerations into their projects. The program was created by the Government of Yukon in partnership with the Northern Climate ExChange. CCIMP also provides technical expertise, climate trends, climate change projections, adaptation project support, and vulnerability and risk assessments.

As part of CCIMP, the Northern Climate ExChange has delivered eight “Decision Making for Climate Change” courses to 100 participants and over 30 “Climate Change 101” presentations to government departments, non-governmental organizations, and various communities of practice, as well as classes and public presentations.

The CCIMP model has garnered national attention as an innovative and efficient collaboration between the research community and decision makers because it helps to bridge gaps between science and policy work.

WHAT IS MAINSTREAMING?

In the case of the Climate Change Information and Mainstreaming Program, mainstreaming means to integrate considerations associated with climate change into normal procedures and activities.

© CAPACITY-BUILDING

Sharing knowledge through training and planning opportunities empower Yukoners to take concrete actions related to the impacts of climate change. Youth engagement provides Yukoners under 30 with learning and action events that foster leadership development.

TRAINING

Since 2009, the Government of Yukon and others have offered training in order to build capacity for responding to climate change-linked issues, such as:

- **Wood Energy Technology Transfer** courses to assist professionals with the safe installation, inspection and maintenance of wood heating systems (Department of Energy Mines and Resources, three courses in 2011).
- **Advances in Lighting Techniques** course for improving design, reducing home lighting energy costs and installing effective controls (Department of Energy Mines and Resources, 2012).
- **Electric Vehicle Conversion** course for an introduction into electric vehicle propulsion (Department of Energy Mines and Resources, 2012).
- Advanced seminar on **Permafrost Engineering Applied to Transportation Infrastructure** (Cold Climate Innovation, Yukon Research Centre, 2013).
- **Solar Photovoltaic Design and Installation** one week training covering the design, installation, theory, technical requirements and hands-on experience of building a functional system (Department of Energy Mines and Resources, two workshops in 2014 and one in 2015).
- **Certified Energy Advisor** training for New Houses (Yukon Housing Corporation, 2015).
- Certified Energy Advisor training for **mandatory energy labelling** of all new homes in Whitehorse (Yukon Housing Corporation, 2015).

✦ The Public Service Commission, through its orientation course for new Government of Yukon employees, will enable information sharing on climate change issues, responsibilities, and support services through distribution of relevant materials.

Solar Photovoltaic Design and Installation Workshop, March 2015.



YOUTH

The Government of Yukon recognizes the importance of involving youth (under the age of 30) in climate change issues. It has invested considerable effort into leadership development, using innovative approaches such as:

- a **Climate Change Youth Ambassador** program that enables a young person to attend the annual United Nations climate change Conference of the Parties (COP) negotiations as part of the Government of Yukon delegation,
- the **Yukon Youth Conservation Corps**, a summer employment and training program for Yukon students (aged 16 and up), with an emphasis on environmental education and enhancement,
- the Northern Forum **Youth Eco Forum** (held in 2012),
- annual **Yukon Youth Outside the Box** forums (2007-2010), and
- annual **Youth Climate Change Conversations** events (2011-2015).



Youth Climate Change Conversations event hosted in 2015.



The Youth Conservation Corp pitches in on green projects across the Government of Yukon, including constructing a greenhouse at the Climate Change Secretariat in 2013.

© EFFECTIVE PARTNERSHIPS AND COLLABORATIONS

The Government of Yukon supports an inclusive response to the impacts of climate change at local, regional, national and international levels. To this end, it continues to work in partnership with governments, First Nations, business, industry, organizations and individuals.

The Yukon Climate Change Consortium (YC3) is a good example of this approach. It is a partnership of the Council of Yukon First Nations, Northern Climate Exchange and the Climate Change Secretariat. YC3 focuses on improving inter-agency collaboration, communication and efficiency on climate change issues.

Pan-territorial partnerships have resulted in significant accomplishments. At the 2009 Northern Premiers' Forum, the premiers agreed to have their governments work together to better understand the impacts of climate change throughout Nunavut, the Northwest Territories and Yukon and to propose concrete and practical climate change adaptation measures.

The *Pan-Territorial Adaptation Strategy*, released in 2011, has officials tasked with implementing the actions identified under the strategy. To date, the Pan-Territorial Adaptation Partnership has completed the following actions:

- shared resources and best practices for northern adaptation amongst territorial officials,
- launched a Northern Adaptation website in 2013: www.northernadaptation.ca,
- completed 26 Pan-Territorial Information Notes to inform a broad audience about climate change adaptation projects in the North: www.env.govyk.ca/infonotes,
- co-hosted the 2013 Pan-Territorial Permafrost Workshop, and
- co-hosted the 2015 National Adaptation Plenary with Natural Resources Canada.

The Government of Yukon participates in national and international events to broaden its perspective and deepen its understanding of how others respond to climate change. For example, it has regularly attended the annual United Nations climate change conference since 2005.

The government also participated with the Government of Canada in the Arctic Council's **Task Force on Black Carbon and Methane** to learn more about reducing short-lived climate pollutants that influence climate change.

PAN-TERRITORIAL PERMAFROST WORKSHOP

The workshop brought together over 200 front-line decision makers and permafrost researchers from Nunavut, the Northwest Territories and Yukon to share knowledge, form connections and look at possibilities for adaptation. Community perspectives were woven throughout the event, which included sessions on landscape, built infrastructure, transportation, oil and gas impacts and mapping. The workshop has enhanced knowledge and generated ideas for adaptation that can be applied to infrastructure-related decisions in communities across the North.



Thawing permafrost at Herschel Island.

THE ARCTIC COUNCIL AND CLIMATE CHANGE

The Arctic Council is an intergovernmental forum which addresses issues faced by Arctic governments and indigenous peoples. Member states include Canada, Denmark/ Greenland/ Faroe Islands, Finland, Iceland, Norway, Russia, Sweden and the U.S. The Government of Yukon worked with the Government of Canada during its 2013-2015 Chairmanship of the Arctic Council to support circumpolar sharing of information on important climate change issues.

SUMMARY

The Government of Yukon is actively responding to the challenges posed by climate change, both directly and by supporting the efforts by others. A wide array of actions advance progress towards four goals:

- enhancing knowledge and understanding of climate change,
- adapting to climate change,
- reducing greenhouse gas emissions, and
- leading Yukon action in response to climate change.

The original scope of research efforts has expanded since 2009 to include permafrost thaw, public health, emergency response planning and transportation infrastructure – and will soon include short lived climate pollutants.

Monitoring confirms that progress is being made towards the sector-specific targets introduced in 2012. With transportation activity accounting for 57 per cent of total GHG emissions in Yukon, mitigation efforts by individuals and organizations alike should yield meaningful results.

The Government of Yukon recognizes that climate change poses opportunities as well as serious challenges. Future development must not only contribute to the economy but minimize its contribution to global climate change, recognizing that energy use and climate change are inextricably linked. The energy efficiency and conservation projects delivered by the Energy Solutions Centre and other government departments help Yukoners to both manage their energy costs and reduce their impact on the environment.

There is growing recognition of the coordinated response led by the Government of Yukon and of the work undertaken not only by government but also the Northern Climate ExChange, Yukon College, Council of Yukon First Nations, Yukon Energy Corporation, Pan-Territorial Adaptation Partnership, Cold Climate Innovation Centre, and others. Funding from the federal government has supported dozens of research projects, and its investment in hydro generation infrastructure improvements has been of immense help in reducing emissions.

Six years into implementing the original 2009 *Climate Change Action Plan*, the majority of the government's 33 original commitments have been completed or are underway. This progress report identifies 28 new climate change actions, most focussed on mitigation and adaptation. The Government of Yukon is learning from its successes and will continue to plan for the climate change challenges the future will bring.

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