

YUKON
ENERGY



YUKON ENERGY STRATEGIC PLAN 2010-2012

JANUARY 10, 2010

FINAL

Board Chair Message

The Yukon Energy's 2010 – 2012 Strategic Plan was developed by the Board of Directors with guidance from Yukon Energy's management team. This strategy details how Yukon Energy will generate, transmit and distribute an adequate supply of cost effective, reliable electricity for Yukoners and for the growth of Yukon's economy.

Yukon Energy envisions carrying out this mandate by modernizing and making the most of our existing hydro resources while promoting responsible use of electricity and adding, as necessary, new clean electrical supply. Renewable sources include hydro, wind, geothermal and solar and some potential clean sources include biomass and natural gas.

Demand for electricity is on the rise in Yukon. Our population is increasing and our economy is growing. Some of this demand is on or near the existing transmission grids and some is off the grid in isolated areas. Customers on the transmission grid are primarily serviced by hydro generated power. Those off the grid are primarily serviced by diesel generated power. To meet increased demand both on and off the grid, this strategic plan lays out the following key priorities 1) improve reliability and efficiency, 2) generate clean energy, 3) create a buffer of new renewable energy, and 4) engage Yukoners so we can collectively create a clean energy future.

Yukon Energy's strategic priorities align and support the Yukon government's Energy Strategy and Climate Change Action Plan. By doing so, Yukon Energy is demonstrating its commitment to sustainability.

Pat Irvin
Acting Chair

President's Message

Strategic planning is a dynamic process, carried out on a yearly basis by the Board of Directors, to ensure Yukon Energy has a strong corporate vision and a set of strategic priorities for getting there.

The first strategic priority is to improve system efficiencies and system reliability. New investments and procedural changes are being put in place. In the next two to five years we hope to achieve a seventy-five percent reduction in controllable outages (unplanned and not caused by nature).

Our next priority is to meet demand with clean energy. To do so, we continue to research new projects, work to improve existing hydro facilities and work to build an integrated transmission system. Making the most of our existing assets makes good sense; this is why we are adding another turbine to the Aishihik facility and building a new power house at the Mayo site. In addition to new facilities, we are working to have an interconnected grid so that we can manage all Yukon's hydro resources as one system.

Sustainability influences everything we do at Yukon Energy; we care about the environment and we believe that energy plays a vital role towards the health of communities and the economy. This is why the strategy's third priority addresses renewable energy development and the importance of energy conservation.

Building a clean energy future for Yukon requires everyone's help. Our fourth priority is about engaging Yukoners, especially First Nations, to plan and meet future needs.

David Morrison
President

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Introduction

Annually, Yukon Energy's Board of Directors meets to develop a strategic plan that sets the course of the organization for the next two years. The board does this on an annual basis to ensure the corporation's actions are rooted in its mandate and focused on its long-term vision. This is the 2010 - 2012 strategic plan and it includes some background and contextual information, a mandate, a new vision, guiding principles, performance objectives and strategic priorities. This strategy guides the development of the corporation's yearly business plan, operational plans and budgets.

Background

Yukon Energy Corporation (Yukon Energy) is an electrical utility incorporated under the *Yukon Business Corporation Act*. Yukon Energy is a wholly-owned subsidiary of Yukon Development Corporation (YDC), a crown corporation owned by the Government of Yukon. YDC directs Yukon Energy to fulfill some of its mandate by ensuring there is a continuing and adequate supply of electrical energy in Yukon, in a manner consistent with sustainable development. Yukon Energy is also responsible for the existing hydro assets that once belonged to the Northern Canada Power Commission (NCPC) and with these assets it generates, transmits and distributes electricity. Its operations are regulated by the Yukon Utilities Board, the *Business Corporations Act*, the *Public Utilities Act* and the *Yukon Waters Act*.

Yukon Energy was established in 1987 and now supplies power to almost 15,000 electricity customers. Distribution to these customers is a shared responsibility with Yukon Electrical Company Limited. Yukon Energy's generating capacity is 124 MW of which 75 MW are from hydro facilities, 48 MW from diesel generators and .8 MW from wind. Yukon Energy's hydro system has a maximum of 75 MW of summer capacity but this capacity is reduced during the winter months to 55 - 60 MW as there is less water available in the winter for the Whitehorse hydro plant. Yukon Energy has approximately 80 employees located in Whitehorse, Faro, Mayo and Dawson City.

Yukon Energy has accomplished a great deal in the last few years with the completion of two transmission projects that now supply hydro power to Dawson, Pelly Crossing, Stewart Crossing and the Minto mine – reducing green house gas emission by more than 35,000 to 40,000 tonnes per year. Presently, Yukon Energy is working to join the company's two major transmission grids, so Yukon's hydro resources can be managed as one integrated system. In addition work is under way to enhance both the Mayo and Aishihik hydro facilities.

There is more to be done and this strategic plan outlines the rationale and priorities that will guide Yukon Energy's future actions. The following section includes the strategic plan's mandate, vision and principles.

Mandate

Yukon Energy generates, transmits and distributes a continuing and adequate supply of cost-effective and reliable electrical energy for customers in Yukon.

Vision

Yukon Energy provides a secure supply of clean electrical energy for Yukon, by focusing on renewable sources of power and energy solutions that complement the corporation's legacy hydro assets.

Principles

As Yukon Energy implements its mandate it does so by striving to:

- prioritize safety in all our actions
- optimize the utilization of existing assets for the benefit of customers
- be accountable to our customers and Yukoners
- act sustainably at all times (social, environmental, economic bottom-line)
- recognize and encourage integrity, learning, growth and development
- foster an attitude of team work
- operate with respect for one another
- be innovative when seeking energy solutions
- take a proactive approach to meeting electricity needs
- develop partnerships as required to meet electricity needs

Strategic Context

Government Policy

Yukon Development Corporation Act

The *Yukon Development Corporation Act* and its regulations direct Yukon Development Corporation (YDC) toward certain activities that the corporation has instructed its wholly-owned business Yukon Energy, an electrical utility, to undertake. In particular, the *Yukon Development Corporation Act* directs YDC to participate in the economic development of Yukon by ensuring there is a continuing and adequate supply of energy in the territory in a manner consistent with sustainable development. The act gives the corporation the power to develop and promote the development of energy systems and the generation, production, transmission, and distribution of energy in all its forms.

YDC incorporated Yukon Energy Corporation under the *Business Act* in 1987, so that Yukon Development could own and operate the electrical energy generation, transmission and distribution assets of NCPG (federal agency) for customers of Yukon. The electrical rate structure suggested by Yukon Energy is subject to the authority of the Yukon Utilities Board.

Yukon Government Energy Strategy

The Yukon government's Energy Strategy guides how energy can be produced, conserved, and used in Yukon. It promotes sustainability, energy security, self-sufficiency, optimizing benefits, climate change coordination, leadership, and partnerships. A number of priorities are listed under the headings of 1) efficiency and conservation, 2) renewable energy, 3) oil and gas, 4) electricity, and 5) energy choices.

In particular, the Energy Strategy promotes the use of renewable energy including the commitment to increase the renewable energy supply 20 percent by 2020. As well, the strategy acknowledges the need to manage demand, in order to ensure the best use of existing electricity supply. It also recognizes as the economy grows, industrial developments can lead to legacy opportunities for new renewable infrastructure.

The Energy Strategy provides direction to establish a net-metering and independent power producer policy. Net metering allows customers the ability to generate their own clean electricity, to lower the amount of electricity they buy, and to sell back any excess. An independent power producer policy will enable businesses to generate and sell electricity to Yukon Energy when conditions allow for it.

Yukon Government Climate Change Action Plan

The Yukon government's 2009 Climate Change Action Plan seeks to enhance knowledge of climate change, adapt to climate change, reduce green house gas emissions, and lead action in response to climate change. The Yukon government has set a cap on its own green house gas emission by 2010 and a target to reduce its emissions by 20 percent by 2015 with the goal of being carbon neutral in 2020.

Greenhouse gasses associated with Yukon Energy's electrical and heat generation has declined from 1990's 93.6 to 2006's 7.81 kt CO₂, eq. as a result of increased hydro generated electricity supply and the removal of diesel generated electricity from three Yukon communities and one industrial client. Moving forward Yukon is seeing trends towards more household electrical use, more commercial business activity and more industrial clients, especially in the resources industries. Typically, diesel is considered as a source of power, especially for remote locations. In general, unless conservation measures are combined with new clean or renewable energy there will be a need to burn more diesel to meet base load demand and peak demand. This would result in more emissions including carbon dioxide.

Public Utilities Act

The *Public Utilities Act* among other things defines a public utility as producing, generating, storing, transmitting, selling, delivering or furnishing electricity or gas to or for the public or a corporation for compensation. The act also defines the role of the Yukon Utilities Board (YUB) and the regulation of public utilities via a franchise. There are several Orders in Council that direct the YUB as well. One is the Rate Policy Directive (1995) O.I.C. 1995/090 that ensures Yukon Electrical Company Limited and Yukon Energy can not charge customers different rates and all Yukon residential customers who use 1000 kWh or less per month are charged the same no matter their location in Yukon.

One of the YUB's roles is to regulate the two utilities: Yukon Energy and Yukon Electrical Company Limited to ensure Yukon has a cost effective and adequate supply of electricity.

Sustainability

Yukon Energy is a member of the Canadian Electricity Association and as such is committed to its Sustainable Electricity initiative - a three pronged vision which includes the health of the environment, society and the economy. The initiative has four elements: a CEA policy for sustainable development – corporate responsibility, the development of performance indicators and reporting, a CEA public advisory panel and method for external verification. The policy states:

1. Environment: Minimize the adverse environmental impacts of our facilities, operations and businesses.
2. Stewardship and Biodiversity: Manage the environment resources and ecosystems that we affect to prevent or minimize loss and support recovery.
3. Climate Change: Manage greenhouse gas emissions to mitigate the impact of operations on climate change, while adapting to its effects.
4. Health and Safety: Provide a safe and healthy workplace for our employees and contractors.
5. Workplace: Support a fair, respectful and diverse workplace for our employees and contractors.
6. Communications and Engagement: Communicate with and engage stakeholders in a transparent and timely manner.

7. Aboriginal Relations: Communicate with and engage Aboriginal people in a manner that respects their culture and traditions.
8. Economic Value: Provide economic benefits to shareholders, communities and regions in which we operate.
9. Energy Efficiency: Produce, deliver and use electricity in an efficient manner while promoting conservation and demandside management.
10. Security of supply: Provide electricity to customers in a safe, reliable and cost effective manner to meet current and future needs.

Clean Energy

Clean energy, green energy and renewable energy are all terms used today with various meanings. Clean energy describes both renewable and nonrenewable technologies that generate power. The renewable forms are varied, but typically are described as wind, solar, geothermal, bio-power, marine and hydro. These once alternative energy sources are now becoming more main stream as the technologies that support them become more efficient and affordable. Nonrenewable sources of power such as natural gas are seen as a clean alternative to oil and diesel.

Clean power can be thought of in several different ways for instance: 1) how clean is the energy is that is produced (any emissions) and 2) how clean is the technology's full "lifecycle" i.e. what type of materials are needed to build the technology, where do these materials come from, where are the components manufactured, what impact does the assembly have, and where do the components go when the technology is decommissioned?

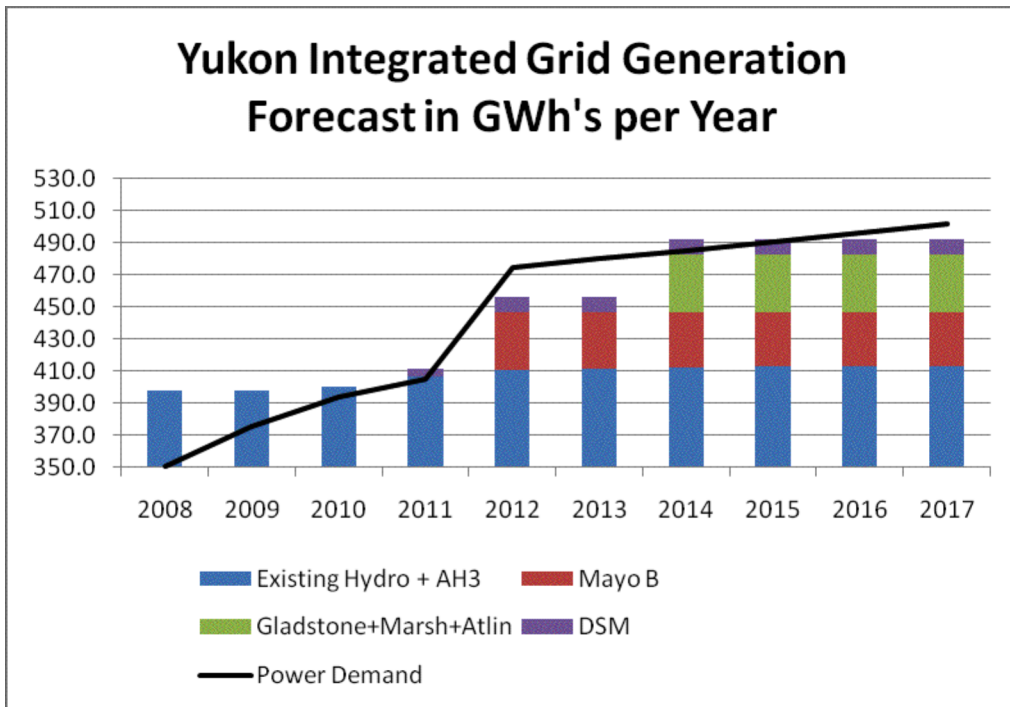
Resource Planning

Resource planning identifies the best clean and renewable energy generation and transmission options that can be developed to meet predicted future demand. In 2006, Yukon Energy's 20-year Resource Plan was developed and filed with the Yukon Utilities Board. The plan details near and long-term energy forecasts for various base-load and industrial-load growth scenarios. Resource planning is challenged by the economies of scale that come from operating an isolated grid in Yukon – with a small customer or rate base. This makes meeting new demand, especially from industrial clients, a significant challenge where federal government support is often necessary.

To date resource planning efforts have largely been focused on renewable energy solutions that meet future demand near to (within 50 km) or on the existing transmission grids, projects like adding the third turbine to the Aishihik power plant. In addition, resource planning has been adapted to include the enhancement of the Mayo power plant with the project called Mayo B. Forecasts for energy demand are constantly being adjusted and present scenarios indicate that even with the implementation of the existing proposed projects demand will be greater than generation. Thus, conservation and demand side management strategies will need to be implemented.

The 2006 Yukon Energy Resource Plan is due to be revised in 2010 and will need to address new growth scenarios, impacts of new government policy (Energy Strategy and Climate Change Action Plan) and advancements in clean energy technologies. It will

also need to address the introduction of an independent power producer policy, a net metering policy and the need for a demand side management program. To avoid future diesel use the resource plan will also assess several options like geothermal, biomass and wind to see if they can be part of the energy mix solution. Figure 1 shows the forecast demand for power on Yukon's hydro grids and the renewable energy projects underway in the planning or construction phase to meet the demand. The graph also shows that this may not be sufficient to meet all of the demand in every year, such as in 2012, 2013 and after 2015. Other sources of renewable energy, conservation and DSM will likely be required in both the near term (up to 2014) and long term (after 2014). Short term shortfalls in power demand can and may have to be made up with existing diesel generation if other renewable source of electricity cannot be brought into service in time.



Performance Objectives

Reliability & Efficiency

- Decrease of total and controllable (unplanned) outages over the next two to five years by more than 75 percent.
- Increase efficiencies of the system to create approximately 5 GWh/yr¹ of energy and a reduction of greenhouse gases.

Clean Energy

- Develop approximately 50 GWh/yr² of clean energy via enhancements to existing hydro infrastructure by 2014 and avoid the production of approximately 50,000 tonnes of green house gas emissions per year (plus the emissions related to acquiring and transporting the fuel) while creating a cost savings of \$12 million a year of diesel fuel.
- Create a renewable portfolio standard for Yukon Energy of at least 90 percent clean and preferably renewable energy.

Buffer (Surplus) of Renewable Electricity

- Determine a meaningful buffer (surplus) standard and then develop appropriate renewable projects to meet targets, for instance if the buffer is five percent above generation required it would be about 17.5 GWh/yr in 2011 and 23 GWh/yr 2012.
- Determine meaningful demand side management strategies that can contribute to the maintenance of the buffer.

Customer and Corporate Relations

- Develop a partnership policy and plan to encourage the addition of new renewable energy projects, especially with First Nations.
- Develop an IPP and net metering tariff and supply management plan to complement related government policy and program development.
- Plan with Yukoners and customers to avoid the production of green house gases associated with electrical energy needs.

¹ This amount can be gained by reducing losses and by increasing the efficiency of existing equipment.

² Each of the planned hydro enhancement projects will provide renewable energy approximately as follows: Aishihik 3 (5 GWh/yr), Mayo B (36 GWh/yr), and the three renewable water projects (36 GWh/yr).

Indicators

The following indicators will be used to compare the state of strategic priorities from one year to the next.

Reliability & Efficiency

- Controllable outages on the Whitehorse-Aishihik-Faro grid were 19 in 2008 and 13 in 2007. Controllable outages on the Mayo-Dawson grid were 6 in 2008 and 9 in 2007³.
- System Average Interruption Duration Index (SAIDI) 6.04 (2008) and 5.95 (2007)⁴.

Clean Energy

- Power sales were \$28,518,000 in 2008 up from \$28,076,000 in 2007⁵.
- Predicted total load is 393.6 GWh (2010), 404.7 GWh (2011), and 474.8 GWh (2012).

Buffer (Surplus) of Renewable Electricity

- Diesel generated electricity is increasing (1.6 GWh in 2008 and 1.2 GWh in 2007)⁶.
- Secondary sales are decreasing (\$777,000 in 2008 and \$1,000,000 in 2007)⁷.
- Peak demand is rising (64 MW in 2008 from 59 MW in 2007)⁸.

Customer and Corporate Relations

- One new industrial customer added to the system in 2008.
- Anticipating two new industrial customers in 2010.
- One community (Pelly Crossing) was added to the grid in 2008.
- Carbon dioxide emissions in the Yukon were reduced by 35 to 40,000 tonnes because of Yukon Energy projects in 2008.

³ KPI Safety Performance Measures Q2 2009.

⁴ KPI Safety Performance Measures Q2 2009.

⁵ Yukon Energy Corporation 2008 Annual Report.

⁶ KPI Safety Performance Measures Q2 2009.

⁷ Yukon Energy Corporation 2008 Annual Report, note part of the reduction is due to a hydro unit being out of service in October and institutional customers using less due to maintenance.

⁸ Yukon Energy Corporation 2008 Annual Report.

Strategic Priorities and Actions

Priority 1 - Optimize equipment to improve system reliability and system efficiency.

Yukon Energy will reduce the number of controllable outages and improve system efficiencies. Towards this end, system procedures are being reviewed and investments are being made to improve and modernize Yukon Energy's electrical generation and transmission equipment. Two thirds of the core capital and operating budgets are being dedicated to reliability improvements for the next five years.

Efficiency projects like improving the performance of hydro generating equipment and transmission lines are underway. As well, the Whitehorse, Aishihik, and Faro (WAF) transmission line will be joined to the Mayo Dawson (MD) transmission line so the hydro systems can be managed as one unit. Yukon Energy is also working with Yukon Electrical to find ways to improve distribution efficiencies.

Key Actions

- ✓ Continue to implement reliability improvements
 - Complete the review of maintenance procedures
 - Complete the review of capital needs
 - Wrap up objects and actions into a reliability improvement and monitoring plan and program
 - Implement reliability projects within the following areas:
 - Protection system and technology
 - Transmission, generation, and distribution
 - Control and Communications

- ✓ Formalize the system efficiency program
 - Complete review of generation assets
 - Complete review of transmission assets
 - Wrap up objects and actions into a Efficiency Plan and Program
 - Implement identified efficiency projects:
 - System modeling
 - Performance tests
 - Turbine re-running
 - Synchronous condenser?

- ✓ Manage the hydro system as a whole
 - Complete the interconnection of the two grids
 - Complete the power benefits model

- ✓ Develop a human resource strategy to determine work force requirements needed to implement this strategy and to address issues of safety, health, retention, recruitment and succession.

Priority 2 - Meet future demand with clean energy that complements the hydro system.

In 2005, Yukon Energy developed a twenty-year resource plan with key actions designed to meet expected near-term energy needs. The plan recommended new capacity planning criteria and the execution of the following projects: Aishihik 3rd turbine, Marsh Lake storage, and the Carmacks to Stewart Crossing transmission line. These projects are now either being studied or implemented, along with the hydro enhancement project called Mayo B.

Moving forward, within the next five years, resource planning must solve the challenge of meeting new demand in the range of 30 to 70 GWh/yr and peak demand shortfalls in winter. New generation will need to be clean and preferably renewable and it must complement or work well with the existing hydro infrastructure. Conservation and demandside management initiatives will also be implemented.

Yukon Energy will also address resource planning issues beyond the existing grid system (part of long-term planning) to ensure there is clean electrical generation to meet the needs of communities using diesel for electrical production and that there is enough electricity available to support economic growth in the territory.

Planning will be done to determine the best ways to meet Yukon's transmission infrastructure needs.

Key Actions

- ✓ Update the Twenty-year Resource Plan
 - Incorporate new government policy direction from the Yukon Energy Strategy and the Climate Change Action Plan
 - Incorporate the clean energy and in particular the renewable energy mandate
 - Include a renewable resource buffer strategy
 - Include demand side management strategies
- ✓ Implement winter energy and hydro enhancement initiatives
 - Complete installation of Aishihik third turbine
 - Complete the procedures necessary to build Mayo B
 - Continue planning for hydro enhancement projects
- ✓ Continue analysis of new hydro project options
 - Assess potential for previously identified small and medium hydro projects
- ✓ Develop a Yukon Transmission Strategy
 - Identify priorities for major transmission expansion
 - Discuss inter-jurisdictional transmission opportunities

Priority 3 - Establish a buffer of surplus renewable energy.

As long as Yukon's electrical grid is isolated from other jurisdictions, Yukon needs to self-generate its power to meet demand. And, by having a buffer or surplus of power Yukon's future economic growth is more secure. How much should this buffer or surplus be? What type of generation should be used to create it? How can its existence be affordable? Current policy direction dissuades or even prevents the use of diesel to generate electricity even though it is easy to install, produces on demand and is not seasonally restricted in its output. It however, uses expensive fuel, pollutes and creates carbon dioxide. Therefore, in comparison to diesel a business case can be made for the use of renewable resource generation projects that in the past might have been deemed small, alternative or demonstrative.

Contributions to this surplus or buffer will also come as a result of efficiencies, conservation and other demand side management strategies like load management.

- ✓ Include a buffer strategy in resource planning
 - Determine the size of the surplus or buffer needed
 - Analyze the role that alternative and renewable energy projects can play in the establishment of the buffer and diversification of the system
 - Employ conservation or demand side management measures to help maintain the buffer
- ✓ Review the secondary sales policy
 - What is the best use of secondary power for rate payers?
- ✓ Formalize the geothermal electricity program
 - Geothermal research and development plan
- ✓ Formalize the wind electricity program
 - Ferry Hill & Mt. Sumanik Feasibility Studies

Priority 4 – Engage customers to better meet future energy needs.

Yukoners rely on electricity to have meaningful, healthy lives. We also require electricity to support and strengthen the economy. Given concerns about climate change, there is now more interest in how electricity is generated, transmitted and distributed. Strategies are encouraged and even required so new generating capacity does not pollute or create green house gases. This is the case both on and off the transmission grids. Moving forward it is important to understand all our customers' needs so we can work with them to create a clean energy future.

The future holds an exciting array of opportunities for improved services to rate payers and Yukoners. Partnerships, especially with First Nations, will be required to create a more secure and sustainable energy future. The demand for clean energy in Yukon will also help to stimulate the growth of the green economy, whose businesses work to advance new technologies whose purpose is to conserve, increase efficiencies and produce more sustainable energy.

Key Actions:

- ✓ Engage Yukoners so they can be part of the planning towards a clean energy future
- ✓ Develop a partnership policy and plan to encourage the addition of new renewable energy projects, especially with First Nations
 - Seek innovative ways to finance projects
- ✓ Develop an IPP and net metering supply management plan to complement related government policy and program initiatives
- ✓ Work with industry and commercial partners to reward the use of clean energy and its wise use
 - Define and network with industry and commercial clients to establish their needs
 - Build a renewable energy business strategy for off grid industrial projects and stranded (diesel) communities
 - Establish a conservation or demandside management program
 - Participate in the planning process for an Alaska Highway or other pipeline projects

Glossary

Biomass – Energy resources from organic matter, including wood, agriculture waste, and other living material that can be burned to produce electricity and heat (from the Energy Strategy).

Climate change – A change in the average weather that a given region experiences. Climate change on a global scale includes changes to temperature, shifts in wind patterns, and changes to precipitation (from Climate Change Action Plan).

Controllable outages – There are planned and unplanned outages. Controllable outages are those that are unplanned and caused by human or equipment failure as opposed to being caused by an element of nature like lightning, birds or wind.

Demandside management – Initiatives that influence patterns of energy consumption, including actions to shift energy use from peak times to periods when less energy is required (Energy Strategy).

Geothermal – The use of heat from the earth to generate electricity or provide space heating and cooling (Energy Strategy).

Independent power producer – An energy producer who generates electricity for sale to utilities or consumers such as the general public, businesses or industries (Energy Strategy).

Net metering – Electricity consumers who own small, renewable energy generators such as wind or solar can receive a credit for a portion of the electricity they generate (Energy Strategy).

Renewable energy – Energy that comes from sources renewed on an ongoing basis through natural processes. Examples include sun, wind, wood, flowing water, or relatively warm ground, air or water temperatures (from Climate Change Action Plan).

Sustainable development – Beneficial socio-economic change that does not undermine the ecological and social systems upon which communities and societies are dependent (Umbrella Final Agreement).

Sustainable electricity – is about pursuing innovative business strategies and operating activities that meet the needs of members, stakeholders and the communities in which we operate, while protecting and enhancing the legacy we leave for future generations (Canadian Electricity Association)

Sustainability – A state in which society does not systematically undermine natural or social systems within the biosphere (Natural Step).