Straight Talk About Electricity:

cost to operate each light bulb based on 6 hours per day at 9.5¢ / Kwh

60 watt bulb
$12.48 per year

13 watt bulb
$2.70 per year

A SAVINGS OF $9.78 per year*
* January 28, 2009
A message from the publisher

by Wayne St. Amour

Welcome to the third issue of Powering Albertans brought to you by the Alberta Electric System Operator or the AESO. The job of this magazine is to provide factual and unbiased information about electricity in our province.

In this issue we focus on electricity transmission. Like a network of major highways, the transmission system moves large amounts of power over long distances.

If you’ve driven Highway 2 you’ve likely seen some of Alberta’s transmission towers that carry electricity from power generators to customers.

You may have also noticed more cars on the road. Like Highway 2, Alberta’s transmission system is busier; in fact, we have the equivalent of a traffic jam that we call congestion in some areas of the province where the demand on the system is very high. This means the system’s flows of electricity can be constrained. One reason for the congestion is there haven’t been any major transmission lines built to reinforce the backbone of the grid in more than 20 years and the need for power in Alberta has steadily increased.

A traffic jam on the power system means the wires are running near their maximum more often and for longer periods of time. We need to strengthen the system to decrease the risk of power outages.

In this issue we describe our plan for the provincial electric transmission system. We discuss some of the major projects in the Industrial Heartland region, our activities on the need to reinforce the system from Edmonton to Calgary, around the City of Calgary and in southern Alberta. These projects will help remove the traffic jams and keep pace with Alberta’s power needs.

Strengthening transmission now, during today’s economic reality, is important timing as costs decrease for labour and equipment. It will also allow the system to catch up to growth we’ve experienced in Alberta over the past number of years.

Albertans depend on a strong transmission highway to move the electricity we need everyday to power our homes, work, schools and hospitals and the AESO is committed to meeting that need.

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WE ARE PLEASED TO SUPPORT...

Science Alberta Foundation’s programs and services which promote the advancement, learning and value of science and technology in everyday life. Like the AESO, the Science Alberta Foundation embraces the opportunity to foster an understanding and appreciation of how science and technology innovations have helped create our strong and prosperous province.

Message from the editor:

by Nancy H. Arab

In this issue we are answering a question we get asked a lot “Who is the AESO?”

You say the AESO is not-for-profit, independent and has a public interest mandate, but what does that really mean?

Some not-for-profit companies are charitable organizations connected to a social cause. Our role is business oriented – the business of operating the wholesale electricity market and the province’s electricity grid as well as planning Alberta’s transmission system and connecting customers. We do this work to serve the public interest. We don’t have shareholders or any financial motivation to build transmission lines. Our only motive is to act in the public interest of all Albertans.

We develop Alberta’s long-term plans to deliver reliable electricity, which is one of the primary drivers of our economy and standard of living. Our job is to make sure the system is reinforced to meet the needs of the province.

Independence is another important quality that helps us do the best job we can for Albertans. We are independent from industry. Our company has no commercial interest in any part of the business – generation, transmission, distribution or retail.

We have an independent board with members who are chosen based on their expertise and backgrounds in business to provide oversight and governance. Biographies of our board and executive are on our website at www.aeso.ca

Because of the importance of our public interest mandate, we believe that meaningful opportunities for discussion and consultation with stakeholders is essential in achieving balanced decisions on our plans to strengthen the transmission system.

If you have a question you’d like us to answer in an upcoming issue of Powering Albertans, write us at: powering.albertans@aeso.ca
In the last two issues of *Powering Albertans* we provided a chart showing the average monthly cost to operate a number of home appliances. In this issue we’re focusing on efficiency tips for refrigerators and dishwashers.

**Keep your cool**

Of all the large appliances in your home, refrigerators usually consume the most energy. These tips will make sure your refrigerator is running efficiently.

- Allow 25 millimetres (one inch) of space around the outside of your refrigerator for air flow.
- Choose a model with an energy saver switch.
- Set the temperature for only as cold as you need; check the manufacturer’s recommendation.
- Don’t keep that old, inefficient refrigerator running in the basement or garage. It could be costing you $150 or more per year in electricity.
- Don’t overfill the refrigerator, this blocks air circulation. However, a full freezer will perform better than an empty one.
- Check your refrigerator’s door seal by closing the door on a $5 bill. If it’s held tightly in place, the seal is working well, if not, the door should be adjusted or the seal replaced.

- Clean your refrigerator’s coils (if applicable) and air intake grill below the door every three months.
- Keep refrigerators away from all sources of heat, including direct sunlight, furnace vents, radiators and appliances such as ovens and dishwashers.
- Allow hot foods to cool before putting them in the refrigerator.
- Defrost frozen foods in the refrigerator; the cool air from the packages will help maintain coolness.

**Clean up on dishwashing**

- New dishwashers use 28 per cent less energy than the average of models found in most homes today.
- Water heating accounts for about 85 per cent of the energy used by a dishwasher.
- The average life of a dishwasher is 13 years.
- Older dishwashers use 30 to 53 litres of water per complete wash cycle, while newer models (after 1994) use 20 to 38 litres.
- Short cycle dishwashers or those with an econowash feature use less hot water.

- Look for dishwashers with built-in heat boosters, which raise the hot water temperature to at least 60° Celsius (C). This allows the temperature on your hot water tank to be set at a lower temperature to suit your other needs, in the 45° C to 50° C range.
- Each 5.5° C reduction in water heating temperature setting can result in a three to five per cent reduction in energy consumption for water heating.
- For further savings, use the no-heat or energy saving drying cycle and open the door when the wash cycle is complete to let dishes air dry.
- Most new dishwashers don’t require a pre-rinse. Scrape food and empty liquids. If you must pre-rinse do it manually and use cold water.
- Only run your dishwasher when it is full and use the energy saving cycle.
- Clean drains and filters regularly.
- Using a dishwasher can actually be more efficient than washing dishes by hand because we tend to wash dishes by hand three to four times as often as we use the dishwasher.

Source: ENMAX Power website [www.enmax.com](http://www.enmax.com) and Utility Consumer Advocate website [www.ucahelps.gov.ab.ca](http://www.ucahelps.gov.ab.ca)
Electricity at work

In the last issue of Powering Albertans this illustration, which has also been made available to schools in Alberta as a poster, explained how electricity is generated. In this issue we are tackling transmission. Please contact us if you’d like to order posters or additional copies of this or the previous illustration. Call us toll-free at 1-888-866-2959 or send us an email at powering.albertans@aeso.ca

A Generating plants
Power is generated using a fuel source to create a rotating motion that is then turned into electricity.

B Transmission substation
A set of large transformers increases the voltage of power coming from a generating plant for its long journey through the transmission grid to customers. Voltage can be compared to water pressure in a hose.

Alberta’s transmission system is an essential part of the power grid connecting the supply of power from generators to the customers who need it. All large power generators, whether they use coal, natural gas, wind or water to produce electricity, connect to the transmission system to deliver their power to consumers.

The transmission system receives large volumes of energy generated at power plants and moves it at high voltages across all types of terrain to customers. Generally, when power is moved at high voltages, fewer transmission lines are needed and fewer line losses result.

Line losses are especially costly when transmission lines are operating near capacity frequently and more heat than normal is created and used up in transportation.

The transmission system is separated into the bulk system and the regional system. The bulk system is the integrated system of higher voltage 500 kilovolt (kV) and 240 kV transmission lines and substations. It also includes facilities called interties that connect Alberta’s transmission system to neighbouring jurisdictions. With only two interties, one with B.C. and the other with Saskatchewan, Alberta is one of the least interconnected jurisdictions in Canada.

The regional transmission system generally receives power from the bulk system and delivers it to local area customers. The regional system includes transmission power lines and substations operating at various voltages.

- The transmission grid connects more than 300 generating units, with a total installed generating capacity of 12,142 megawatts (MW) to customers throughout the province.
- The transmission system includes about 21,000 kilometres of transmission lines and 530 substations.
- In 2007, Albertans used a total of 62,986 gigawatt hours of electricity. One gigawatt equals a thousand megawatts and the average Alberta household uses about seven megawatt hours of electric energy a year.🔥
**C** Transmission line
Transmission is the backbone of the electrical system, moving power from where it is generated to where it is needed in our homes, farms, businesses and industry. Towers and poles support sets of high capacity wires. Transporting power at higher voltages is best over long distances because this reduces line losses. Electrical current creates heat on a power line; this heat is lost energy as it does not reach the customer. Typically, two to five per cent of the power entering a line is lost due to resistance of the wire as electricity moves along the line.

**D** Intertie
Connections with neighbouring electric systems act like a valve that can be opened and closed, allowing power to move in or out of the province.

**E** Solar panels
Solar panels can be installed on roofs of office towers and other buildings to capture the sun’s energy.

**F** Industrial customer
Industry uses about 60 per cent of Alberta’s total electricity supply; some companies build their own power sources to support industrial operations such as steel mills, forestry and petrochemical processing plants. When Alberta needs more power, some industrial customers can send their extra energy onto the power system.

**G** Distribution substation
Power lines enter the substation, where a transformer reduces the voltage to a lower level that can be safely carried on distribution power lines that will deliver electricity to homes, farms and businesses.

**H** Distribution line
Low voltage power lines are best suited for transporting electricity over short distances. These power lines carry electricity from a substation to homes, farms and businesses.

**I** Power meter
The amount of electricity delivered to a home, farm or business is measured using a meter.

**J** Run-of-river hydro power
These hydroelectric plants use the natural flow of river water to turn turbines and generate electricity.
Today’s transmission system
Strengthening Alberta’s power highway

Most Albertans take electricity for granted. We flip the switch and the power is there. It gets us out of bed on time, keeps our food cold, cleans our clothes and lets us read long after the sun has gone down.

But behind that simple action is a complex system or “highway” of transmission towers and wires that delivers electricity from generators around the province to our homes, businesses, farms and industry. It’s this transmission highway that powers Alberta’s economy and our quality of life.

Unlike oil and gas, electricity can’t be stored. So the moment we flick on a switch, a power plant or wind farm must be able to supply electricity and transmission wires must be in place to move the electricity to where it can power everything we take for granted in our daily lives.

From 2003 to 2007, our need for electricity grew at a rate equal to adding the power needs of two cities the size of Red Deer (a population of about 86,000) to the system each year. And the demand continues to increase.

But while the transmission highway is experiencing more traffic than ever before, the system itself hasn’t had a major upgrade in more than 20 years.

Today, we’re experiencing traffic jams on the transmission highway. In other words, the system is running near its limits more often and for longer periods of time. That’s why one of our highest priorities has been to consult with Albertans and prepare applications for plans to strengthen or reinforce key areas of the system and reduce the risk of outages.
The improvements we’re planning will not only deliver the power we need, but in many cases they will control costs by reducing system inefficiencies. When electricity moves through a power line, it creates heat just like your toaster does when it is turned on. This heat is called “line loss” because it represents lost power that cannot be delivered to a customer.

If a transmission line frequently runs close to capacity, line losses rise. In 2007 these losses cost Albertans about $200 million. There is also an environmental cost because air emissions are produced in the process of generating electricity that ultimately doesn’t reach customers.

A strong and efficient transmission system delivers another financial benefit to Albertans because the price of electricity, like other commodities, will be lowest when competition can occur.

Our studies indicate we will need even more generation to meet power needs in the future. Recent analysis shows Alberta is expected to need 5,000 megawatts (MW) of new generation by 2017 and a total of 11,500 MW in additional capacity by 2027.

And new generators from a variety of sources are more likely to be built if transmission lines are available to deliver the electricity they want to produce.

In December 2008, Albertans reached a new peak (the highest demand for power placed on the system at one time) of 9,806 MW. The system most often hits a new peak on cold and dark winter evenings around suppertime when people are cooking and using appliances and electronics.

Despite the wise use of energy and power conservation efforts, we will need more generation than our current system produces to supply the increase in demand. The good news is that within 20 years, we could double the amount of total generation in Alberta through a variety of sources such as wind, biomass (e.g., wood waste), clean coal, hydro and natural gas.

Whether it’s wood waste, water, clean coal or oilsands by-products, Alberta’s existing and potential future forms of power generation are important. Our job is to make sure the transmission system is reinforced to keep pace with the demand for power as our population and economy grow and to ensure a diverse and competitive supply of electricity from Fort McMurray to Fort Macleod.

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Bringing more power to the people

At the AESO, we keep a close watch on how well the provincial transmission system is meeting Albertans’ needs. These efforts include conducting technical studies and consulting with the public to find ways to improve our power highway across the province.

Our work has shown us what areas of the transmission system need to be reinforced now, and we’re moving forward to find the best solutions.

We have identified key reinforcements that will help the transmission system:
- Catch up to growth.
- Run more efficiently.
- Save money by reducing line losses.
- Connect new power generators.
- Deliver the power we depend on.

The following briefly describes the projects we are working on to strengthen Alberta’s transmission highway.

**Key system reinforcement projects:**

- Creating a stronger system between Edmonton and Calgary that can carry more power to customers in central and southern Alberta.
- Addressing the power needs of industry in the Industrial Heartland around Edmonton and up to Fort McMurray.
- Increasing the ability of the southern system to connect new wind farms and deliver that power to where it is needed in the southern region.
- Upgrading the system around and in the City of Calgary so it can carry additional electricity and provide stronger connections and power service to nearby towns.

Keeping the lights on in central and southern Alberta

The work we’re doing to strengthen the network of power lines between Edmonton and Calgary is the biggest transmission project Alberta has seen in more than 20 years. Our transmission planners have been exploring all options for carrying at least 1,000 MW of electricity between 300 and 600 kilometres. (By the way, one MW is enough power to light 10,000 100-watt bulbs).

Our planners have to make sure the system will be able to carry the needed power safely, reliably and efficiently. At the same time, we want to minimize the impact of new transmission towers on the land and for landowners.

In addition to the studies, we believe it’s also important to meet with people who live in the area and to hear firsthand their perspective on the project. Over the past months, we’ve talked with over one thousand Albertans at our open houses and we’ve followed up with meetings, letters and emails and other documents published on our website.

We have answered questions and listened to suggestions from the public, landowner and environmental groups, First Nations and all levels of government. This input helped us identify 11 potential geographic options between Edmonton and Calgary.
We need this transmission system reinforcement now for three important reasons:

1. RELIABILITY
   ▶ Electricity demand in central and southern Alberta is stretching the system between Edmonton and Calgary to its limits.
   ▶ Improvements will reduce the amount of time the system is operating at or near capacity and decrease the risk of outages.
   ▶ Strengthening the system will allow more power to flow to better meet the needs of people living in central and southern Alberta.

2. EFFICIENCY
   ▶ The transmission reinforcement will save Albertans between $2 and $3 million per month through reduced line losses.

3. MARKETS
   ▶ Transmission lines need to be in place before new generators can be built that ultimately connect and deliver their power to Albertans.
   ▶ When Albertans have access to different types of generation throughout the province, and that generation comes from a variety of sources like wind power or natural gas-fired electric generators, power prices will reflect this competition. Like any product we buy, when supply is high, prices are usually lower.
   ▶ Our transmission interties with B.C. and Saskatchewan need to be restored to move the amount of power they were designed to deliver. Interties are transmission lines that connect Alberta to neighboring provinces, allowing us to import and export power. Interties also provide a market when we generate more power than we need (e.g., when wind is blowing at the level that produces more power than we can use) and give us access to power in emergencies.

For the past several years, Alberta has imported more power to meet our electrical needs than we have exported. Our studies show that two transmission lines between Edmonton and Calgary would meet the power needs for people living in central and southern Alberta for the next 20 years.

These lines will provide an efficient way for energy generated in the northern part of the province to go where it is needed in the south.

How much will this project cost?
Current estimates indicate that each transmission line would cost between $560 million and $1 billion and that each billion dollars of investment would add about $1.40 to the transmission component of a typical residential customer’s monthly bill. We estimate that two new transmission lines would add between $1.57 and $2.80 to the transmission component of a typical residential customer’s monthly bill. This cost does not appear on bills until after the facility is operating.

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What is a transmission facility owner (TFO)?

Transmission facility owners (TFO) own and operate high voltage power lines and equipment within specific service areas that link generating units to large customer loads and distribution systems.

Every time we file an application with the Alberta Utilities Commission (AUC) that explains the need for a transmission system reinforcement and the preferred technical and high-level geographic options, the TFO must also file an application with the AUC. This is called a facilities application. Before submitting a facilities application, the TFO does detailed technical studies and consultation with landowners and other interested parties to determine the preferred geographic route.
What are the next steps?
Our next step is to consider the input we’ve received through public consultation and recommend a preferred option for the type of transmission facility and its general location so that reliable supplies of power will continue to be delivered to Albertans.

How do you decide what needs to be built?
When our transmission planners study options, they analyze how well each option will work and compare costs and benefits and overall impacts.

Transmission facilities come in various shapes and sizes, and decisions about tower size and how much electricity a line can carry helps deal with different electrical challenges.

For example, different types of transmission lines carry different amounts of power. The higher the transmission line’s voltage, the more power it can carry.

There are two types of transmission towers for these lines. Some towers are taller and need a wider right-of-way (the amount of land that surrounds all transmission towers). There are specific requirements about how this land can be used to protect people’s safety and to make sure the towers aren’t accidentally damaged.

Transmission towers can also be designed to carry more than one power line so additional power lines can be added over time without building new towers. Sometimes a transmission line can be designed for a higher voltage but operated at a lower voltage until additional power is needed in the future. This allows us to adjust plans according to what’s happening with the economy, industry and demand for power.

It also reduces the overall impact on landowners and the environment and can result in lower costs over the long term.

Transmission lines can be built to use either alternating current (AC) or direct current (DC). Alberta’s existing transmission system has been developed to work with the AC electricity generated at power plants and the AC power that we use in our homes, farms and businesses. See Power Lingo on page 12 for definitions.

Some DC transmission lines called high voltage direct current (HVDC) are able to carry a large amount of power. We’re continuing to study options for this technology in Alberta. DC systems also need additional equipment to convert the power from AC to DC and back to AC so we can use the power in our homes, farms and businesses.

Transmission lines can also be placed underground. In fact, in 2008 a new underground transmission line began serving Edmonton’s city centre. While there are many underground distribution power lines in Alberta and around the world (distribution lines operate at lower voltages and carry power to our home, farm or business), underground transmission lines are less common. In most cases underground transmission is limited to special circumstances since there are restrictions in the amount of power it can carry over long distances.
Southern Alberta transmission system reinforcement

Why do you need to build more transmission in southern Alberta?
In the South region, we have received applications for 7,500 MW of wind power to connect to the transmission system in southern Alberta. This transmission system was originally built to serve the largely rural communities in the region and cannot handle the higher volume of wind power in development.

When these new wind power projects are built and ready to connect to the grid, new transmission lines are required to move the electricity to where it is needed in southern and central Alberta and the Calgary area.

What option are you proposing to connect more wind power on the system?
In December 2008, after comprehensive study and consultation, we announced our preferred option is to build new transmission lines in the shape of a loop to connect new wind farms to the grid.

The loop will also connect to points in the existing system to improve overall reliability and meet other pockets of load growth in the region.

Flexibility was key to this system reinforcement because there is uncertainty about when, where or if all this new generation will be built. The transmission improvements have been planned so they can be built in stages. This means we can adjust the plans to match wind power developments and manage the costs of new transmission as it is needed.

The first stage will connect as much as 1,200 MW of new wind power. There are currently 497 MW of wind power connected to Alberta’s transmission system. The plan includes two additional stages that will be triggered by the pace of wind development.

Our studies show that it is realistic to expect about 2,700 MW of new wind development in the South region during the next 10 years.

How much will this project cost?
The estimate for the first stage is $750 million, while the additional stages could cost $800 million and $280 million respectively.

What are the next steps?
In December 2008, we filed our need application with the Alberta Utilities Commission (AUC) for approval. In the next stage, the AUC will announce details about the regulatory process and timeline. The expected date for these facilities to be in service is between 2011 and 2016.

With an approved application, we would assign the system reinforcement project to AltaLink, which is the transmission facility owner (TFO) in the area. AltaLink would complete detailed technical studies and carry out public consultation to identify a specific route they would recommend in a facilities application they would file with the AUC for approval.

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Advancing the energy strategy
On December 11, 2008, the government released its provincial energy strategy and noted the importance of electricity as a facilitator of economic development in Alberta. It stated that...“Advancing new transmission investment will ensure reliable service for Albertans, help drive our clean energy agenda by growing new renewable energy potential, and enhance our ability to serve electricity export markets.”

Our long-term plan to expand the transmission system aligns with the government’s strategy.

1 Launching Alberta’s Energy Future, Provincial Energy Strategy, December 2008, p. 44.
Powering Industry

Why are you building new transmission in the Industrial Heartland area?
The major driver for new transmission in the Industrial Heartland (Sturgeon, Strathcona and Lamont Counties) is to serve the power needs of industry in the region. Additional demand from residential and commercial customers in the area is adding to the need to strengthen the system.

What options are being proposed to meet that need?
After extensive technical and cost analyses and after considering feedback we received from people who attended our public open houses and numerous other presentations and meetings, our system planners identified two strong options for proposed routes that are now with the TFO for additional study. Both options deliver solid benefits including the greatest flexibility, lowest cost and land-use impact and highest reliability over the next 10 years.

The first option is a new 500 kilovolt (kV) transmission line that would start west of Edmonton and run north and east to the Industrial Heartland area. The estimated cost of this development is approximately $360 million in 2008 dollars.

The second and preferred option is a new transmission line that would start from south Edmonton and run north and east into the Industrial Heartland area. The estimated cost of this development is approximately $260 million in 2008 dollars. This line would be built to operate at the higher capacity of 500 kV but would run at 240 kV until additional power is needed.

In addition to these major developments, other plans to strengthen the system in the area include new transmission lines to deliver power to proposed industrial projects. The estimated cost of these improvements is about $450 million in 2008 dollars.

What are the next steps?
The TFOs are currently exploring route options both inside and outside the existing transportation utility corridor (TUC) located around the City of Edmonton. These corridors are areas set aside for infrastructure like roads and power lines. The TFOs will identify a preferred route for the transmission line when they prepare their facilities application.

We expect to file our need application at the same time as the TFOs file their facilities application. This will likely be in fall 2009. We estimate the facilities could be in service in 2013.

Is there a plan to build a new transmission line to Fort McMurray from the Edmonton area?
The preferred reinforcement option for the Industrial Heartland is a new transmission line that would start from south Edmonton and run north and east into the Industrial Heartland area and would be built to operate at the higher capacity of 500 kV but would run at 240 kV until additional power is needed. This option includes a later stage for two new transmission lines from the Keephills/Lake Wabamun area to Fort McMurray and one from the Industrial Heartland area to Fort McMurray.
City of Calgary upgrades needed

The Calgary region is a major power customer that accounts for nearly 25 per cent of Alberta’s demand for electricity. The region currently depends on six transmission lines between Edmonton and Calgary to deliver much of the electricity required to meet customer needs.

City of Calgary transmission to be improved

The transmission system serving the city needs improvements to address:

- Aging transmission system facilities.
- Significant growth.
- Proposed new generation projects (1,800 MW) in and near the city.
- The potential for wind power to begin supplying the region when transmission reinforcements are completed in southern Alberta.

Our transmission planners are conducting technical studies to determine what transmission system improvements are needed around north Calgary and in the city centre. We believe there is an opportunity to minimize transmission development impacts while keeping pace with the city’s demand for power. Options to explore could include expanding the existing TUC or creating a larger loop around the city.

South Calgary reinforcement studies move ahead

In February 2008, most of the southern part of Calgary experienced a momentary power outage. The severity of this power outage would have been lessened and likely eliminated if new transmission equipment that could carry more power had been in place.

We are studying various options to strengthen the system that serves south Calgary to meet significantly increased power needs. This could include expanding the system so it can deliver more electricity to the region and provide improved reliability over the existing lower capacity system. These reinforcements would also provide flexibility to connect potential new generation projects proposed in the Calgary area and southern Alberta.

How much will this project cost?

Our estimate is about $550 million in 2008 dollars.

Underground versus overhead high voltage transmission lines

Interest in underground transmission continues to grow around the world. While some types of lines that carry power at lower voltages can be installed underground, less than two per cent of the world’s transmission lines at higher voltage levels are installed underground. This is because cost estimates for conventional underground installations are typically at least five to 10 times more expensive than high capacity overhead lines.

What are the next steps?

Public consultation on these proposed transmission system improvements began in late 2008. We expect a second phase of consultation to take place in spring 2009.

What can I do?

Calgarians and indeed all Albertans can help ease the strain on the electric system by reducing how much power they use or shifting it to times when power demand is lower. For example, running dishwashers and washers and dryers later in the evening reduces the demand for power during the 4 to 7 p.m. electricity ‘rush hour’ when most people get home from work and switch on lights and appliances as they prepare dinner.

For additional information about these transmission reinforcements and consultation opportunities, please contact us at:

1-888-866-2959
stakeholder.relations@aeso.ca
www.aeso.ca
Alberta Interconnected Electric System (AIES)
The system of interconnected transmission power lines and generators managed by the AESO, making sure that the supply of electricity matches the demand for power every second.

Interconnection
An electrical connection to the transmission system by a generator or large commercial or industrial customer.

Intertie
Transmission system facilities that connect two neighbouring electric systems. They consist of high voltage transmission lines and other transmission system equipment.

Alternating Current versus Direct Current
In the late 1880s, a battle emerged between electricity pioneers George Westinghouse and Thomas Edison. The reason: Edison promoted direct current (DC) for electric power distribution while Westinghouse was in the alternating current (AC) camp. AC is current that flows alternately in one direction and then in the reverse, while DC flows continuously in the same direction. A battery uses direct current. More than 125 years later, Westinghouse's legacy is firmly established in the AC system that powers most North American (including Albertan) homes, farms and businesses. But Edison's ideas also remain in the DC systems that today increasingly help move power over long distances. These include high voltage direct current (HVDC) transmission lines used in Manitoba and Quebec, and within the Pacific Northwest and California-Nevada areas of the U.S. DC is used for long distance transmission because it has some major advantages over AC:

- Lower transmission line losses
- Lower cable and tower costs
But lower line costs are offset by the high costs of special equipment needed to convert the power from AC to DC and back to AC because that is the type of current that our computers, appliances and electric motors use in North America. We convert it so we can use the power in our homes, farms and businesses. There is also a limit to the number of converters (currently three) that can be practically used on any DC line.

With AC transmission connections, adding towns, cities, industry or generators to the grid can be done almost anywhere along a line without the special equipment that a DC line needs.

More information about AC and DC lines can be found on page 8.

About our cover
On our cover we provide one example of how using energy more efficiently can save energy, reduce costs and help the environment. We use the example of changing one light bulb.

Here’s how we calculated the light bulb savings: One 60 watt incandescent bulb running for six hours a day uses 131.4 kilowatt hours a year. The annual cost of running this light bulb is $12.48 per year using an electricity cost of 9.5 cents per kilowatt hour.

You can save almost $10 per year by replacing that one 60 watt light bulb with a 13 watt compact fluorescent (CFL) bulb. The CFL bulb running six hours a day uses only 28.47 kilowatt hours per year with a total annual cost of $2.70.
The strategy focuses on three desired outcomes that span across Alberta’s entire energy sector – clean energy production, wise energy use and sustained economic prosperity. Special attention is also given to enhancing the capacity of Alberta’s electricity system.

Referring to electricity as a “facilitator of prosperity,” the strategy outlines the challenges our province will need to address during the coming years to ensure Albertans continue to have access to safe, reliable and affordable power.

The most urgent objective identified is upgrading and expanding the province’s transmission system. The Provincial Energy Strategy states that this is essential to meet Alberta’s current and future electricity demands and to support the province’s potential to expand its growing renewable energy sector, which will include more wind, run-of-river hydro, geothermal and biomass generation.

Because Alberta’s electricity market – and in turn the prices paid by consumers – is based on the principles of supply and demand, it is essential that sufficient transmission capacity be in place in advance of the need. This provides certainty to those who invest in new generation projects that they will have the ability to ship their product to Alberta households and businesses. This is also why long-term planning is so essential.

The Government of Alberta has committed to take the lead in developing a plan for a comprehensive upgrade to the provincial transmission system to accommodate long-term growth, while taking advantage of technology to minimize impacts on the land and landowners.

One of the ways to limit those impacts will involve establishing multi-use corridors for siting future energy and transportation infrastructure.

The transmission plan will also consider enhancements to the province’s intertie capacity to import and export electricity with neighbouring jurisdictions, which is essential in maintaining reliable service, particularly with Alberta’s existing and future potential for wind power.

In order to ensure that the plan can be implemented in a timely manner, the province has also committed to reviewing the regulatory process to ensure that landowner concerns are heard, impacts are addressed, and that decisions around new transmission infrastructure can be made in a timely manner.

As readers of Powering Albertans know, providing power to the province involves a complex system of electricity generation, transmission lines, and retail suppliers, which offer choice to consumers. But many Albertans don’t know the many steps and the infrastructure it takes to ensure the lights come on when they flip the switch.

That is why the Provincial Energy Strategy also recommends expanding knowledge and awareness initiatives to better inform Albertans about their electricity system. These initiatives will help Albertans make better informed choices about their energy use. They will also help the public understand the benefits of a reliable and efficient transmission system, and why investment in new generation and transmission will keep the lights on during the years to come.

For more information on the Provincial Energy Strategy, please visit www.energy.alberta.ca.
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