Getting Power from Plant to Plug:

New Transmission Infrastructure Needed to Fuel Alberta's Growth
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Remarks to the Calgary Chamber of Commerce
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GREETINGS

I'd like to begin by thanking Heather Douglas and her team at the Calgary Chamber for taking the initiative and designing a speaker series focused on developments in the electricity industry. The Chamber and its members will be better able to participate in the discussion about the future direction of Alberta's electricity market.

SETTING THE SCENE

As a power generator, distributor, and retailer with more than 600,000 Alberta customers, EPCOR is a motivated and active contributor to this conversation. We applaud the initiative of the Calgary Chamber to undertake this speaker series, and appreciate the invitation to participate in the discussion.

We also bring to the table insights gained from our experience outside Alberta. As you may know, EPCOR has evolved considerably over the past decade. In 1996 our people operated five power and water plants, all in or near the Capital Region. Today, we operate more than 50 power, water and wastewater plants across North America – from California to the Carolinas, from the Queen Charlotte Islands to New York State.

At each of your tables, you'll find a brochure that provides an overview of who EPCOR is today, and I encourage you to visit our web-site to find out more.

Today I'm here to offer EPCOR's perspective on the most important issue facing Alberta's electricity industry today — the need for more power transmission infrastructure.

EPCOR is speaking out because we are seriously concerned that continued access to a reliable supply of electricity is under threat.

Our position is:

- First, that new power transmission infrastructure is urgently needed, both to catch up with growth that's occurred over the past twenty years and to realize future growth opportunities.
- Secondly, that specific transmission builds are needed now, including new 500 kilovolt North-South lines and new transmission lines to the Industrial Heartland region;
- Third, that building new power transmission will benefit all Albertans in three ways – it will reduce environmental impacts, lower energy costs, and increase system reliability.
- And lastly, that despite claims to the contrary and the appeal of an 'every man for himself' proposal for regional independent power generation, there are no substitutes for new power transmission infrastructure. It's the best option for all of us.

To put these issues in context, let's first step back and provide some background about how Alberta's electricity production and transmission network really works. I'll then return to these four points.

More than half of the power produced in Alberta comes from baseload power plants in the Wabamun Lake area southwest of Edmonton, and in east-central Alberta.

The majority of these are coal-fired plants built prior to deregulation, which are owned and operated by TransAlta, EPCOR, and Atco (through Alberta Power). The power produced is sold through Power Purchase Arrangements to energy market participants including TransCanada, EPCOR, TransAlta, and yes, even the City of Calgary through its ownership of Enmax. At the

end of 2007 Enmax held rights to more than 1,100 megawatts of coal-fired generation through interests in PPAs at Keephills and Battle River.[1] Calgary therefore has a vital interest in ensuring they get delivery of their power.

Like arteries from a heart, transmission lines carry Wabamun's energy throughout the province, bringing life to communities in every region. On a typical day, these plants produce about 4,300 megawatts of electricity.

More than half of that energy travels to the Capital Region, including the Industrial Heartland northeast of Edmonton, where billions of dollars are being invested in new refineries and upgraders for the oil sands.

Almost 20% moves northwest, to keep lights on in communities like Grande Prairie and Peace River, and 2% makes the 500 kilometre journey to Fort McMurray.

The final 20% – nearly 1,000 megawatts – makes its way down the North-South transmission lines west of the Queen Elizabeth Highway, to power Calgary and southern Alberta.

Transmission lines are not one-way streets. They are a network that efficiently distributes power from plant to plug – and moves power between regions based on need and production. In addition to sending power south, the network pulls power from southern Alberta up to northern destinations when it's required. It also serves to import and export power to neighbouring provinces when required.

We sometimes read that Alberta's regions should simply look after their own power needs. This "every region or city for itself" attitude will lead to the Balkanization of the transmission grid and severely handicap its efficiency. No part of the province is an island – each part is interdependent on the others for effective operation. We can't ring fence it. When one region is short, for instance Calgary, it gets the extra power via the transmission grid. Conversely, when in surplus it sends that surplus to other parts of the province.

This provincial view of the system is reflected in how we pay for it. Every consumer of electricity pays for transmission services based on their consumption. Industrial users bear the lion's share of the costs, about 61%, with commercial users paying about 19%. Residential consumers pay for roughly 16% of transmission costs.[2]

NEW POWER TRANSMISSION CAPACITY IS URGENTLY NEEDED.

With that as background, let's go back to the four points I opened with – the first being that transmission is needed to catch up to growth that has already happened, and to realize future growth opportunities.

As we saw during the three-year controversy over the North-South transmission line proposal, the need for new power transmission is not universally understood.

But the facts are plain. Alberta's economy, population and electricity consumption have grown enormously over the past 20 years. Twenty years ago, less than 650,000 people lived in

[1] The Keephills PPA entitles Enmax Energy to market for its own benefit 682 MW of output from the two generating units of the Keephills coal-fired generation facility until December 31, 2020. In June 2006, an Enmax subsidiary purchased a 55% interest in the 662.8 MW Battle River PPA. On January 1, 2007, an additional 10% interest in the Battle River PPA was purchased. The agreement also provides for the purchase of the remaining 35% in annual increments of 10 – 15% over three and one-half years.

[2] Transmission costs (plan, build and operate) are recovered from electricity consumers based on consumption. The cost allocation is approximately: 61% industrial, 19% commercial, 16% residential and 4% farm. Generators pay for transmission line losses (AESO, Planning for Alberta's Power Future, October 2007).

Calgary – today, more than one million people live in this great city. The Capital Region was a community of 575,000 twenty years ago – today, 1 million people call that region home.

Twenty-years of growth have more than doubled Alberta's power consumption, from 33 million megawatt hours in 1987 to 69 million megawatt hours in 2007.

What happened to our power transmission grid during those 20 years? Virtually nothing; it is as though time stood still. Only one major transmission line has been added to the system, between Edmonton and Fort McMurray.[3]

By way of analogy, if Alberta's power grid was likened to a family home it probably started off as a modest bungalow occupied by a young couple. Over twenty years the couple:

- had a few kids – who still haven't moved out;
- saw the relatives move in from Saskatchewan;
- loaded up the house with new televisions, computers and appliances; and
- decided to make room for it all by adding an extension onto the back.

But they were so busy, they didn't get around to re-wiring the house or installing new breaker panels to handle the load. Now there's no more room to grow: if Granny upgrades to a four-slice toaster, they're likely to blow a fuse.

The consequences for the provincial system are more serious. In our view, the transmission system is now close to a breaking point. Generators are being impacted in their ability to bring on new supply, competition is stifled.

With the grid stretched to capacity, it's also more difficult to find opportunities to conduct maintenance on existing transmission facilities, or deal with outages at power plants. The probability of serious outages will grow unless new transmission capacity is added.

We learned that lesson two years ago, on a hot summer day – July 24, 2006 to be exact.

It was so warm by nine in the morning the Electric System Operator issued an emergency alert calling on Albertans to reduce their power use. Through the day air conditioners kept humming, and several more appeals were issued. Then late in the day a transmission line to a major power plant failed, taking it off line and eliminating the reserve margin the system uses to keep supply and demand in balance.

Finally, at 4:28 p.m. Alberta was completely separated from the western grid when a lightning strike hit the tie line that brings in power from B.C. We were an island, and it was an island without enough power.

Electricity isn't like other forms of energy. You can't store it in large quantities. To work, the system has to hold supply and demand in perfect balance.

If we had only 95% of the gasoline supply Albertans need, we could still run 95% of the cars, or we could ration gasoline and have everyone drive less.

But if there's suddenly only 95% of the electricity supply we need, everything shuts down, unless you can unplug 5% of the province in an instant. And that's exactly what happened.

[3] The only major new transmission line in Alberta in about 20 years was built from Fort McMurray to northeast of Edmonton (Dover to Whitefish line) by ATCO Electric in 2004 (AESO, Planning for Alberta's Power Future, October 2007).

Because of the transmission line failures, Alberta's electric utilities were ordered to "shed load." You do that by turning off power to businesses and neighbourhoods.

If you fail to bring the system back into balance, the entire network will shut down to protect itself from damage. It can take days to get it all back up and running.

On that hot July day, we were both prepared and lucky. The grid was safely brought back into balance through some forced power outages, and thirty minutes later we were able to start turning the power back on. The tie line to B.C. was working again, bringing hundreds of megawatts of power across the Rocky Mountains. Eighty minutes later, all power was restored.

Why worry about an 80 minute power outage that happened two years ago? Because it's an example of what happens when transmission lines fail, or when there aren't enough of them to get power from plant to plug.

Why is EPCOR worried? Because we take a provincial view, and believe that if we fail to act now and reinforce Alberta's transmission system, it will only be a matter of time before there is a catastrophic failure. Alberta can do better than this; there is no excuse for delay.

Just to underscore how close to the breaking point we are, consider this:

- Last summer, Albertans set four new records for power consumption, and there were five emergency alerts asking consumers to reduce power use;
- This winter, demand for electricity reached an all time high of 9,710 megawatts;
- And the provincial effective reserve margin has fallen from 22.5% in 2003 to 7% in 2008.[4] This is the safety level of power available that can be called upon to keep the system in balance when we hit peaks or sudden outages. My point is that it's getting very, very tight. Our reserve tank is near empty.

The need for new power transmission isn't just about catching up with the extraordinary growth of our province. It's about preparing for the future. New power infrastructure is essential to support Alberta's future growth.

The scale of the demand and the investment is enormous. The System Operator forecasts that 5,000 megawatts, or 42% more power, will be needed by 2017. And, by 2027, that number will reach 11,700 megawatts.

To close this gap, we will need large scale power developments – and fast.

We are not going to close that gap with renewables, such as wind, that produce electricity about a third of the time we need it. Alberta has 500 megawatts of wind power capacity – the most in Canada. But the annual output from those turbines is about the same as a 175 megawatt conventional power plant, and the turbines must be backstopped by other plants and transmission lines capable of delivering power when the wind's stopped blowing.

EPCOR and TransAlta are helping fill the gap with baseload generation. The new Keephills 3 unit we are building west of Edmonton, which we co-own, will have a net capacity of

[4] The "Effective Reserve Margin" is a measure of the power capacity that can be *counted on* during peak load conditions. To calculate the generation available under these conditions: hydro capacity is de-rated 35%; all wind capacity is excluded since historically it has not produced power under peak load weather conditions; Rossdale, with its long start up times, is excluded; 115 MW of industrial power that historically has not responded to price signals is excluded. In addition, the calculation of both "Reserve Margin" and "Effective Reserve Margin" excludes capacity from the British Columbia and Saskatchewan tie-lines, and interruptible load. For 2008, the following data is forecast: Installed Power Generation Capacity: 12,428 MW; Effective Capacity: 11,248 MW; Peak Demand: 10,515 MW. Based on these forecasts, the Capacity Reserve Margin is 18.2%, and the Effective Reserve Margin is 7%.

about 450 megawatts. Our estimated cost for the unit is about $1.6 billion. Nearby, we jointly own the 450 megawatt Genesee 3, which when it began operation in 2005, was the single largest addition to Alberta's grid.

Other provinces have made large government investments in centrally planned power generation, and put taxpayers at risk. In Alberta we have an energy market for power generation. Plants like Keephills 3 and Genesee 3 are built at investor risk, not taxpayer expense, and there are no guaranteed rates of return. This is the way it should be.

The System Operator's forecast suggests that by 2017 Alberta will need the equivalent of 11 new units the size of Keephills 3 and Genesee 3. If you could build them all today and at today's costs – which you couldn't – it would be an investment of nearly $18 billion. And even if you had the money, you'd be challenged to find the construction trades, the concrete and the steel, and you'd face a daunting timeline for permitting and approvals.

EPCOR, as a power generator, cannot commit to investments on this scale unless we have a reasonable level of certainty that we can get the supply to market. It would be like asking upstream oil and gas investors to commit to drilling new wells in a region that's not serviced by pipelines, and has no reasonable hope for pipelines being built in the future.

One of the reasons that electricity supply is needed is to help Albertans capture more value from oil sands development. Bitumen production is expected to triple over the next ten years, and new upgraders and plant expansions are needed to process the increased supply.

Many of these facilities are already announced or underway in the Industrial Heartland. Four of them have already requested access to power transmission; lines that are not there today. Certainty of electricity supply is of vital importance to the proponents, and to their investors.

Without access to new sources of power, upgrading facilities will be built outside Alberta, and we'll miss out on one of the largest industrial economic opportunities in North America.

BENEFITS OF A NEW 500-KILOVOLT NORTH-SOUTH TRANSMISSION LINE, AND NEW TRANSMISSION TO THE INDUSTRIAL HEARTLAND

This brings me to the second point I raised earlier, and that is that specific transmission builds are needed now.

There are two projects that we single out for immediate attention: the construction of new 500-kilovolt North-South transmission lines and new transmission to the Industrial Heartland.

It's not my intention to re-visit the history of the North-South line, but I will say that EPCOR shares concerns about the process and tactics that were used. When the proposal re-enters the regulatory route, we will be advocating:

- first, that we support the construction of new 500-kilovolt North-South transmission lines;
- secondly, that we believe the consultation and regulatory process should be fair and inclusive;
- and, lastly, that we are agnostic about the precise route, and on the question of who builds and operates the infrastructure.

All Albertans will benefit from this capacity, which brings me to the third point, which is that North-South and Industrial Heartland lines will:

- reduce environmental impacts

- lower energy costs for consumers
- increase system reliability, and
- support Alberta's growth

The scale of the environmental benefits may surprise you.

By operating at higher voltage, the line will be more efficient – and so less power will be lost along the journey. Today, line losses are approximately 5%, not the 20% you may have heard elsewhere. The System Operator's original studies showed that the new line would reduce Alberta's peak power needs by 125 megawatts, or the amount of power used by Red Deer.[5]

The new infrastructure will also improve access to competitive, low cost generation that can reduce the market price of energy. The first new line between Edmonton and Calgary will add about 600 megawatts to the North-South transfer capacity. That means we can bring more power from wind farms, B.C. hydro generators, and existing or planned plants. Congestion on the current transmission system restricts access to these sources, reducing competitive pressures that could lower electricity prices.

It's also important because Alberta is a net importer of power – we rely on B.C. to keep the lights on during times of peak demand. Last year, Alberta imported more than 900,000 megawatt hours of electricity.[6] The line works two ways, which is beneficial for both provinces because it gives us the flexibility to move power back to B.C. during times of low Alberta demand, allowing hydro dam reservoirs to be re-charged.

But today there are times when the Alberta system is so congested that the tie line to BC cannot be used to its full capacity. The North-South line will allow us to import power when it's needed. This is vital to improving the reliability of the grid.

THE BEST OPTION

And, lastly, to my final point: despite claims to the contrary, there are no immediate substitutes for new power transmission. It is the best option.

Wind farms, distributed generation, and southern gas-fired generation all have a place in Alberta's energy market.

But these so-called alternatives cannot be built in time, at the scale required, and on a cost-competitive basis. We need the power supply now. It would take ten or fifteen years to seriously develop these alternative visions for Alberta's electricity industry – and a wholesale restructuring of Canada's most successful electricity market. The transmission network is tightly interconnected, and operates on the principle of mutual support for reliability and security.

The idea of gasifying coal and shipping it via pipelines, rather than shipping electrons over wires, is interesting, and progressive thinking. It may be the way we go ten to fifteen years from now. But the technology and costs to do that today, compared to other alternatives, makes it grossly uneconomic. Gasified coal is two to three times the cost of today's power. When you add transportation costs, the gap is simply too wide to close if we need power now, which we do.

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[5] Alberta Electric System Operator, *Edmonton-Calgary 500 kV Transmission Development Need Application*, May 7, 2004. Table 4-6 Summary of Concept Loss Savings (RP-05-388 at page 56).

[6] In 2007, Alberta imported 917,230 MWh and exported 884,729 MWh to B.C. for a net import figure of 32,501 MWh. Source: MSA 2007 Year in Review at the web-page: http://www.albertamsa.ca/files/MSA_2007_Year_in_Review_rev.pdf

As I explained earlier, wind power is not a substitute for new transmission infrastructure – in fact, the more wind turbines we build, the stronger the power grid needs to be, and the more baseload generation you need for backstop.

As for building large natural gas-fired baseload generation in southern Alberta, the reality is that it's more efficient and cost effective to build thermal generation in north-central Alberta and move the power via transmission lines.

With upgraders and industrial operations in the Industrial Heartland, the north also has more opportunities for industrial cogeneration – an efficient process that recovers and uses heat that would otherwise be wasted.

Whether you're considering the implementation timeline, the business case, or the environmental impact—transmission is the clear winner.

Conclusion

Electricity is the lifeblood of the Alberta economy and society, and transmission lines are critical to our survival.

But unlike many issues in our society, this is one where you can't see, hear or taste the problem until it's too late. If the lights are on, everything seems fine.

Too often, in other jurisdictions, it's taken a major blackout or incident to prompt people into action. Let's work together to solve this challenge for the benefit of all rather than for the short term gains of a few. Rather than waiting for the problem to silently build until it's critical, we can act now and implement the System Operator's plan to reinforce the provincial power grid.

The reasons are clear:

- We haven't had a major upgrade during twenty years of growth, despite the fact demand has more than doubled, and major growth is on the horizon
- The system is near capacity, and we've already dodged a few bullets
- And if we don't act today, we are putting our transmission system and Alberta's economy at risk.

A new, North-South transmission line would be a key enabler for the province's long-term economic growth, and it would reduce environmental impacts, lower costs, and increase system reliability.

I hope that you will take this opportunity to reflect on what a reliable source of electrical power means to the welfare and prospects of your business, and that you'll think about some of the things you might do to help keep the lights on.

Visit our website at EPCOR-dot-C-A. Put it on the agenda of one of your upcoming business, community, or industry association meetings. Speak to your M.L.A., your City Councillor, or the Utilities Consumer Advocate and let them know of your concern. And most of all, when the hearings on the new power lines resume – hopefully this fall – get involved and speak out about the need for transmission infrastructure.

Thank you.