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Distributed Energy Resources

Most Canadians don't realize how lucky they have been to be connected to the Canadian electricity supply. Canada's price for power is one of the world's lowest prices, however, the distribution costs in some provinces are very high and increased distribution costs will start to occur as the Canadian distribution lines are replaced. Canadians in remote far northern off grid communities are paying very high prices for diesel electricity from a low of \$.45/kWh to over \$1.10/kWh. Canada's major on grid power supplies are one of the lowest costs in the world.

Canada is starting to see carbon costs as a costly inconvenience and some provinces are trying to avoid paying a carbon tax. The people in power that are trying to stop the carbon tax, must not care about the future for the children and grandchildren, because carbon is not going away and most of the world, including Canada are committed to fighting carbon.

Canada has been experiencing the most humid hot temperatures this summer, plus the most forest fires and the most ice ever going south from the far north. Maybe someday Manhattan will be under water!

How do we fight and defeat the energy and carbon challenges and clean up our world for our kids and grandkids?

A. Power Conservation

Again Canadians have been spoiled and have not operated their power efficiently. EverGreen is proud to offer Air@Work that provides reliable energy efficiency and sustainable cooling. The Air@Work is a heat exchanger that forms the core of an air cooling and heat recovery system by recirculating the exhaust air. The Air@Work system will reduce the energy for heating and cooling by 60 to 70%, plus effectively reduce greenhouse gases.

Canadians are living longer and populations are growing, therefore, the power demand will be increasing yearly. I believe Ontario's power demand at 12:00 p.m. today was 20,700 MW and the power supply was 22,118 MW. Ontario has power to spare, despite the growing population and the export market to the US is not working well, sometimes Ontario has to pay for the US to receive our surplus power.

What if Ontario's home owners, apartment owners, industrial and commercial building owners, schools, universities, hospitals, etc. started to conserve on their energy. The Air@Work will effectively reduce the daily energy consumption up to 70%, let's start to look at the energy supply that can be reduced daily.

Power supply reduction:

- 20% 4,423 MW
- 30% 6,635 MW
- 40% 8,847 MW
- 50% 11,059 MW
- 60% 13,270 MW
- 70% 15,482 MW

What can Ontario do with their extra power that can be conserved? Who will purchase the power, Quebec, Manitoba or the bordering US states? In the early 80s, Ontario Hydro spent time reviewing the exportation of up to 5,000 MW from their Nanticoke Coal Plant to Erie, Pennsylvania. Five lines would have been installed across Lake Erie at a cost of much less than the \$1 billion dollar project recently being discussed from Nanticoke to Erie to supply 1,000 MW. Or should Ontario reduce their power purchases from their most expensive power sources? The Nuclear power plants in Ontario are facing major upgrading that is estimated at about \$12 billion per plant. The last upgrading budget was about \$12 billion and the actual cost was 2 ½ times higher.

The Nuclear production should be reduced, because of outstanding and waiting environmental issues, “what to do with the nuclear waste?” The nuclear waste has not been destroyed or removed because nobody knows how to dispose the nuclear waste. Years ago the nuclear plants were going to house their waste in large cement containers and place the containers into old barges and then sink the barges out in the closest ocean. We are thankful that did not happen in Canada, but it has happened in other countries with their deposits of nuclear waste out in the ocean.

The Air@Work will greatly reduce the energy to be consumed for heating and cooling and we are pleased to go one step further and add a **heat pump** to the homes and small building projects, therefore, there will be an increase in the demand for electricity throughout the colder months for the supply of clean heat. Adding the heat pump to the building greatly reduces the carbon produced in the homes and buildings throughout Ontario and these buildings will become Non-Emitting.

Non-Emitting is what we all want!

B. Independent Power Productions

Base power sources will change from nuclear and gas to clean carbon neutral Biomass Power systems supplying only electricity or supplying combined heat and power.

Our Biomass power systems can be uniquely designed to best utilize the available waste from:

- Residential Waste: paper, cardboard, plastics, textiles, leather, wood

- Industrial Waste: housekeeping waste, packaging, wood
- Commercial & Institutional Waste: paper, cardboard, plastic, wood
- Construction & Demolition Waste: wood, plastic
- Municipal: landscape and tree trimmings
- Agricultural Waste: plastic (bale wraps), spoiled feedstock

As landfill locations throughout Ontario are reaching their maximums, cities and communities are starting to look for alternatives to landfill and our Waste-to-Energy (W-t-E) Biomass power systems can provide the diversion from landfill with the above list of waste streams. Our Biomass W-t-E power systems range from 1 MW to 20 MW, plus the opportunity to have multi-biomass W-t-E systems placed in series to provide the base power needed for the specific applications. The applications will range from 1 MW to over 200 MWs.

The increased IPPs in small communities off the main grid line can be owned by IESO, the local LDC, the community as a Co-op ownership or a mixed ownership of the Community and the supplier of the W-t-E system. Having communities off the main grid line being the power producer will greatly reduce the forthcoming distribution infrastructure costs. Also industrial and mining applications can become IPPs for their specific power needs.

The IPPs will provide needed jobs in the communities serviced, while keeping the power cost from reaching new higher levels.

C. Non-Emitting Power Resources

The main grid distribution for Ontario will change and become smaller and be designed to meet more economic power production uniquely for each application, providing more efficiency to best service the larger populated areas throughout Ontario. IESO will be the leader and providing opportunities for the LDCs and off grid communities to participate in each application.

The power sources will include part-time power supplies from Solar and Wind, and clean base power sources including biomass and water. The base power will provide power 24/7 to meet the power demand for each specific application. There will be high and low power demand periods and the base power biomass will provide a determined base power supply. To meet the peak power needs, power will be stored in batteries. This power can be supplied from low power demand periods of the base power supply and solar and wind sources.

D. Scenario 5 - Decentralized Future

The **Eco/Electric Load Growth** will decrease thanks to energy conservation and better use of the electricity produced throughout Ontario. The net Grid will reduce through



conservation which is good and provides the opportunity to reduce nuclear power and offer a good growth period for newly installed Renewable Energy, especially our Biomass units will help to keep the transition cost down.

EVs (electric vehicles) will be a major new consumer of electricity throughout Ontario, however, their power requirements will not be as high as anticipated.

Heating and Cooling electrification will be cut in half or more, thanks to the installation of our Fairtype Air@Work.

The **Policies** addressing Net Metering, Carbon Pricing and Rate structures must be done economically.

Net metering offers the consumers (residential and/or industrial, commercial) the opportunity to work with IESO and their local LDC and if the pricing is not compatible for the consumer, then the consumers are going to go behind the meter and some homes and large industries have started to disconnect from the LDC and become their own Independent Power Producer (IPP).

The Carbon prices will be established and some industries do not seem to care, but they will have to pay the price. There are 90 locations across Ontario that are producing over 25,000 tons annually. All 9 Ontario universities are exceeding 25,000 tons with the largest producer of carbon is the oldest university UofT that produces 85,638 tons. I have met with the Facilities Manager, who oversees all the Universities and he was positive to take action to reduce the carbon throughout all of the universities, but the universities have put things on hold thanks to Premier Ford and that hold up will be removed.

Rate structures must be reviewed and “thanks” to the new Ontario government all renewable energy incentives have been cancelled except for “SaveOnEnergy” and it is schedule to remain available until about mid-2020.

The **Fuel Prices** are still driven by greed, but as the people of Ontario start to reduce their carbon consumption, and the home owners take action to reduce their carbon and install the Fairtype Air@Work unit to their building complete with a heat pump, then the home owners, apartment owners and the small commercial and industrial building owners will start to become Non-Emitters and produce zero carbon. Natural gas and propane heat will be replaced with clean electric heat and/or biomass heat.

Electric vehicles are the new source of automobiles and as the public starts to realize that an EV is economical to operate and the recharging of the batteries are going to be cheaper per kilometer than gasoline, diesel and natural gas fueled vehicles, they will start to buy EVs. Also note that Premier Ford stopped the grants for buying EVs and they will be eliminated as of the end of August.



DER, please review this complete presentation as it outlines how changing to DER will provide good and needed new jobs for people of Ontario and to be a strength in Ontario to fight and defeat Climate Change.

Stories: action is to be taken to provide a cleaner environment and provide a clean future for our kids and grandkids.

The Distributed Resources will be generated with the right government support, or the people of Ontario that are concerned about the future for their kids and grandkids will start to do something now at their expense to help to clean the future for their loved ones. The longer the people of Ontario do nothing the quicker a sickening change of life will happen to our youth.

Energy storage can be economically installed and we don't need lithium batteries, because they are finding environmental effects from the lithium. We believe in lead acid batteries for the world's energy storage. We have a technology that stops the sulfation of lead acid batteries and this will effectively extend the battery life by 2 or 3 times. This is a major economical saving. It all depends on the buyer. Over 20 years ago I visited one of the Bruce Nuclear plants and reviewed their dying 2 volt lead acid batteries they were using for emergency energy storage. The price to service all their emergency power storage batteries would have been approximately \$35,000.00 dollars. The people I met with said they didn't know the Battery Energizer, therefore, they were just going to buy new replacement batteries at a price around \$1,500,000.00. I have an old customer (a city to remain nameless) who purchased the Canadus Battery Desulfator for their fleet of 195 emergency vehicles in 1998. They are still using the original Canadus units and when they trade in a vehicle they make sure they take the Canadus unit off the old vehicle and put it in the new vehicle. This city has saved hundreds of thousands of dollars.

Bulk transmission must change to save the province of Ontario billions of dollars duplicating the existing distribution lines. The distribution lines will be much, much shorter and directed to service multiple designated communities independently throughout Ontario from Southern Ontario along highway 401, which has the largest percentage of population in Ontario. As the cities go north there will be more independent power stations established to provide the power for each or a group of designated communities to share the same power lines. IESO and the local LDCs can work with the cities as volume is determined. The further north the more costly it is to install transmission lines over many kilometers of empty unused space, therefore, it is more economical to provide an Independent Power Project to service the selected communities.

Community sizes and number of communities in an IPP will determine the sizing of the IPP to service each unique designated roadway for communication and control.

Trans active energy prices will be uniquely determined based on location and demand.

Implication for Ontario's Market Design will be a challenge, but the general design can be duplicated as more IPPs are established to provide local power.



Fuel prices for our Biomass system using municipal solid waste components will save money and in some cases provide a revenue for diverting waste from landfills.

DER energy efficiency will greatly reduce the power demand in many applications which will reduce the energy costs for the consumers from homes, apartments, schools, universities, hospitals, health care centres to large industrial and commercial buildings. The cost for biomass power will vary, but many of the applications will provide reduced energy costs by using their own biomass waste, which they have been paying to be disposed.

External Market Conditions offer economic opportunities for the installation and operation of carbon reducing technologies to produce a cleaner world.

Global security will not be a concern as our Renewable Energy and Energy Efficiency technologies are certified and meet or exceed the Canadian standards.

Canada and the UK just announced their plan for the new action for Carbon trading.

With the Ontario Power Authorities and Power Providers working together in HARMONY, they will have the opportunity to supply the power needed to service the Ontario markets. If they find a secure opportunity to develop external markets they can trust, then long term export energy contracts can be implemented, if the price is right.

Emerging Technologies can be economically implemented into Ontario's power generation and work together in HARMONY to provide Energy Efficiency and Renewable Energy systems to best service the Ontario markets.

Solar and wind will have opportunities to provide net metering for backup power, using battery storage for the distribution of the power as required. Large landmasses are required for solar projects and these landmasses must not use agricultural land.

Geothermal will have opportunities to provide project power provided the price is good?

The aggregation of Renewable Energy technologies that can work together in HARMONY to provide an efficient and economical power supply, therefore:

- Solar and wind can provide assurance of power production to supply backup power, to supply power as required, especially for peak power demand
- Battery storage is required to work with solar and wind to store the power produced and deliver that power to meet needed timely power demands
- Battery storage can be economically used to store power during off peak demands and use that power during peak power times. This will save the consumer money as they will pay the power provider for off peak energy used during peak power times.
- Battery storage can be used to store unneeded power in off peak times and use that power at peak times.

- Biomass power works 24/7 providing base power and will be designed to best save power not needed in battery storage and use that power to service peak demands.
- Energy Efficiency is a means to effectively reduce the power demand, reducing energy costs and reduce carbon effectively.

Improved automation will be appreciated from the base power production of our Biomass Power systems providing carbon neutral energy.

Block Chain (AI) ???

Customer Preferences are seriously being reviewed as residential and commercial power consumers are reviewing power independency vs their present power supplier and the cost of energy, and most importantly the reduction of greenhouse gases to fighting climate change and reducing carbon. Canadians have been spoiled with their power supply and they will now be taking serious action to defeat climate change to protect their family members.

Energy Self Sufficiency is a growing consideration. As new power systems are being developed and are now available to best serve base power to the small residential and business consumer, people and corporations are looking for alternatives to best service their power requirement, while providing energy savings and carbon reduction. The new Ontario government is trying to put an end to the Cap and Trade, but that isn't going to happen. The people of Ontario are uniting and are becoming committed to fight and defeat Climate Change, so their children and grandchildren will have a clean environment to live in.

Lower energy costs are available by coordinating our proven Energy Efficient Fairtype Air@Work, which will reduce energy for heating and cooling by 60 to 70%. Plus, our Renewable Energy Biomass CHP systems will provide clean heat and power for the home and large industrial and commercial buildings, etc. When you couple energy conservation and a small sized power source together, then the consumer (residential and/or business) will receive economical savings, plus being an appreciative supporter of carbon reduction.

Choices, the residential and commercial power consumers should be given the choice to purchase their power from their local LDC or independently from companies that can supply them with the best fit of Renewable Energy and Energy Efficiency technologies. IESO and the LDCs should work together to provide these alternative power supplies to their customers. Their selected power supplier must be able to best service their power demands, while reducing carbon and being able to put the residential and commercial property owners close to a Non-Emitter status. By reducing their carbon, they will develop a carbon value which will have a carbon credit per ton. This carbon value will help to pay for their Renewable Energy and Energy Efficiency system that was uniquely designed to service their power needs.

Cost control should be established as a long term contract between the consumer and the power supplier. The contract could be funded by our green funders or through a leasing agreement.



Energy conservation is a major contributor to an economical power future for the consumer and the supplier of the power system. Based on the consumer demand for the power, the conservation will provide the consumer with financial and carbon savings.

Best regards,

GASpence

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