

ONTARIO POWER OUTLOOK

RELIABILITY ISSUES/CONCERNS

FEBRUARY, 2010



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ADVOCATES FOR:

Cleaner Air
Affordable Energy Rates
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“ENSURE THAT ONTARIANS HAVE ACCESS TO SAFE, RELIABLE AND ENVIRONMENTALLY SUSTAINABLE ENERGY SUPPLIES AT COMPETITIVE PRICES”

Ministry of Energy Statement of Environmental Values, Environmental Bill of Rights

The 20 year Integrated Power System Plan (IPSP) produced by the Ontario Power Authority (OPA) was submitted for approval to the Ontario Energy Board (OEB) summer of 2008. That Plan, according to former Energy Minister Dwight Duncan would “guide the development of Ontario’s entire power system, including transmission networks”. The planning process was intended to revitalize an aging system and integrate “the broad array of industry, environmental and societal considerations” while fulfilling the legislated mandate to “**protect the interests of consumers with respect to prices and the adequacy, reliability and quality of electricity service**”. That Plan has been indefinitely suspended.

It has been 5 years since electricity restructuring began in earnest in Ontario. It has been 5 years since the first announcement to close Ontario’s coal-fired power plants. A great deal of money has been spent during that time, including the \$65 million/year budget (2010) for the Ontario Power Authority and the hundreds of millions of dollars spent on the shelved IPSP. What do we have to show for it?

The CAE Alliance is convinced that the restructuring process has incurred significant cost increases that are now having an effect on consumers’ electricity bills. We address these increased costs in our document “The Rising Cost of Power in Ontario” (available on our website). Higher electricity rates hurt all of us. Increased costs have a proportionately higher impact to those on lower/fixed incomes; reduces consumer spending; and impacts the ability of business and industry to remain competitive in the global market. The Ontario economy has slowed and that according, to the Ministry of Finance is due in part to higher energy rates.

Of equal concern is the availability of reliable electricity resources in Ontario. The restructuring process has garnered intermittent new supplies, jettisoned stable resources and dithered regarding critical baseload supply. Reliability is on shaky ground, particularly in the middle of this next decade.

FACTORS IMPACTING RELIABILITY

The OPA has recently procured 13,500 MW of new or refurbished power generation to be installed by 2014. This increase will be offset by the reduction of 6,434 MW of coal-fired generation to be removed from service by that time.

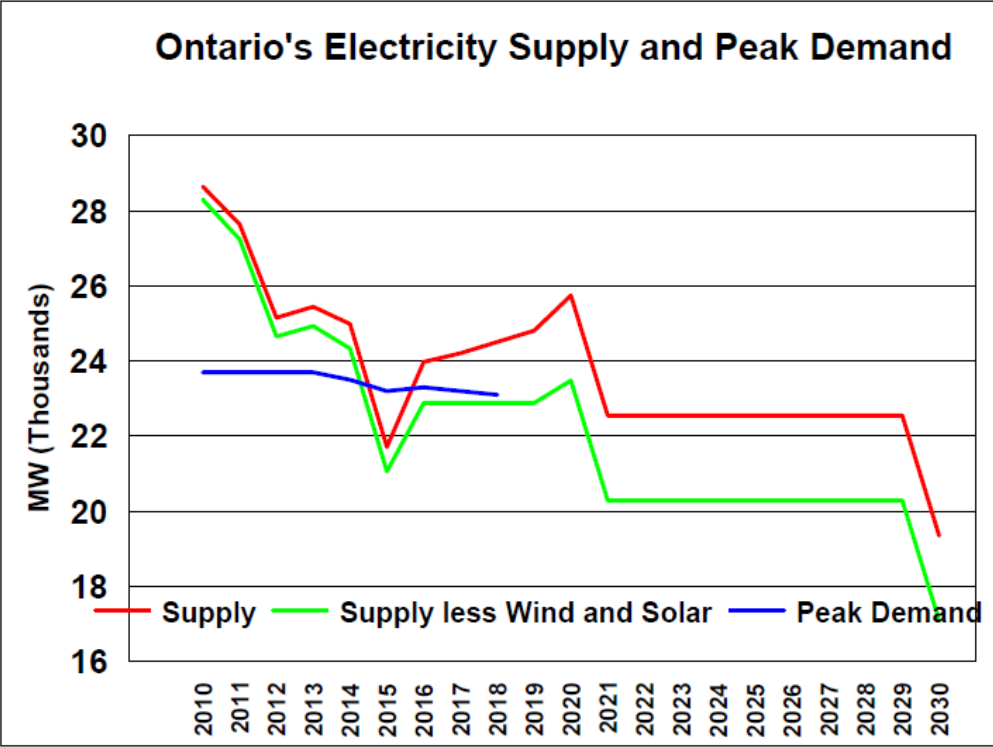
Technology Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Renewable (Incl. RESOP)	11	396	113	341	1,447	507	600	286		7	3,709
Clean		1,095		1,036	2,113	868	408	280		900	6,700
Nuclear							1,500	750	750		3,000
Totals	11	1,492	113	1377	3,560	1,375	2,508	1,316	750	907	13,409
Accumulative Totals	11	1,502	1,615	2,992	6,552	7,927	10,435	11,752	12,502	13,409	

Note: In-service nuclear capacity in 2012 and 2013 are for indicative purposes only; the refurbishment schedule for Bruce A Units 3 and 4 is under review.

Ontario Power Authority 4th quarter Report, 2009

These new resources will not be sufficient to ensure reliable and adequate supplies of power in 2014 – 2020.

Natural Gas →



Declining resources include coal retirement and nuclear resources removed for refurbishment and retirement

1. Coal-Fired Generation

6,434 MW will be removed from service by 2014 - 2,000 MW in 2011.

These units provide intermediate generation to balance load – increasingly important as new intermittent resources are added. They can be utilized for baseload in the event of decreased nuclear capacity and can be quickly dispatched for peak load needs.

2. Nuclear Refurbishment and New Build

The OPA advises that “*nuclear availability is lowest between 2016 and 2020 when a number of units are simultaneously on refurbishment outages.*” and “*... the period between about 2016 and 2021 will see a considerable reduction in the contribution from nuclear resources. For purposes of overall adequacy, it will be especially critical to manage and maximize nuclear availability during this period.*” The OPA has advised that the availability of skilled labour, long lead times for equipment and critical material resources could adversely impact scheduled completion dates. The Bruce Power refurbishment is currently behind schedule.

Nuclear energy produces over 50% of Ontario’s daily power supply (53% in 2008; 55% in 2009). Nuclear units will be refurbished, returned to service and retired within the next decade. This will leave shortfalls of varying amounts – of baseload generation production – during the years from 2012-2020. Renewable resources such as wind and solar cannot offset the required constant energy production. In the past, when nuclear units have been unavailable, coal-fired power generation has successfully filled the gap.

■ As recently as 2008, the OPA advised that the province needed to quickly build a new nuclear facility because most existing reactors – the source of about ½ of Ontario’s electricity – were projected to reach the end of their design lives between 2016 and 2021 and would require replacement and/or refurbishment.

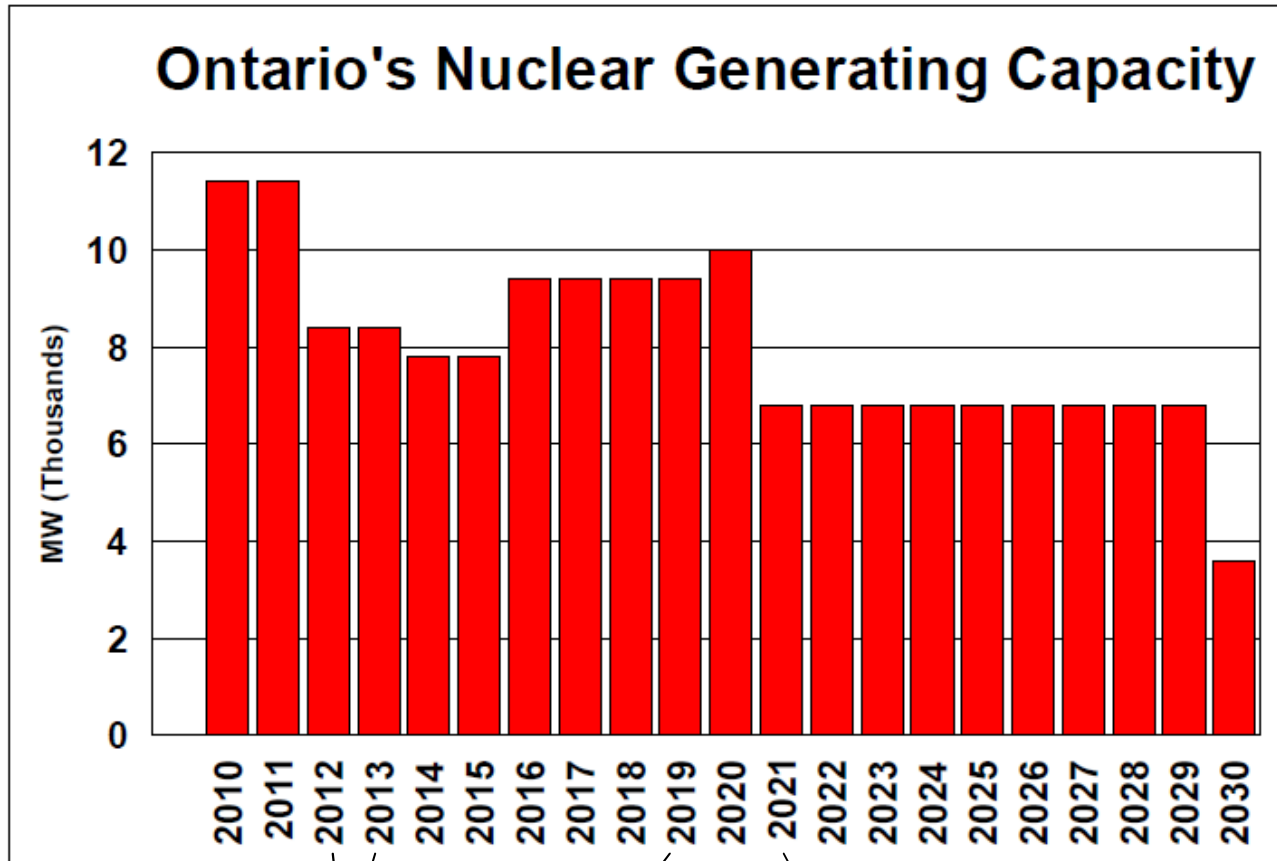
■ 3,100 MW at Pickering will be “tuned up” to allow in service of these units to 2020 when they will be retired from service. Details regarding outage timing and dates have not been released.

There is no plan, as yet, to replace these units with new nuclear, a process which takes 10 – 12 years.

■ 3,500 MW, the existing Darlington units, will undergo refurbishment beginning in 2016. Early information seems to indicate consecutive outages but details regarding timing and length of outage for each unit have not been released.

■ Bruce Nuclear units – 6,600 MW potential – 4,700 MW currently in service.

1,500 MW from the refurbished Bruce units will be available in 2011, provided the transmission is available. This will trigger the refurbishment/outage of Bruce A, units 3 and 4 - 1,500 MW.



Pickering "Tune-Up"
Darlington refurbishment
Pickering removed from service

The above chart is an estimation of installed nuclear capacity based on details to date. (February, 2010) The chart assumes 2 Bruce units coming out of service for refurbishment once the current out-of-service units are returned to service; Pickering "tune-up" work 2012-2013; Darlington refurbishment 2014-2019; retirement of Pickering in 2021, and no new nuclear facility.

3. Renewable Resource Additions

With the implementation of the Green Energy Act, the Ontario government has increased the procurement of renewable resources, primarily wind and solar. These resources however, are intermittent, cannot be counted on for consistent or dispatchable generation, and require conventional resource back up, or storage. *“While Ontario’s wind output capacity has increased steadily over the last number of years, the need to manage the variability of this energy resource has also grown. While the highest hourly output for 2009 was 989 MW on October 31, the lowest was just 1 MW on August 13.” ...*

Solar photo-voltaic (PV) outputs are less persistent than wind – meaning they can change output significantly within minutes or even seconds. (IESO, The Ontario Reliability Outlook, December, 2009)

“In anticipation of large amounts of variable generation connected to the transmission grid and distribution systems, the IESO is developing new ways to help it balance supply and demand. ... Storage technologies – from flywheels to pumped storage and batteries – are being demonstrated in various pilot projects around the world ... “ (IESO) Mass storage technologies will not be available, or cost effective for some time. (There are some potential pumped storage sites in Ontario but due to cost and time are not feasible in the next number of years.)

The IESO, in December, 2009, reported that, *“Greater levels of wind resources, will drive system operators to want increased access to ramping and ancillary services from neighbouring jurisdictions to make up for changes in wind output. ... system operators could also access additional ramping capabilities from adjacent markets to support increased levels of variable capacity.”* However, the OPA has advised that long-term Ontario may not be able to continue to rely on the same level of support from its interconnected neighbours as it has received in the past, resulting in reduced confidence in imports.

4. Natural Gas-Fired Generation

It is apparent that natural gas-fired generation will be required to fill the generating gaps throughout this next decade and beyond. The IESO reports that 4,700 MW of new gas has been installed since 2003; 2,400 MW in development; and an additional 1,600+ MW in the queue (Nanticoke and Cambridge – see http://www.ieso.ca/imoweb/connAssess/caa_StatusSummary-2.asp), in addition to pre-existing natural gas fired generation. That totals approximately 12,000 MW of installed natural gas-fired generation. Natural gas will be the “finger in the dyke”.

Ontario will rely heavily on natural gas-fired generation:

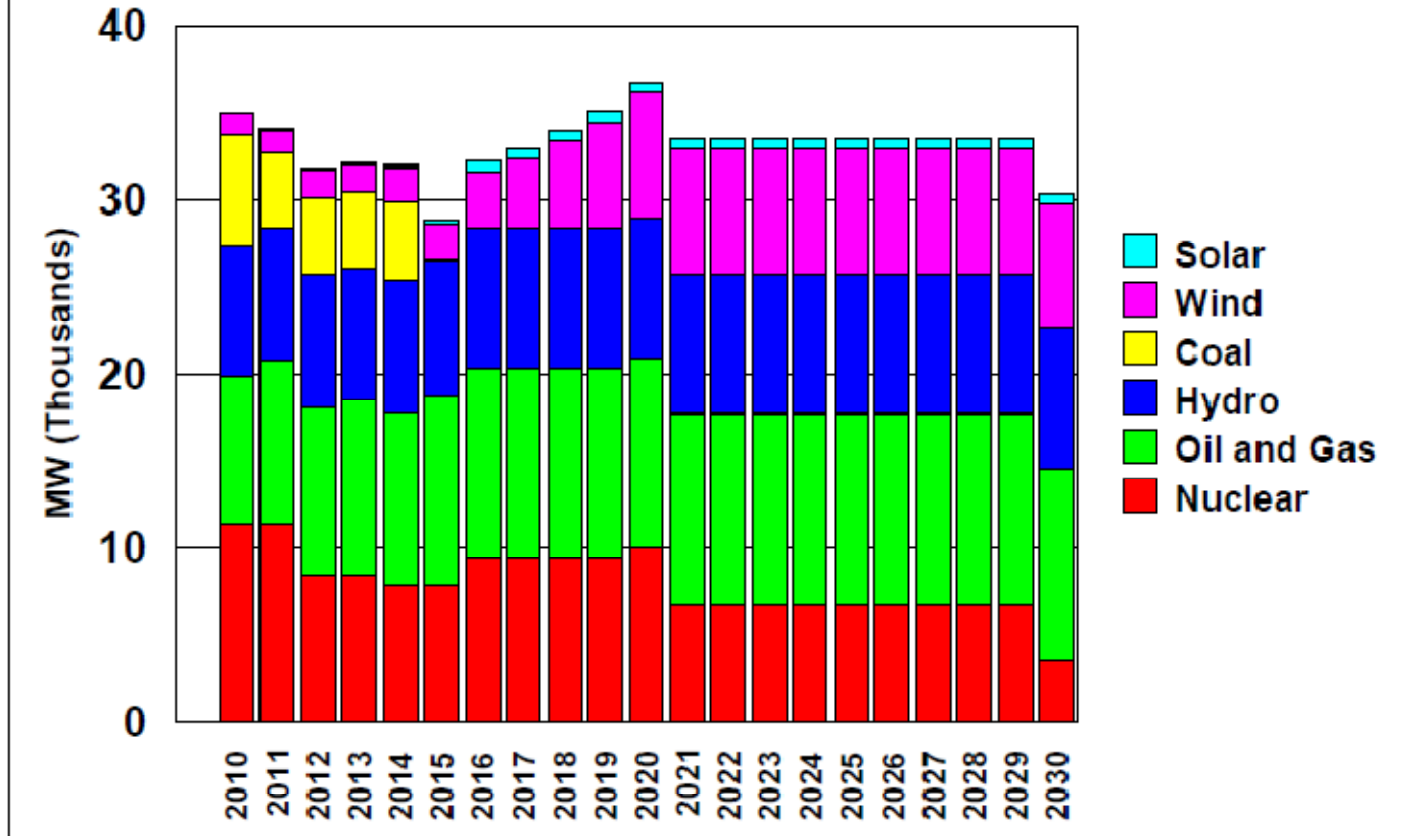
- for coal replacement;
- if conservation goals are not met;
- to complement the variability of renewable resources;
- as interim and/or long term replacement for nuclear resources; (The OPA advises that lower nuclear capacity could increase natural gas-fired power production by 5-23 TWh/year.)
- in case of surplus baseload (if nuclear units are shut down as a result of surplus conditions gas generation would provide generation until nuclear units are brought back into service – 72 hours)
- as substitutes for transmission reinforcement;
- to address system reliability in constrained local areas.

■ There have been numerous cautions regarding overreliance on natural gas-fired generation resources. The OPA repeatedly advised that natural gas should not be utilized for baseload power generation. Concerns include fuel cost; long-term supply constraints; insufficient fuel to supply home heating and electricity generation during winter months; insufficient gas infrastructure. Although natural gas costs are lower now, it is uncertain whether they will remain so. Supplies from western Canada are in decline. Although shale gas finds in the U.S. appear promising, these wells are uncertain in terms of productivity and longevity. In addition, environmental concerns regarding extraction methods are becoming increasingly apparent.

The CAE Alliance addressed a number of issues associated with significant natural gas-fired power generation in our Submission to the Ontario Energy Board in respect to the Integrated Power System Plan, summer, 2008, available on our website.

The following chart demonstrates the critical role that natural gas-fired generation will have over the next decade.

Ontario's Electricity Generation Capacity



Note - this chart shows installed capacity. Wind resources generate at about 20% - 30% capacity. There is little/no allowance for planned outages, reduced hydroelectric demand during summer months, longer than predicted refurbishment times. At any one time 4,000 MW - 6,000 MW of capacity is unavailable at any time due to ongoing maintenance and unit outages.

(Peak demand 24,380 MW, 2009; 26,160 MW in 2005.)

5. Demand Forecast

Demand for electricity in Ontario declined in 2009 as a result of the economic recession, conservation efforts and mild weather. Down 6.1 per cent over 2008, demand reached just 139 TWh, its lowest level since 1997. (Production for 2009 was 148.1 TWh – net export 9.1 TWh) This was double the anticipated 3% drop in demand. (Peak hourly demand 2009 - 24,380 MW)

Any of the following, or combination on the following factors, could impact resource requirements:

- Government expectations include 20% hybrid vehicles in the provincial auto mix by 2020, resulting in increased power demand, particularly during present off-peak hours.
- Industrial demand, down 20% in the first ¼ of 2009 compared to the same period in 2008, could rebound.
- Return to hotter, drier summers – lower hydroelectric availability.
- Difficulty accessing the attribution of conservation efforts to the reduction in power demand.

Generation by Fuel Type:	2008		2009	
	TWh Production	Percentage	TWh Production	Percentage
Nuclear	84.4	53%	82.5	55.2%
Hydroelectric	38.3	24.1%	38.2	25.5%
Coal	23.2	14.5%	9.8	6.6%
Natural Gas/Oil	11	6.9%	14.3	10.3%
Wind	1.4	0.9%	2.3	1.6%
Other	1	0.6%	1	.8%
TOTAL	159.3		148.1	
	(22.2 TWh exports; 11.3 TWh imports)			

CONCLUSION:

As a result of failure to address baseload requirements, relying too heavily on natural gas-fired generation, focusing resource cost on uncertain conservation programs and intermittent resources, Ontarians are entering a new era of more expensive, yet less reliable electricity in this province. This will impact all aspects of our lives and livelihood and hinder economic recovery and growth in Ontario.