ONTARIO CLEAN AIR ALLIANCE RESEARCH: BRIEFING NOTE

New IESO Report on Wind & Solar Energy Combined with Battery Energy Storage vs SMRs

In August 2025 the Independent Electricity System Operator (IESO) released a new report: **Hybrid Resource Portfolio Equivalency Assessment: Study of the reliability and economics of variable generation and BESS resource portfolios to meet system needs traditionally supplied by dispatchable resources.**

The report has two very important findings about the potential for wind, solar and battery energy storage systems.

1. They can meet at least 99.5% of Ontario's **peaking** and **base-load** electricity needs.
2. They can meet Ontario's **peaking** and **base-load** electricity needs at a **lower cost** than new small modular nuclear reactors (SMRs).

RELIABILITY

According to the report, wind and solar energy combined with 4, 6, 8 and 10-hour duration lithium-ion batteries can meet 99.5 to 99.98% of our **peaking** electricity needs and 99.7 to 99.9% of our **base-load** electricity needs under all weather scenarios.[1]

Demand response resources and/or our existing gas-fired power plants could meet our remaining electricity needs.[2]

ECONOMICS

According to the IESO, due the intermittent nature of wind and solar energy, wind and solar energy systems often need to be "overbuilt" to meet system adequacy requirements. As a result, there will be times when they will produce more electricity than is needed to meet system needs. Furthermore, the report notes that the value of this **excess energy** should "be considered in any planning study when comparing resource portfolios to meet a specific need." [3]

According to the IESO, the values of the **excess wind and solar energy** are $17.8 billion[4] and $28.4 billion[5] in its base-load and peaking scenarios respectively.

When the values of excess wind and solar energy are included in the analysis:

1. wind, solar and battery energy storage can meet our **peaking** electricity needs at a cost of $15.7 to $24.5 billion[6] versus $97.1 to $120.0 billion for SMRs [7] ; and
2. wind, solar and battery energy storage can meet our **base-load** electricity needs at a cost of $19.5 to $29 billion[8] versus $27.6 to $33.8 billion[9] for SMRs.

So, according to the IESO, wind, solar and battery energy storage can meet our **peaking** electricity needs at a cost that is 80 – 84% lower than new SMRs; and they can meet our **base-load** electricity needs at a cost that is 14 – 29% lower.

If the IESO had analysed a resource portfolio consisting of wind, solar, battery energy storage and **demand response**, the need to "overbuild" wind and solar resources to meet system adequacy requirements would be reduced. This would further improve the cost-effectives of renewable energy & battery storage relative to SMRs.

Finally, it is important to note that the IESO's analysis significantly understates the relative cost effectiveness of the wind, solar and battery energy storage systems by making the following overly optimistic assumptions about the cost and performance of new SMRs.

1. The IESO's capital cost estimates for new SMRs [$11,804 to $16,711 per kW (2024 CDN $)[10] are approximately 25 to 50% lower than the actual cost of the Vogtle nuclear reactors [$16,517 per kW (2024 US $)[11] or $22,628 (2024 CDN $)[12]] which came into service in Georgia, U.S.A in 2023 and 2024.

2. The IESO's analysis assumes the SMRs will have annual capacity utilization factors of 90.9% during every year,[13] despite the fact that according to the International Atomic Energy Agency, the lifetime average annual capacity utilization rates of the Pickering and Darlington Nuclear Stations were 71.4% and 78.6% respectively, as of December 31, 2023.[14]

3. The IESO's analysis assumes the SMRs will operate for 60 years without major refurbishments[15], despite the fact that Ontario Power Generation started a $12.8 billion refurbishment of the Darlington Nuclear Station only 26 years after its first nuclear reactor went into service.[16]

4. The IESO's analysis does not include the cost of decommissioning the reactors and storing their radioactive nuclear wastes for one million years.[17]

[1] IESO, *Hybrid Resource Portfolio Equivalency Assessment: Study of the reliability and economics of variable generation and BESS resource portfolios to meet system needs traditionally supplied by dispatchable resources,* (August 2025), pages 4, 5, 8 & 25.

[2] *Hybrid,* page 12.

[3] *Hybrid,* page 26.

[4] The average value of excess **base-load** energy in 10 different weather years. *Hybrid*, page 23, Table 9.

[5] The average value of excess **peaking** energy in 10 different weather years. *Hybrid,* page 21, Table 7.

[6] Table 1 of the *Hybrid* report does not include the value of excess **peaking** wind and solar energy, namely, $28.4 billion. Therefore, to calculate the net cost of **peaking** wind, solar and battery energy storage, their costs shown in Table 1 [$44.1 to $52.9 billion] must be reduced by $28.4 billion. *Hybrid*, page 4, Table 1 and page 21, Table 7.

[7] *Hybrid,* page 4, Table 1.

[8] Table 1 of the *Hybrid* report does not include the value of excess **base-load** wind and solar energy, namely, $17.8 billion. Therefore, to calculate the net cost of **base-load** wind, solar and battery energy storage, their costs shown in Table 1 [$37.3 to $46.8 billion] must be reduced by $17.8 billion. *Hybrid*, page 4, Table 1 and page 23, Table 9.

[9] *Hybrid*, page 4, Table 4.

[10] *Hybrid*, pages 8 & 9 and Appendix 1.

[11] *The World Nuclear Industry Status Report 2024*, pages 230-231.

[12] We have converted the U.S. dollar cost to Canadian dollars by multiplying by 1.37. The average exchange rate in 2024.

[13] For SMRs "a system overbuild factor of 10 per cent was assumed to meet 100 per cent of the load served to account for any lost generation from outages, as well as lower summer effective capacity." *Hybrid,* pages 12 & 13.

[14] The International Atomic Energy Agency's capacity utilization calculations for the Pickering Nuclear Station do not include the zero percent capacity utilization rates for Unit #1 between 1998 and 2004 inclusive and Unit #4 between 1998 and 2002 inclusive, when these units were shut down for safety reasons. CLICK HERE TO VISIT PAGE

[15] *Hybrid,* page 9.

[16] Nuclear Refurbishment Begins at Darlington Station CLICK HERE TO VISIT RELEASE

[17]Nuclear Waste Management Organization, *Choosing a Way Forward: The Future Management of Canada's Used Nuclear Fuel*, (2005), pages 344 and 348.

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