Ontario's Power Politic and Distributed Energy Resources (DER)

Discussion Material for CCRE Energy Leaders Roundtable

April 12, 2018

STRATEGIC POLICY ECONOMICS

Picking Up From Last Year

"The Economics and Politics of Carbon Pricing"

Situation a year ago:

- Ontario's Climate Action Plan was developing and Cap and Trade (C&T) had not yet been linked
- Federal Government announced it was pursuing an escalating carbon price to $50/tonne by 2022
- LTEP consultations were completed but the Fair Hydro Plan had interrupted LTEP efforts at the Ministry of Energy

Messages discussed on panel last year:

- Ontario's emission targets are more aggressive than others'
- LTEP planning outlook generation insufficient for climate targets
- Achieving emission targets with C&T would increase Ontario's cost of using energy by $47B per year (75% increase)
- A "Smart" approach could reduce the ***economic*** cost from $27B/year to $3B/year
- Ontario needed an integrated climate, energy, economic, and industrial policy

Topics Explored Today

- Long Term Energy Plan (LTEP) is now in climate denial
  - Ford as well
- LTEP lacks detail on how to fill a growing capacity gap
- LTEP encouraging LDCs to create renewables-based DER
- Renewables-based DER premised on cost myths
- Intermittency - the unfortunate truth undermining costs of renewables-based DER
- Ontario has better options for leveraging DER storage
- We've been here before with the Green Economy Act

Three Major Political Events in Last 6 Months

Linked C&T, the LTEP release, and Doug Ford

1. C&T linked to California, performing as expected
   - Ontario & global efforts are falling short of climate targets
2. LTEP long term forecast is in climate denial
   - Ontario's Environmental Commissioner was very critical:
     - "Ontario's Long-Term Energy Plan, … was a disappointment. .. with an overriding focus on near-term electricity rates, the LTEP fails to address the most pressing energy question of our time:

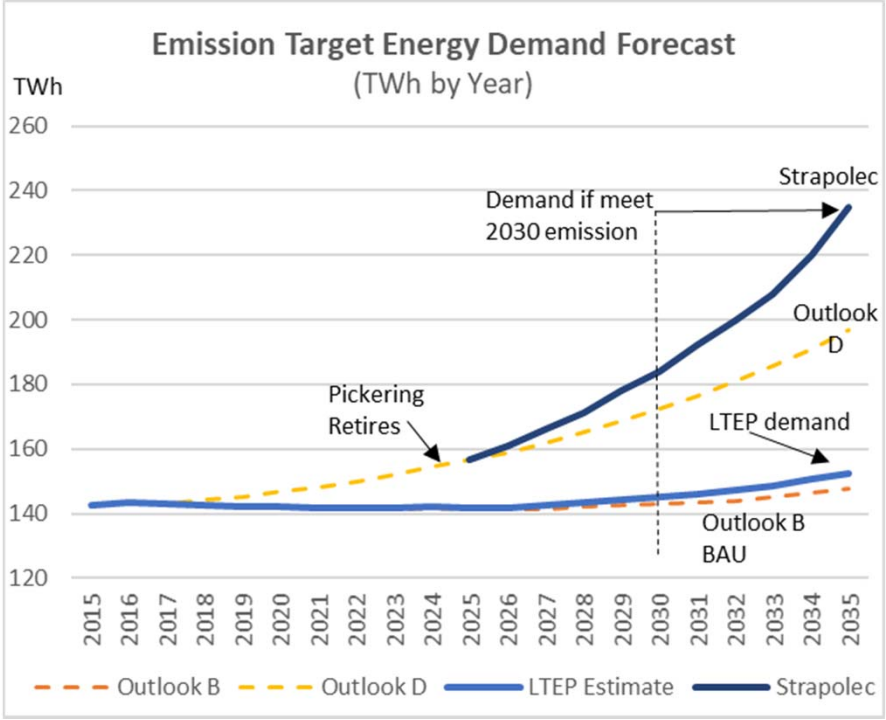
       How will we transform our energy systems to meet our ambitious future climate targets?"
3. Doug Ford became Leader of the PC Party
   - With an anti-C&T and carbon tax platform

These outcomes of our political process do not portend well for an Ontario that still needs:

- Integrated climate, energy, economic, and industrial policy

Interests of politicians and their usurping of the democratic process are undermining an opportunity for Ontario to gain competitive advantage in a decarbonizing world

The LTEP demand forecast ignores the possibility of electrification from emission reduction initiatives



Outlook B and D from IESO Sept 2016 Ontario Planning Outlook (OPO) to support the LTEP process with climate related demand scenarios

Sources: IESO OPO 2016, LTEP 2017, Strapolec 2016 "Emissions and the LTEP", ECO 2018, Strapolec Analysis

Ontario's Growing Capacity Gap

Along with ignoring climate, LTEP has left long-term capacity challenges unresolved

By 2035, 30% of Ontario's generation capacity will up for renewal

Major drops in capacity occur in 2025 and 2030

- Retirement of Pickering removes a baseload supply
- Expiring contracts include renewables and gas assets, reflecting a need to address daytime demand

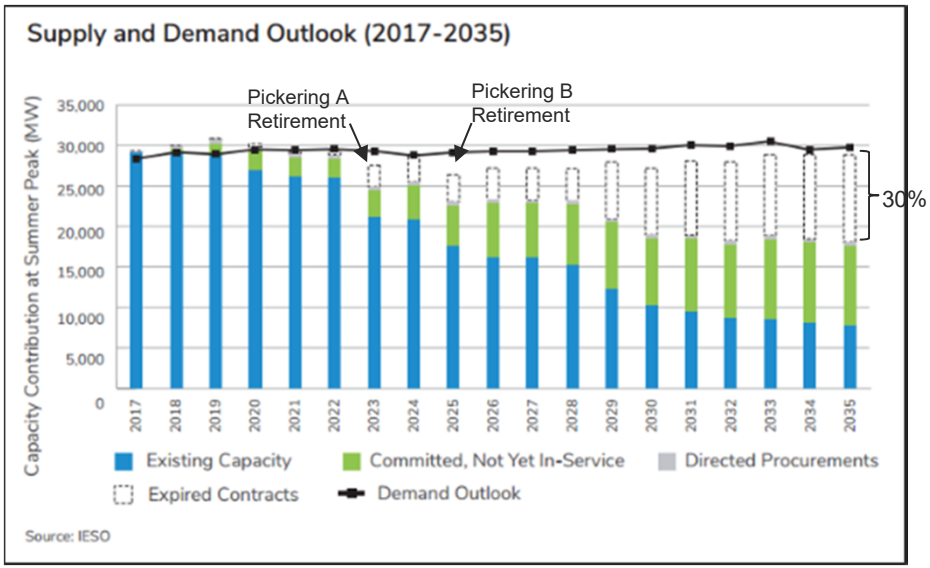
Existing / committed resources are low carbon, low cost assets that provide a flexible baseload

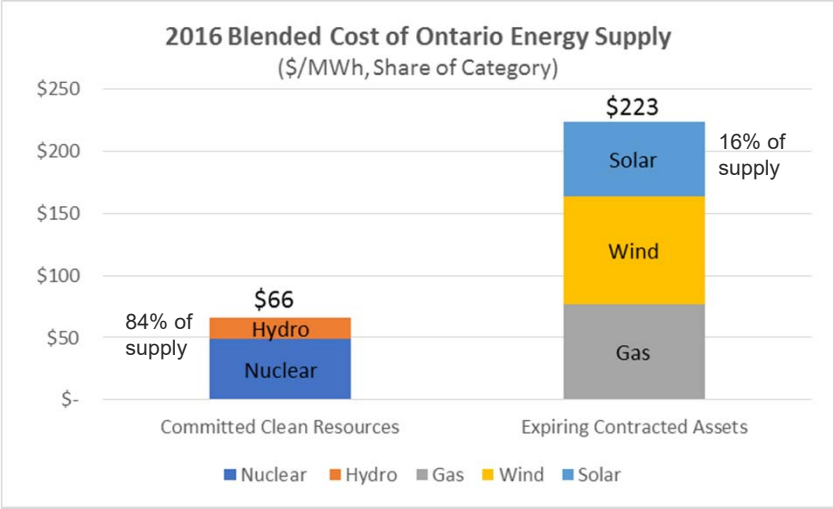
- Ontario's hydro fleet
- Refurbished nuclear
- Biomass
- Import/export energy exchange with Hydro Quebec

Expiring assets reflect high cost resources

- Ontario has an opportunity to switch out the high cost and replace it with low cost

LTEP Answer → *Market Renewal and DER*





Source: LTEP 2017, OEB, Strapolec Analysis

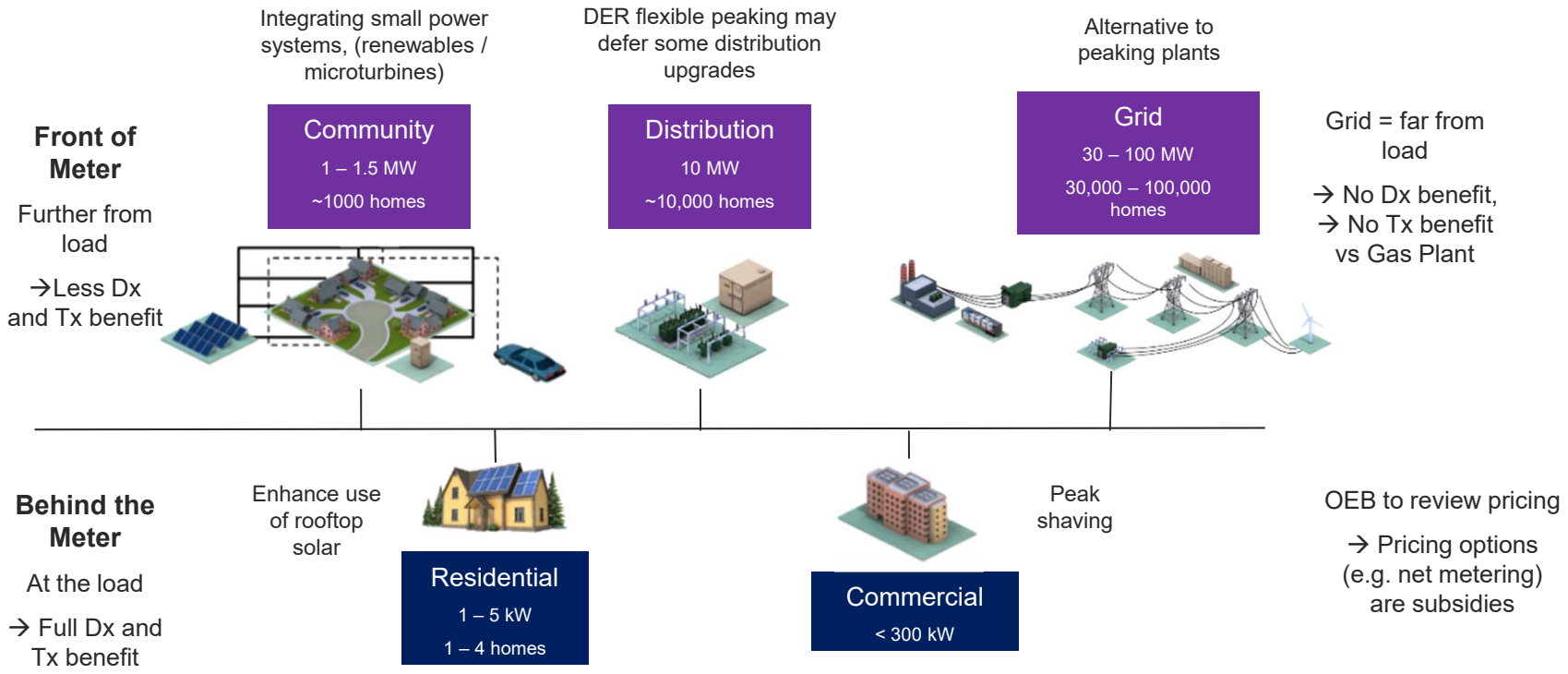
Source: OEB RPP Report, April 2017

Distributed Energy Resources (DER) Seen as a Game Changer

LTEP looks to renewables-based DER and promotes pricing subsidies

LTEP advocates DER as the low cost, low emission solution

- LTEP prioritizes renewables - DER to replace expiring contracted assets – emphasizing “non-wires” LDC solutions
- Seeking benefits in increasing adoption of renewables-based DER



Renewables-based DER question:

Does intermittency detract from the ability of storage to mitigate demand fluctuations?

Sources: LTEP, Lazard LCOS Analysis Nov 2017, Strapolec Analysis

LTEP Looks to Renewables-Based DER

There are many cost myths

Despite forecast cost declines, small scale DER installations costs will remain high beyond 2030

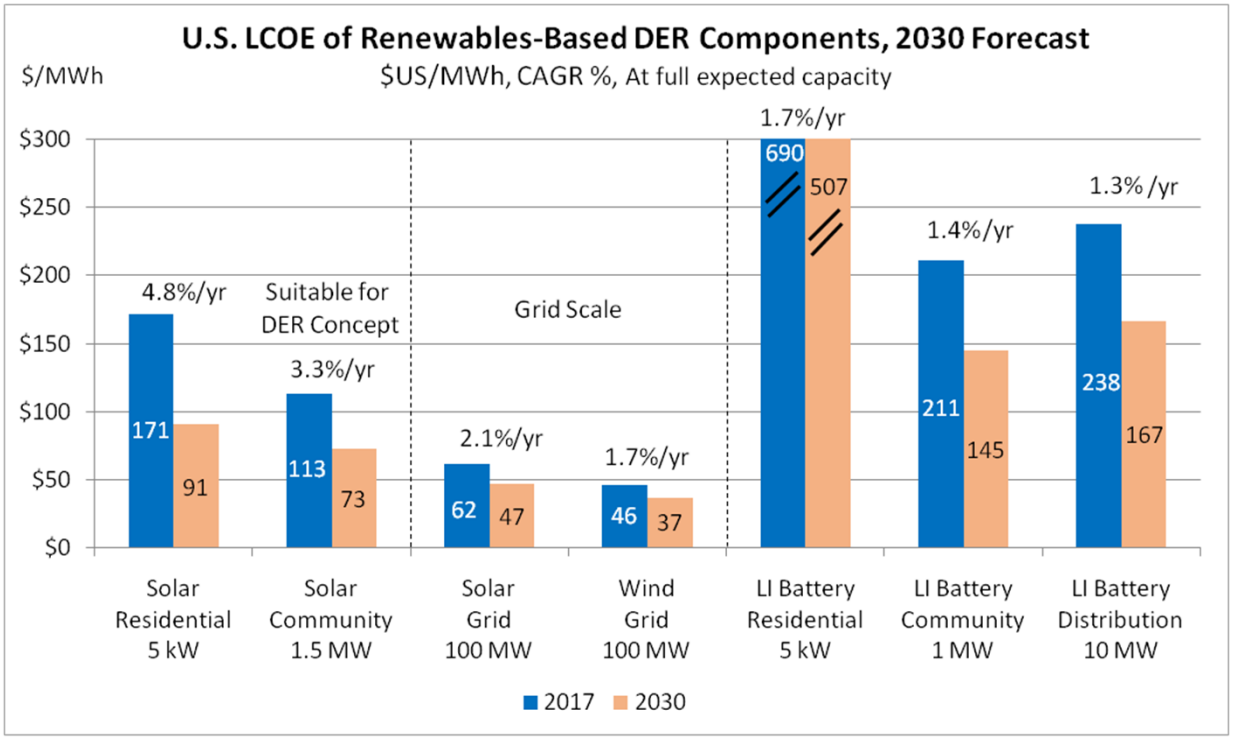
- For both solar and storage;
- Storage costs additive plus 14% efficiency loss
- Residential storage costs expected to be prohibitive well beyond 2030

U.S. forecast for community solar higher than refurbished nuclear (with exchange rate)

- Stored solar will be 3 times the cost

Cost clarity necessary to avoid high cost from LTEP DER "non-wires" push

- Green Economy Act created oversupply of high-cost renewables



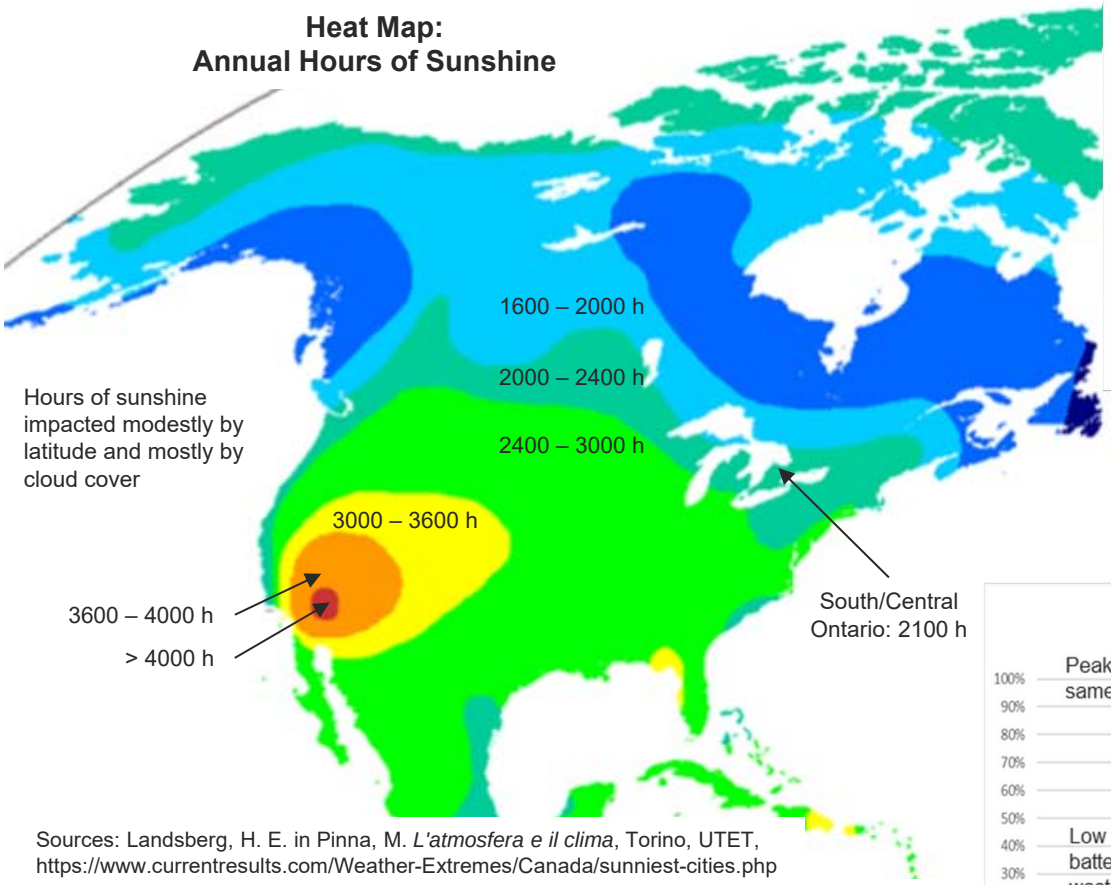
- Refurbished nuclear is $80/MWh per FAO 2017 report, solar would be $84/MWh at an exchange rate of 15%

Source: LTEP 2017, EIA, NREL, Lazard, Leidos, FAO, Strapolec Analysis

Unfortunate Truth for Ontario

Ontario has far fewer hours of sunshine than the U.S.

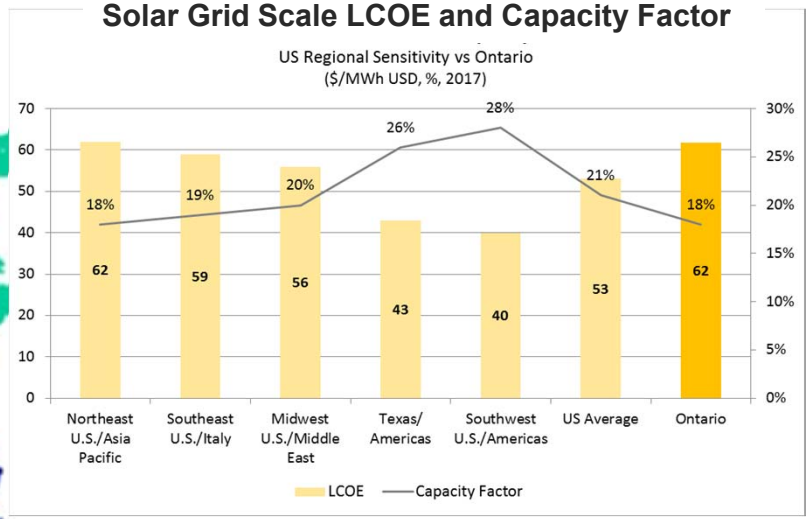
Heat Map:
Annual Hours of Sunshine



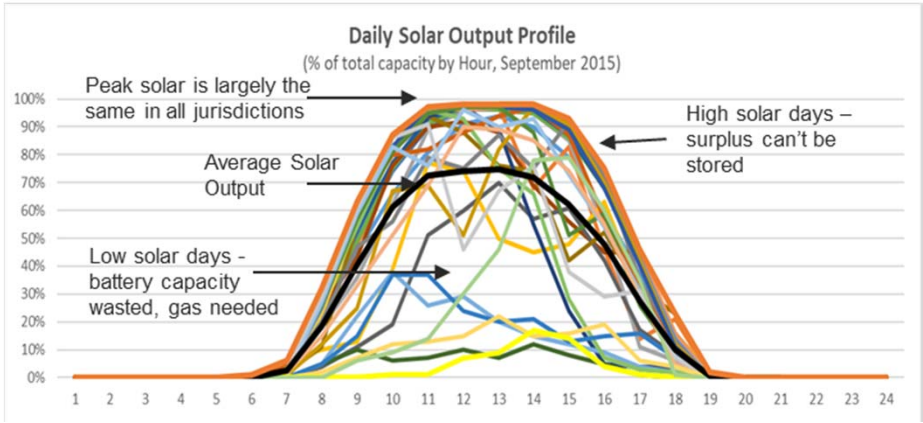
Hours of sunshine impacted modestly by latitude and mostly by cloud cover

Sources: Landsberg, H. E. in Pinna, M. *L'atmosfera e il clima*, Torino, UTET, https://www.currentresults.com/Weather-Extremes/Canada/sunniest-cities.php

Solar Grid Scale LCOE and Capacity Factor



Solar output varies greatly from Day to Day



Source: Lazard 2017, IESO 2015-2017, Strapolec Analysis

The Unfortunate Truth for Renewables-based DER

Ontario's geography makes DER 20% higher cost than U.S., but Ontario has alternatives

intermittency increases cost of DER solutions by 60%

- 50% higher than existing costs

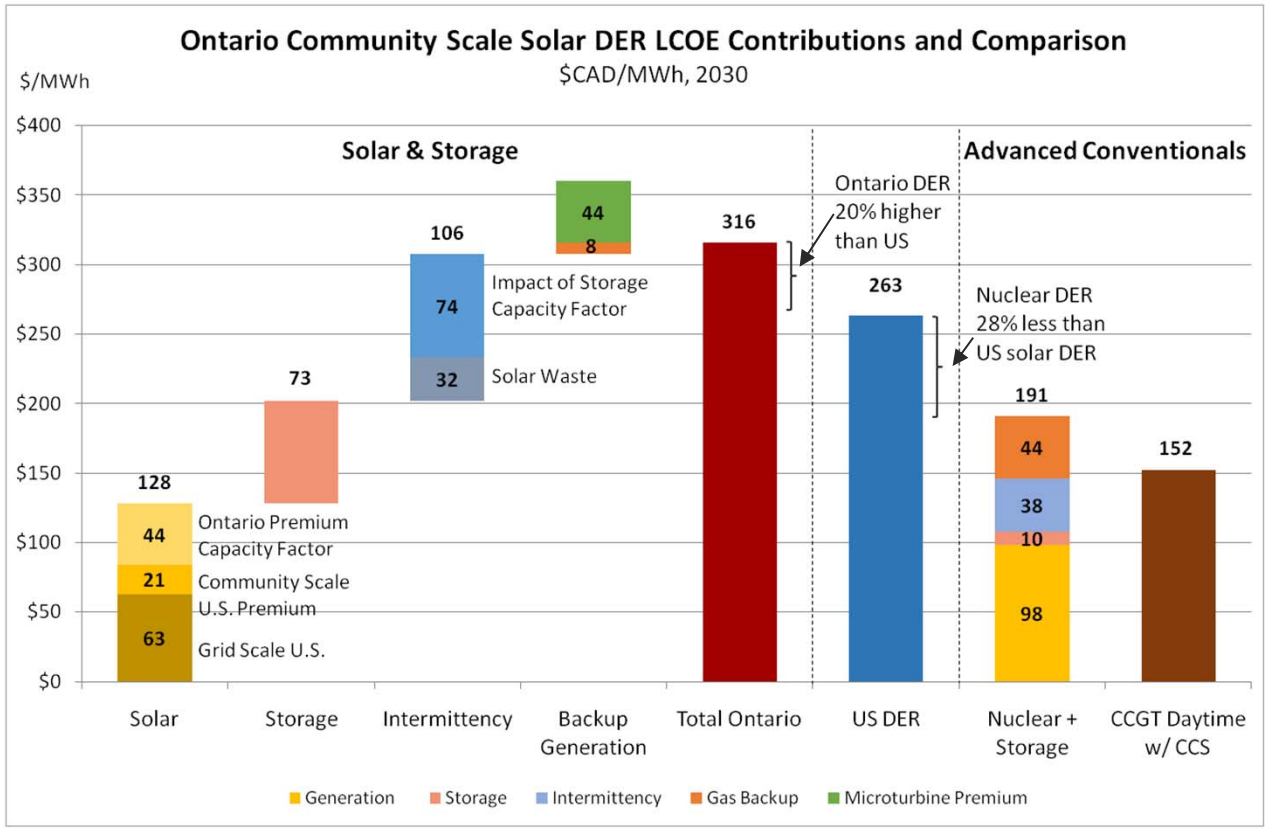
Ontario costs higher than U.S.

- Capacity factor → Ontario lower
- Intermittency → Ontario worse

Renewables DER may represent a threat to Ontario's energy cost competitiveness

Nuclear based DER – an Ontario alternative

- Use baseload to charge distributed storage
- 40% less costly than renewables
- Almost 30% less costly than U.S.
- 10% less than existing costs



- Solar and storage costs reflect per MWh costs for 1.5 MW capacity solutions.
- CCGT includes 90% carbon capture and $2 carbon price
- Exchange rate for comparison: assumed at 15%, applies to 60% of solar/storage, 90% of gas, 25% of nuclear

Sources: EIA, NREL, Lazard, Leidos, EIRP, media reports, Strapolec Analysis

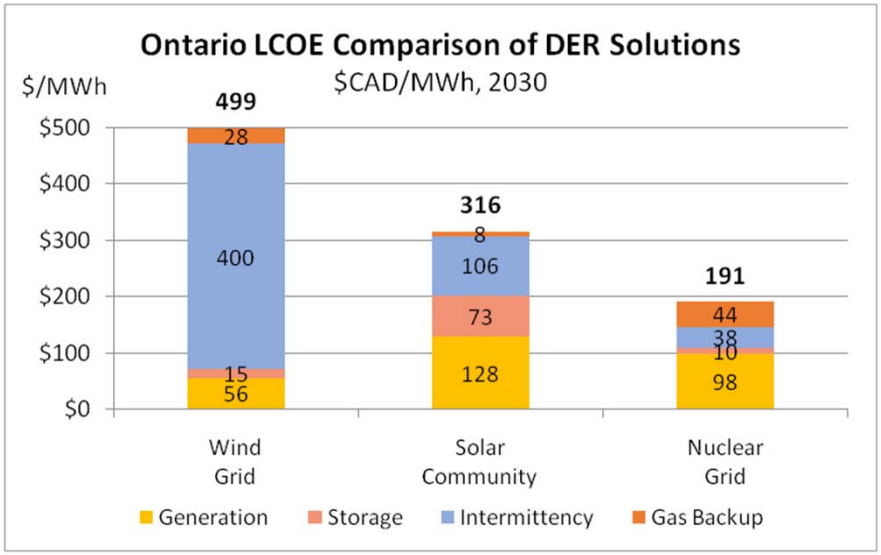
Conclusion – Ontario Needs Smarter, Strategic Approach

Renewables-Based DER

- Cannot deliver on the DER promise of low cost
- Won't be emission free
- Will worsen Ontario's competitive disadvantage, even with declined future costs

Ontario has better options

- DER at two thirds the cost
  - Leveraging baseload supply to charge distributed storage
- Creating competitive advantage for Ontario



Wind with grid scale compressed air 7-10 day storage, solar/nuclear with Lithium Ion

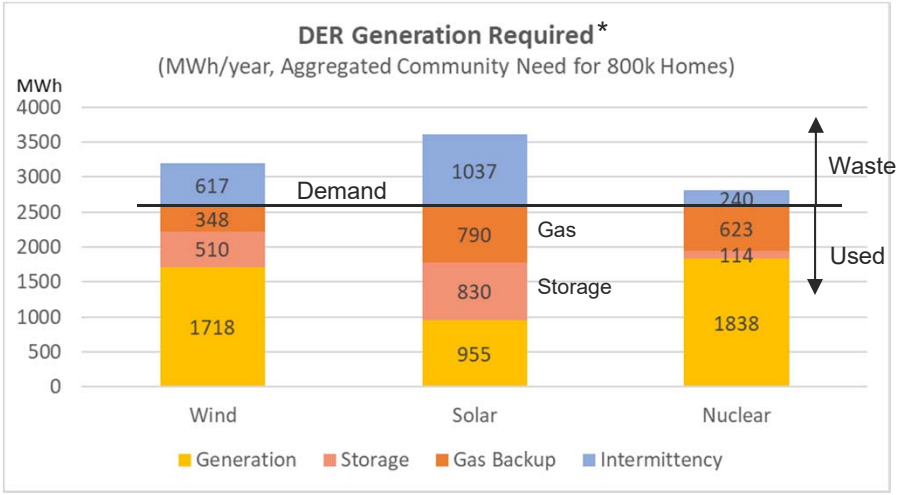
Solutions to the Political Challenge?

OEA may have it right: → focus on low cost, clean and reliable energy

- Legislate governance roles for political and independent agencies accountable for total cost
- Transparent, evidence-based decision making

Let the facts of DER costs determine its adoption

But not through pricing strategy subsidies



* Reflects daytime demand above baseload currently by Ontario's committed low carbon assets

Source: IESO, Strapolec Analysis