



Canadian
Electricity
Association

Association
canadienne
de l'électricité

VISION 2050

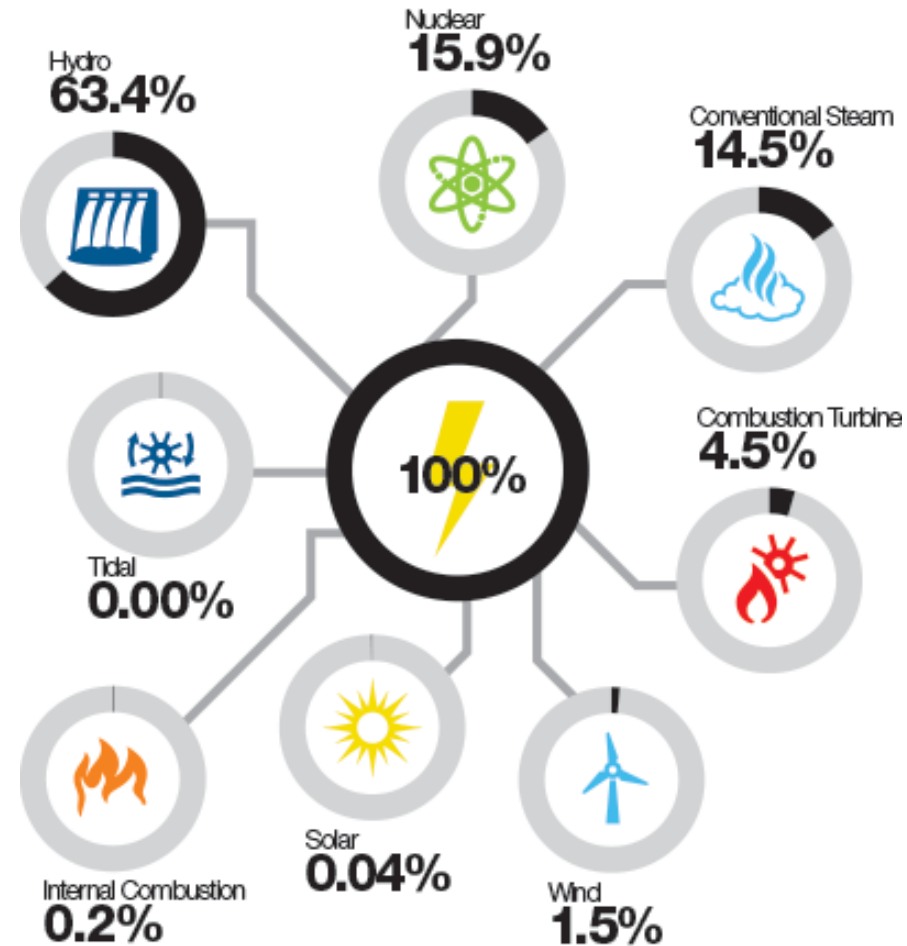
THE FUTURE OF CANADA'S ELECTRICITY SYSTEM



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President and CEO, Canadian Electricity Association
September 24, 2014

WHERE ARE WE TODAY?

- The North American electricity supply is steadily decarbonizing;
- Canada is already approximately 80% non-GHG emitting;
- Environmental regulation in Canada and EPA regulations around criteria air contaminants and toxics have led to a planned decline in coal.



Electricity Generation in Canada by Fuel Type, 2013

Total Electricity Generated in Canada, 2013 = 611.31 TWh

Source: Statistics Canada, Survey 2151, 2013. Retrieved September 10, 2014.

*Numbers may not sum to 100 percent due to rounding.

DECISIONS MADE TODAY AND OVER THE
NEXT 5 TO 10 YEARS WILL HAVE A HUGE
IMPACT ON WHAT OUR SYSTEM WILL
LOOK LIKE IN 2050





VISION 2050

CEA's Vision 2050 does not take a position on what 2050 will look like, but is a discussion on what are the key factors which will shape 2050:

1. **THE CUSTOMER**: technology is enabling the customer in ways not possible before;
2. **CARBON**: if we truly want to deal with carbon, the optimal solution is to price it in the economy, on a North American basis (at a minimum);
3. **ELECTRIC VEHICLES**: the driver for EVs is not an environmental one, but an economic one; and,
4. **THE NORTH AMERICAN GRID**: the electricity grid is already very much a shared resource between Canada and the US, yet additional opportunities for collaboration abound.

THE DISCUSSION IS NOT
ABOUT WHETHER OR
NOT TO DECARBONIZE,
BUT AT WHAT RATE,
AND WHAT ARE THE
RISKS TO THAT RATE?

DECARBONIZATION

Considerations:

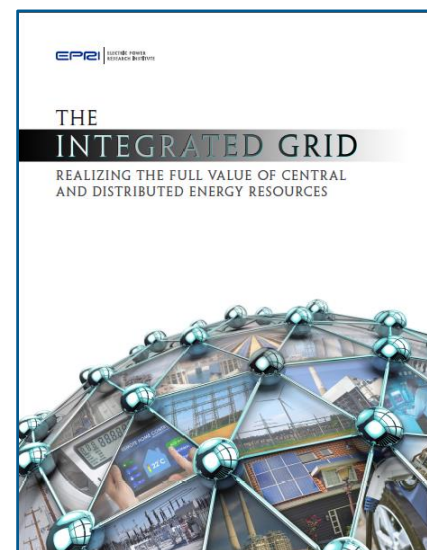
1. How much we want to spend to increase the rate of decarbonization?
 - Any move away from existing carbon-based generation while it still has considerable useful life remaining results in additional electricity price impacts
2. Proposed US EPA Clean Power Rule built around four key building blocks
 - While there is recognition of the capital stock turnover impact, it would be very cumbersome to implement state-by-state as the electricity system is not aligned state-by-state
3. Role of nuclear?

THE ROLE OF RENEWABLES AND DISTRIBUTED GENERATION

THREE PILLARS

In the end, we must also remember the decision-making process on our evolving grid is based on balancing three key attributes:

1. **SUSTAINABILITY**: the move to non-emitting and renewable sources;
2. **AFFORDABILITY**: current daily spend on electricity is less than 2% of household spending; and,
3. **RELIABILITY**: we all expect the lights to go on at the flick of a switch.
 - When we talk about renewable technologies, we also need to talk about inverter technologies and standards to provide reliability services.



The Integrated Grid: Realizing the Full Value of Central and Distributed Energy Resources
Electric Power Research Institute, March 2014.

**CANADIANS WILL
NEED TO MAKE
SOME
IMPORTANT
DECISIONS IN THE
NEAR FUTURE**



The Canadian Electricity Association welcomes your views on Vision 2050.

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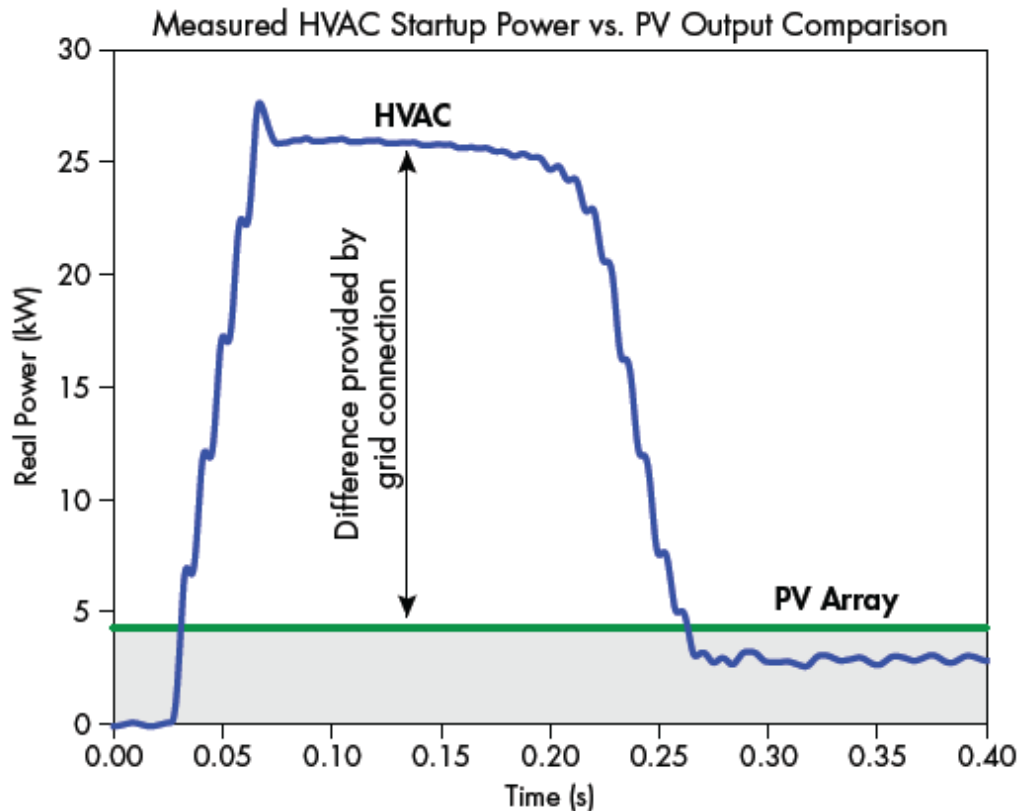
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BENEFITS OF GRID CONNECTIVITY

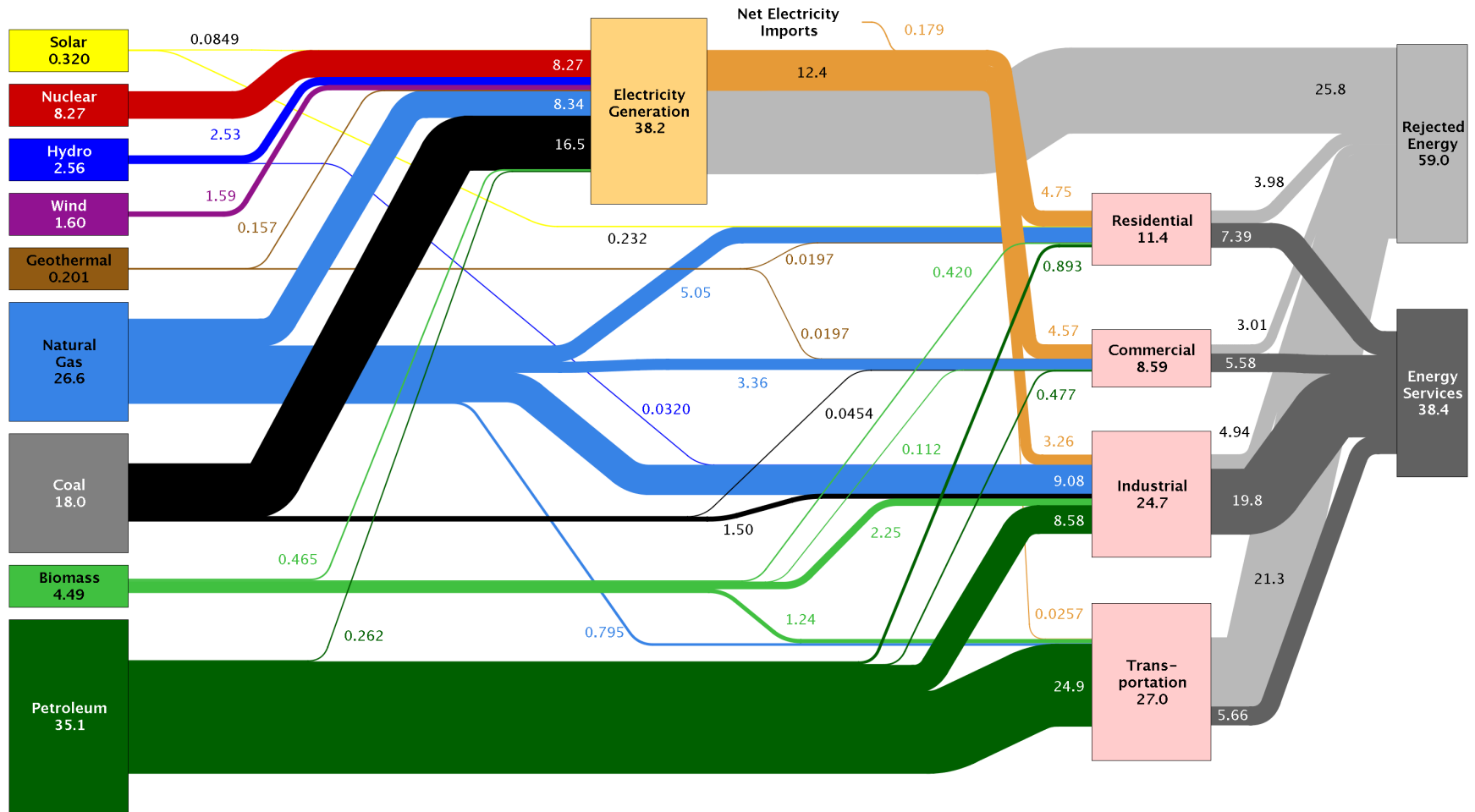


The grid provides in-rush current support for starting large motors, which may be difficult to replicate with a distributed generator.

Source: Electric Power Research Institute, "The Integrated Grid: Realizing the Full Value of Central and Distributed Energy Resources, 2014, p. 18.

Estimated U.S. Energy Use in 2013: ~97.4 Quads

Lawrence Livermore
National Laboratory



Source: LLNL 2014. Data is based on DOE/EIA-0035(2014-03), March, 2014. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 65% for the residential and commercial sectors 80% for the industrial sector, and 21% for the transportation sector. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527