

Towards a Pan-Canadian Wind Integration Study

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canwea

CANADIAN WIND
ENERGY ASSOCIATION

ASSOCIATION CANADIENNE
DE L'ÉNERGIE ÉOLIENNE

Overview

➤ Wind in Canada

- Where we are and where we're going
- CanWEA's WindVision 2025

➤ Developing the Pan-Canadian Study

- Challenges and opportunities
- Approach to initiate study
- Terms of Reference

➤ Next steps

- Funding and execution

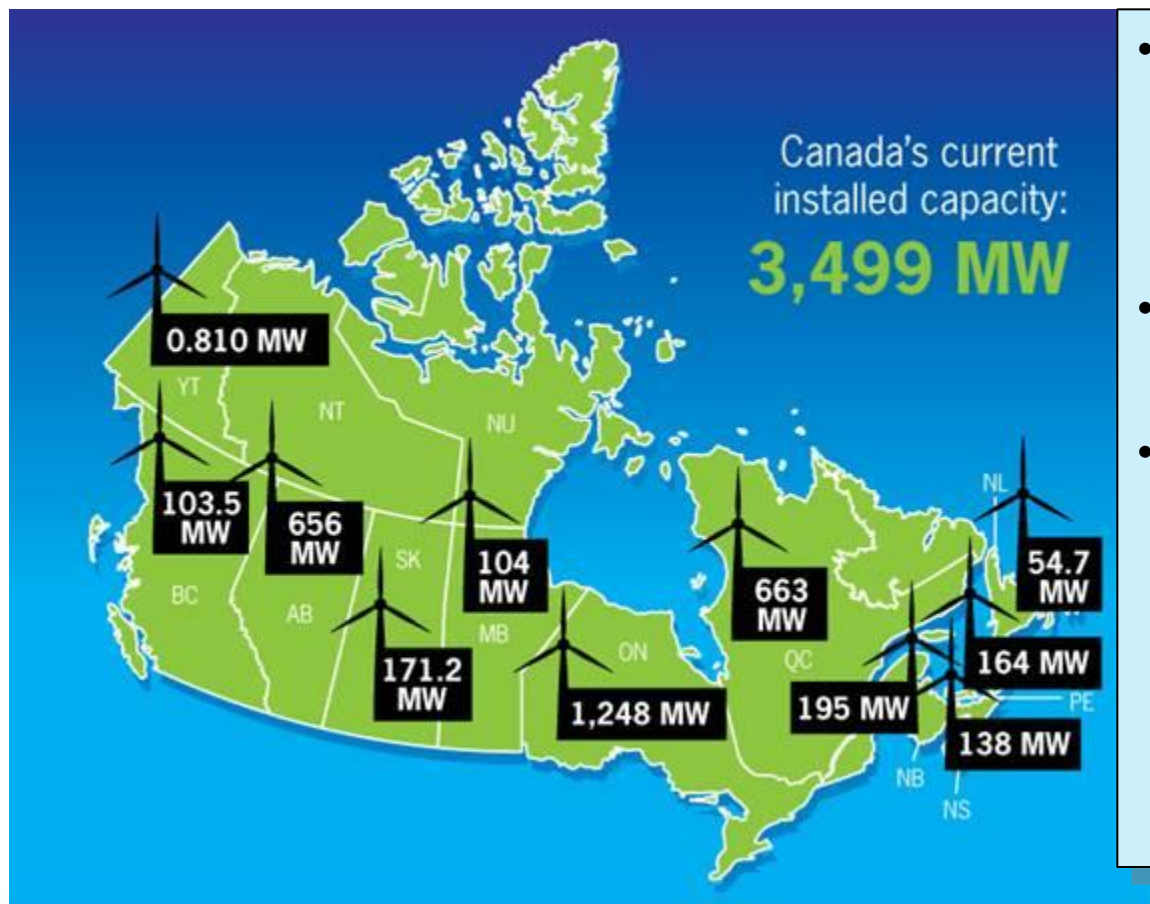


About CanWEA

- **National association for the wind energy industry in Canada**
- **More than 450 members representing all industry players:**
 - Wind turbine manufacturers, component suppliers, wind energy project developers, owners and operators and a broad range of service providers to the wind energy industry
- **Our mission is to promote the responsible and sustainable growth of the wind energy industry in Canada**
- **We are engaged in:**
 - Policy development and advocacy (federally and provincially)
 - Communications and public outreach
 - Educational and networking opportunities
- **For more information and resources on wind:**
 - www.canwea.ca



Wind Energy in Canada - September 2010



- **3,499 MW = Electricity for over 1 million homes = 2 % of Canada's total demand**
- **A record 950 MW added in 2009**
- **New wind developments in 2009 represented more than \$2.2 billion in investment**



Wind Energy In Canada – 2010 to 2015

- **Installed capacity expected to reach 4,000 MW by end of 2010**
- **Contracts signed for almost 6,000 MW of new wind construction to be built between now and 2015**
- **CanWEA believes that a minimum of 12,000 MW of wind energy capacity will be installed by 2015**
 - Ontario's Green Energy Act will result in at least 5,000 MW by 2020
 - Quebec – 4,000 MW by 2016 (3,500 MW has already been procured)
 - Alberta – Building new transmission to connect an additional 3,200 MW
 - Maritime Provinces – Minimum 1,200 MW by 2015
- **But we're just starting to scratch wind potential ...**



Wind Energy in Canada – 2015 to 2025:

CanWEA's WindVision 2025

- **20% of Canada's electricity demand to be met by wind energy by 2025**
 - Target on energy (MWh), not a capacity (MW) basis
- **Opportunity:**
 - Canada has a massive high quality wind resource, a large hydroelectric base, green energy export potential and a solid manufacturing base
- **Impacts:**
 - 55,000 MW of installed wind capacity
 - Minimum \$79 billion investment in Canada
 - Creates minimum 52,000 new jobs
 - Reduces GHG emissions by 17 million tonnes annually

WINDVISION 2025
POWERING CANADA'S FUTURE



Getting to 20% - Integration Challenges

➤ Big target – big questions!

- Where is all this wind going to go?
- What transmission will be needed to accommodate it?
- What are the operational impacts on the Canadian grid?
- What are the costs and the benefits going to be?

➤ Many challenges in answering these questions:

- Electricity is provincial jurisdiction – little national oversight of grid (no FERC equivalent in Canada)
- Certain provinces have done integration studies but these are not easily comparable (they use different targets, assumptions, methodologies, data sets etc.) and they do not look at export/import
- Provinces often have closer ties to U.S. states than they have to neighboring provinces



Tackling the Challenge

➤ Clear interest for all parties:

- System operators: integration studies help them to understand operational implications of increased variable generation
- Utilities: help them to understand export/import potential
- Provincial governments: understand the costs and benefits of their wind targets and associated transmission builds
- Federal government: help provinces view integration from a national perspective – without “stepping on their toes”

➤ Clear need to act quickly:

- U.S. DOE 20% integration study set the stage for a national view
- EWITS and WWSIS went into further detail – but did not look at Canadian provinces because the data was not there
- If Canada “catches up” then we can be part of North America-wide studies going forward – if not we will be left behind



Approach to Work

➤ In 2009, CanWEA initiated development of a Pan-Canadian Wind Integration Study:

- First step was to form a Steering Committee including representatives of every system operator in Canada
- Also includes representatives of governments (NRCan, DOE), experts (UWIG, AWEA) and U.S. system operators (MISO, ISO-NE, NYISO)

➤ Development of Study Terms of Reference:

- Retained Garrad Hassan to do a “situation assessment” and develop ToR for Pan-Canadian Study, in consultation with Steering Committee
- Mandate: develop ToR for full study that uses “Best Practice” methodology and ensures alignment with U.S. studies
- ToR has now been completed – estimated budget for study is roughly \$CAD 4 million, not including in-kind contributions from system operators



Outline of Terms of Reference

➤ Task 1: Meso-scale modeling and wind data

- Base requirement: generate time-series data for 3 years at hourly timesteps, with focus on onshore and Great Lakes
- Optional scope: generate 5 years data; 10 and 30 minutes timesteps; include 30 km offshore

➤ Task 2: Wind generation capacity and location

- Estimate where 20% wind would be located in 2025
- Scenario 1: Anywhere in Canada, with choice based on estimated Cost of Energy that considers resource, Tx proximity, siting restrictions
- Scenario 1: 20% in East and West “groups” with split between Ontario and Manitoba border

➤ Task 3: Wind production data

- For each scenario, generate production profiles



Outline of Terms of Reference (cont.)

➤ Task 4: Transmission reinforcement

- Develop model of national grid in 2025 and estimate hourly demand at each node over a three year period
- Carry out economic dispatch studies to identify reinforcements (may use “copper sheet” method for analysis)

➤ Task 5: Transmission system studies

- Analyze total generation costs; emissions from electricity generation; wind production, effect of constraints, effect on conventional generation, increase in operational costs, power flows (in GW and GWh) to and from the adjacent major nodes on the US transmission systems.
- The study shall include analysis of the benefits of forecasting, by comparison of the results for ‘persistence’ and ‘perfect’ forecasting.

➤ Task 6: Reporting



Next Steps

➤ **Priority: identify funds to carry out full study**

- CanWEA and its members have put forward over \$300K
- System operators will provide significant in-kind contributions
- Seeking funding of \$3 to \$4 million from federal government

➤ **Project execution**

- Guided by Steering Committee (CanWEA only a participant, not lead)
- Hope to secure funding in the Fall (at least for mesoscale modelling)
- Identify contractor (or contractors) in Winter
- Full study expected to take 1.5 years to complete

➤ **Longer term**

- Would like to see North America-wide studies
- Markets will only become more integrated going forward



Conclusion

➤ Wind will play an important role in Canada's energy future

- At 2% penetration now; 5% penetration in 2015; 20% in 2025?
- This can only happen if those charged with running the grid are comfortable with the operational and cost implications

➤ Pan-Canadian Study is critical

- With electricity in general, and wind in particular, there is a need to look at “big picture” (national or continent-wide) and increased market cooperation (reduces integration cost)
- Must draw on Best Practices – “do it right or not at all”

➤ Optimistic that the study will proceed

- Clear benefits for all involved – and virtually no risks
- Clear need for federal leadership on this issue



More information

➤ CanWEA contact for the study:

- Tom Levy, Manager of Utility and Technical Affairs –
tomlevy@canwea.ca

➤ Learn more:

- WindMatters seminar: Growing Wind in the Atlantic Provinces:
September 22 & 23, Moncton, New Brunswick
- CanWEA Annual Conference: November 1 – 3, Montreal -“The place to be” - 2,500 delegates and 250+ exhibitors expected

➤ Questions?

