



# Preliminary results: Climate change likely to decrease icing in most regions of Canada that have wind turbines

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Context

2010s

# Simulations

• Single model shown: CRCM5 (Canadian Regional Climate Model version 5)

# **Extra Charts and Figures**

Average Wind Speed Change (2031-2060, RCP8.5)



• Macro and micro-scale analysis

• Model icing and power loss

(2031 - 2060)

(2061 - 2090)

historical reference period

• +/- 15 days icing

temperature changes

• In North: temperature

more often in icing

sun, so no melting

• East and West coasts:

above 0°C, so more

melting and ice fall

conditions, but no winter

temperature more often

 $\rightarrow$  **GPEO**, Nergica's model

Ice Season Length: average first to last day of ice

- Separate into three distinct periods:
  - **1981–2010:** Historical reference period
  - 2031–2060: Horizon 1 (first repowering)
  - **2061–2090:** Horizon 2
  - Predict an overall decrease in length of



(1981-2010)

- driven by CNRM-CM5 (Centre National de Recherches Météorologiques).
- **RCP 8.5** (very high baseline emission scenario, and emissions continue to rise)



- Correct simulation incongruities:
  - Cloud water content
  - Wind speed extrapolation above terrain (ex. Rockies)
- Model energy production changes
- Analyse operable wind • Look at **multiple climate models/drivers** (other than CRCM5-CNRM) • Identify a consistent signal across many models





#### Average Annual Icing Change (2031-2060, RCP8.5)



- Complete uncertainty analysis
- Analyse individual sites (including direction shifts, economics)



- Half way through project
- Preliminary results suggest **decrease in icing** in most **regions with wind turbines** (southern Canada)
- Several **TB of data**! Many analyses possible – looking for **partners for follow-up** projects.
- The wind industry should keep an eye on the results of this study over the coming year

#### **Project Partners**





### **Project Funding Partners**





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CRCM5 simulations were produced by Ouranos on McGill University's supercomputer Guillimin, managed by Calcul Québec and Compute Canada.



Scan for more info and to download the poster

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