

Research case study &gt; renewables

# Integrating wind power

Version 1: Update May 5, 2017

**Context:** Given the awareness to preserve the environment and harness green energy, the anticipated large-scale integration of renewable sources into power systems should be simple and efficient.

**Problem:** When dealing with wind power integration, the complexity of the traditional non-linear wind generator models discourages efficient distribution planning and reveal that they are not suitable for the task.

**Solution:** Artificial Neural Network model establishes complex mathematical relationships using a series of simple mathematical operations. This new ANN model mimics accurate nonlinear equations representing wind turbine, generator, power electronic converter, and controllers.

**Impact:** The wind generator model built is a fast and accurate which can be used in future wind integration planning. The algorithm created is ready to use by Hydro One to further the integration of renewable sources into their system.

**CUE's role:** CUE researchers developed the ANN model and completed two implementations. After building the ANN models, researchers reviewed industry practices of modeling wind generators for short circuit studies in three different areas.

 Completed

## Sponsors:

Hydro One, Ontario Research Fund

## Timeline:

January 2011-April 2014

## Research team:

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## Key stats

**17%** Wind energy supply by 2035  
**40%** improved execution time with ANN model

