

Distributed Energy Storage: Challenges and Opportunities

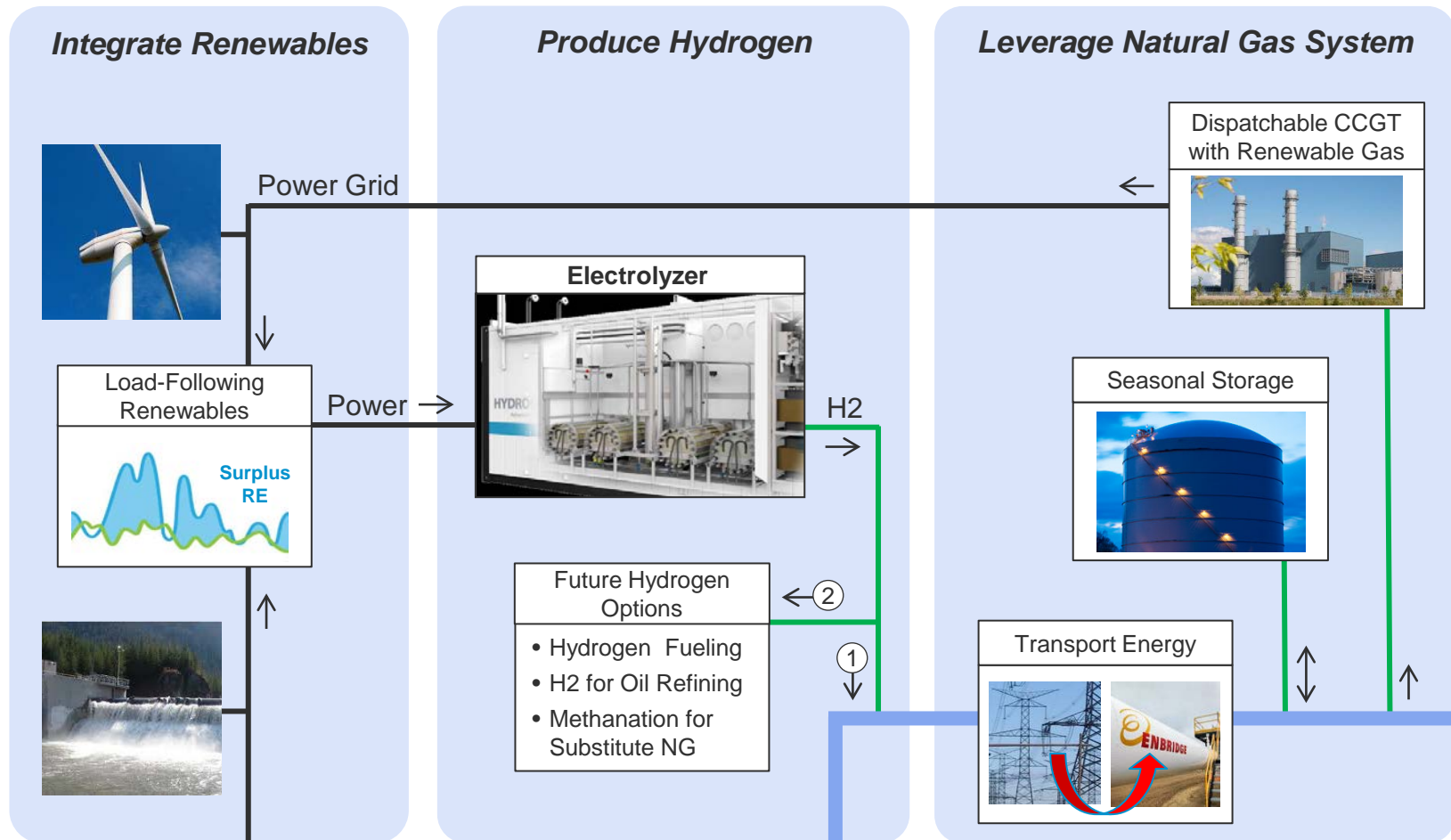
Moving Forward with Energy Storage in Ontario

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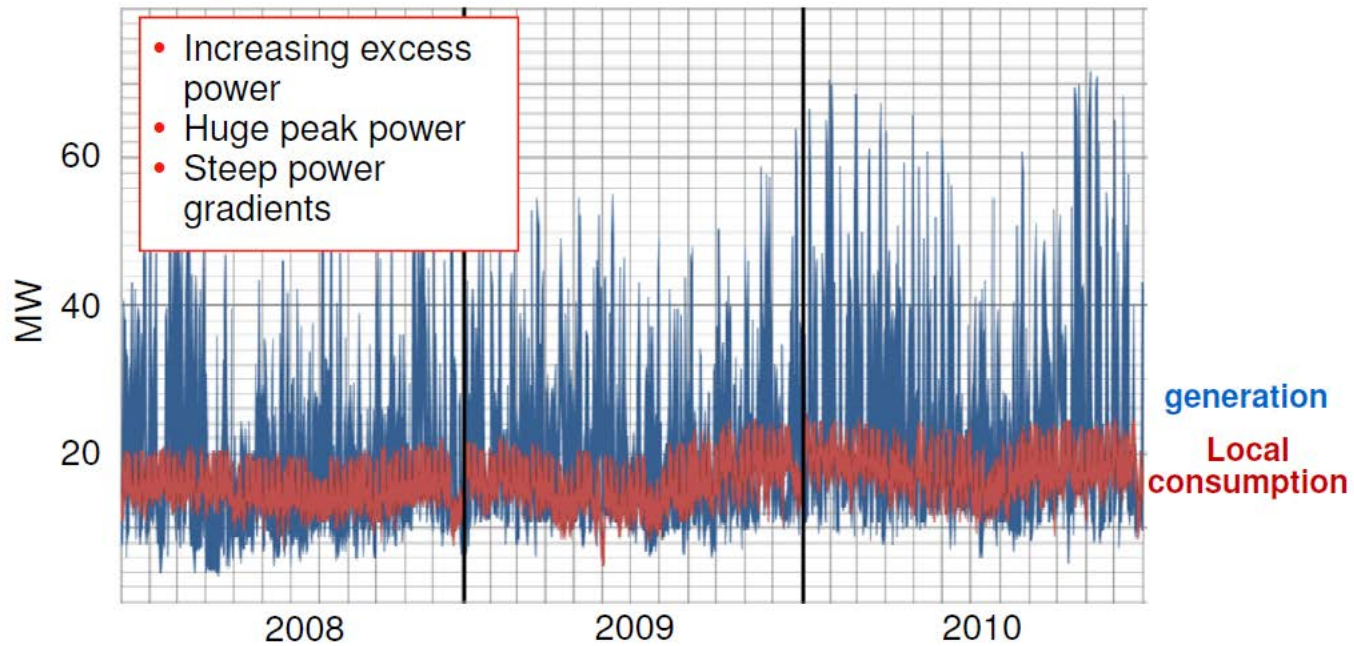
Power-to-Gas bridges the power grid and natural gas system to unlock new options for energy conversion and storage

Power-to-Gas Solution



Power-to-Gas for E.ON demonstration project in Germany has been deployed to address regional RE integration challenges

Supply of renewable power in the region of Falkenhagen, 20 KV grid



▶ Solution: Storage of excess wind power instead of curtailment.



Source: Presentation by Dr. Alexander Vogel, Head of Alternative Energy Systems, E.ON at Gas to Power Conference, Cologne, Germany – November 2012

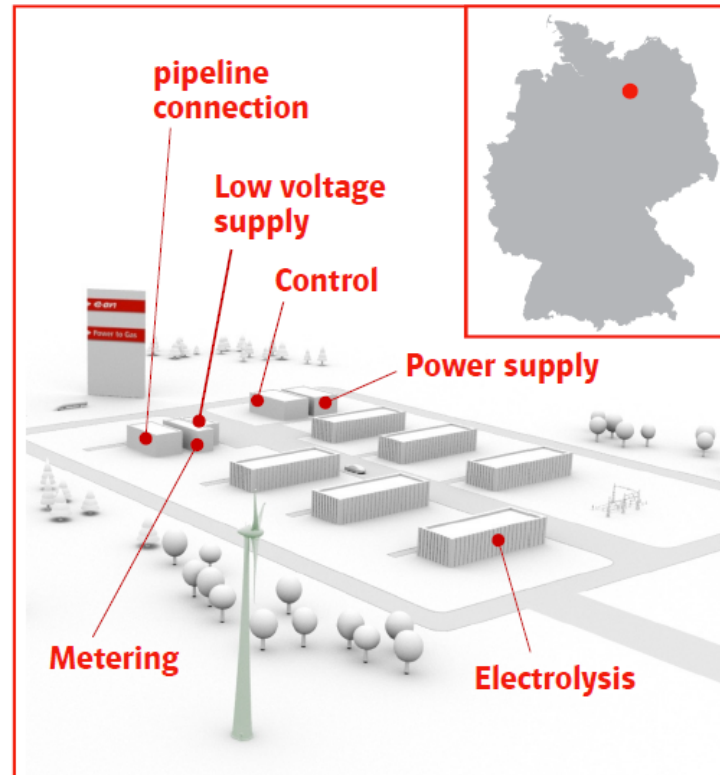
2MW E.ON Power-to-Gas Demonstration Project Objectives

Key Parameters

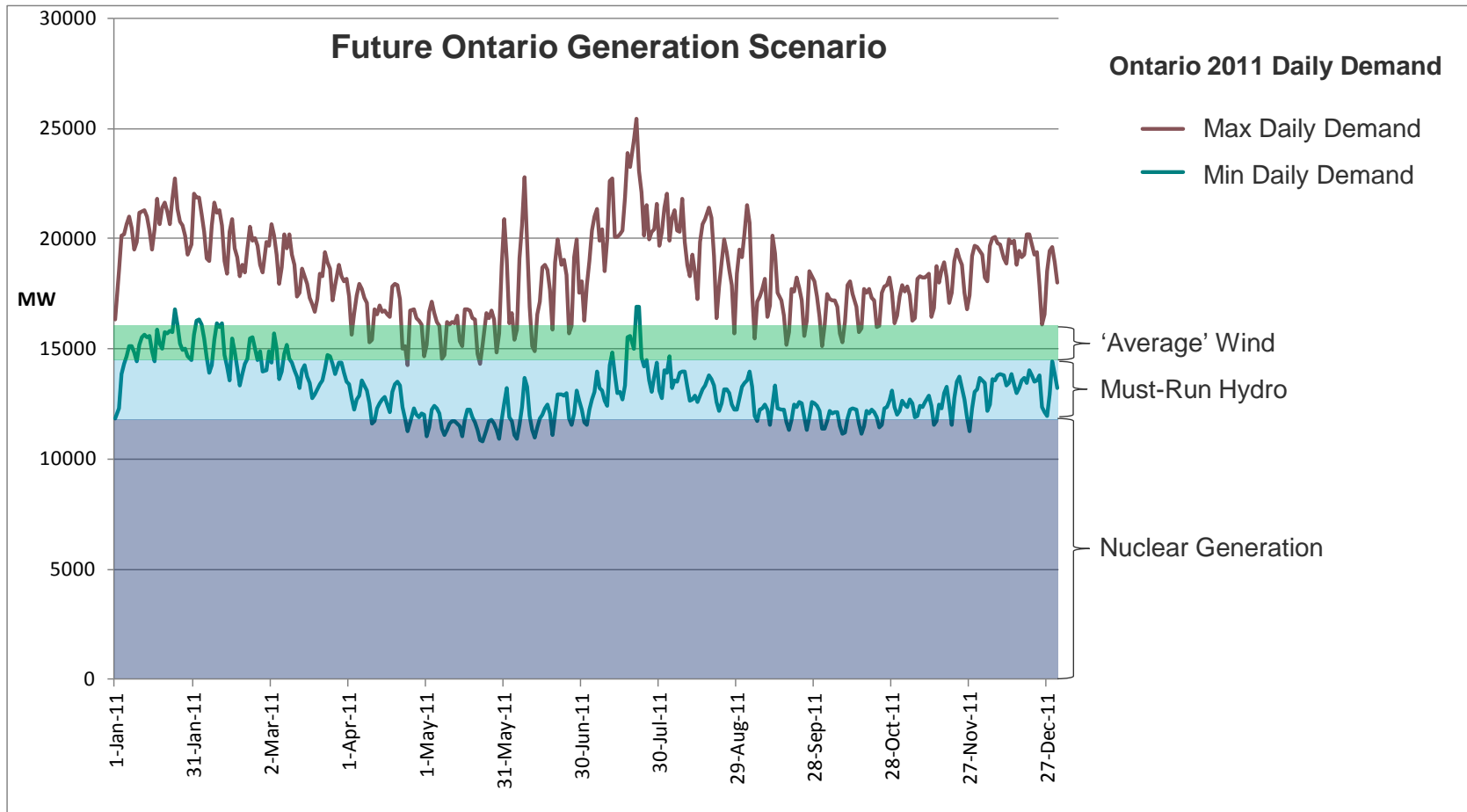
- Power: 2 MW_{el}
- Hydrogen production: 360 m³/h
- Fed into the local gas grid (ONTRAS)
- Planned start of operation Q3/2013
- Owner is E.ON Gas Storage

Goals

- Demonstration of the process chain
- Optimize operational concept (fluctuating power from wind vs. changing gas feed)
- Gain experience in technology, costs, consenting



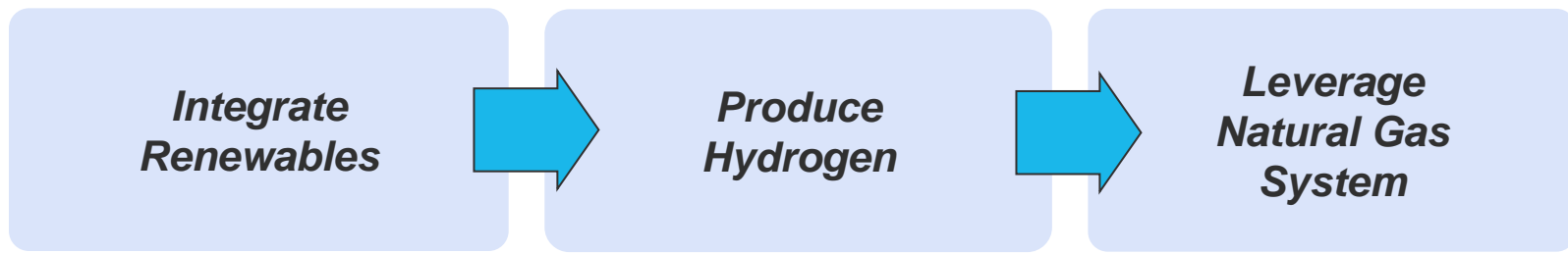
In Ontario, OSPE Energy Task Force's analysis highlights the need for seasonal storage during late spring and early fall



Source: Adapted from *The Real Cost of Electrical Energy* by Paul Acchione, Chair of Ontario Society of Professional Engineer's Energy Task Force. Presentation to Toronto Mensa at University of Toronto - October 2012. Future scenario for 2014.

Enbridge and Hydrogenics are working to develop a 1MW PEM Power-to-Gas Demonstration Project in Ontario

ENBRIDGE P2G Demonstration Project Objectives



- Demonstrate load following of renewables
- Performance monitoring and reporting

- Scale up 1MW PEM Electrolyzer Platform and Build Prototype
- Site Preparation, BOP Design and Commissioning
- Define Project Contracting Path

- Set Gas Inter-operability Standards and Metering
- Clean gas transactions
- Evaluate and Optimize Operations Model



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