

Operating a Much More Variable Power System – Challenges and Opportunities

Ken Kozlik, Chief Operating Officer
Albuquerque, New Mexico, December 8, 2010



Independent Electricity System Operator

- Direct the flow of electricity across the transmission system
- Balance demand for electricity against available supply through the wholesale market
- Manage the financial operations of the \$10-billion wholesale market
- Oversee emergency preparedness activities for Ontario's power system
- Send real-time price-signals to trigger demand response
- Smart Meter Entity - operates the Meter Data Management Repository

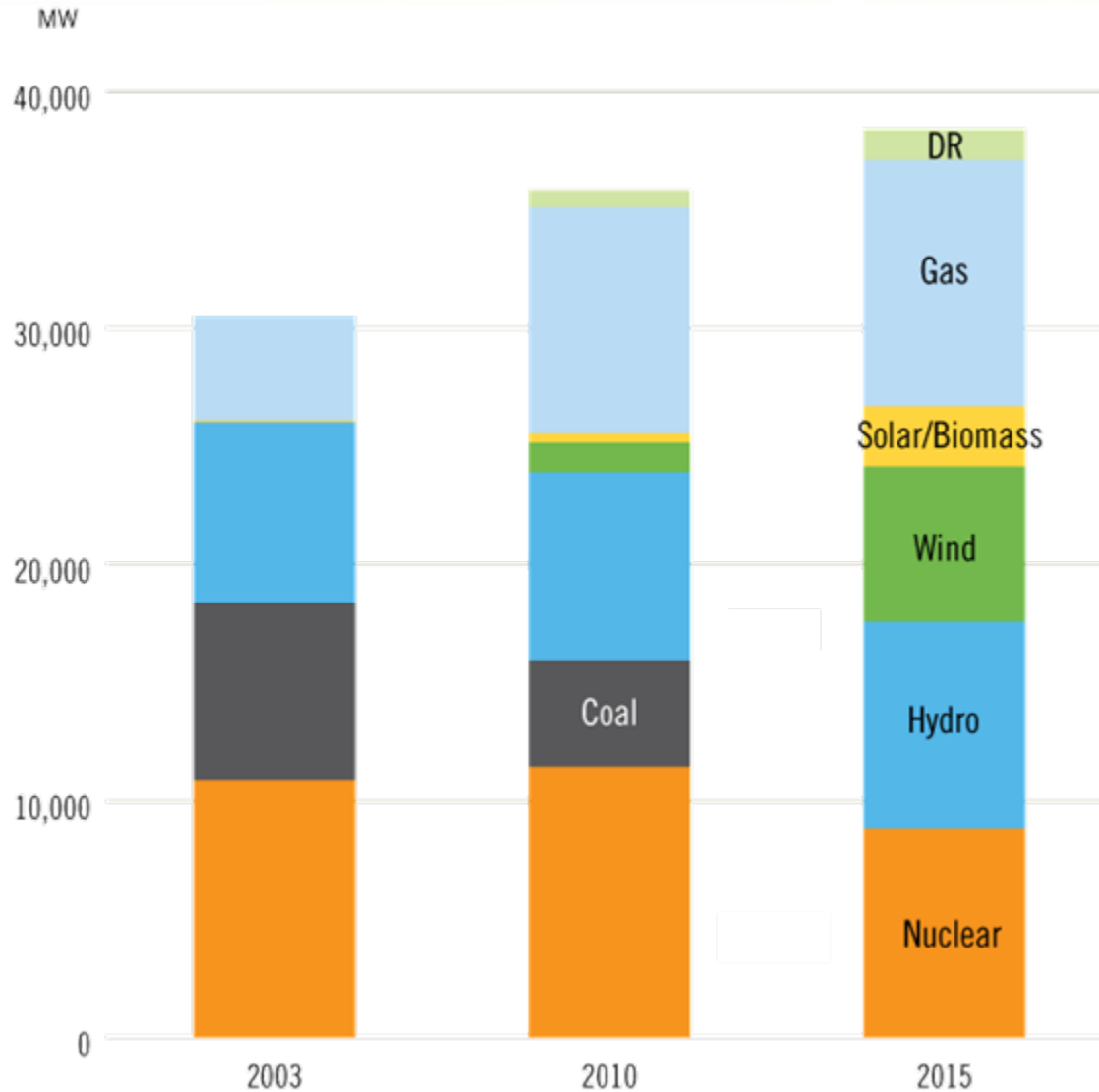


Installed Capacity	35,485 MW
Record Summer Peak	27,005 MW (August 1, 2006)
Record Winter Peak	24,979 MW (December 20, 2004)
Total Annual Energy Consumed	139 TWh
Customers	4.5 million
Ontario Import Capability	4,600 MW
Transmission Lines	30,000 km (18,600 miles)
Average Energy Price plus Adjustments	6.50¢/kWh
Household prices	5.1/8.1/9.9¢/kWh

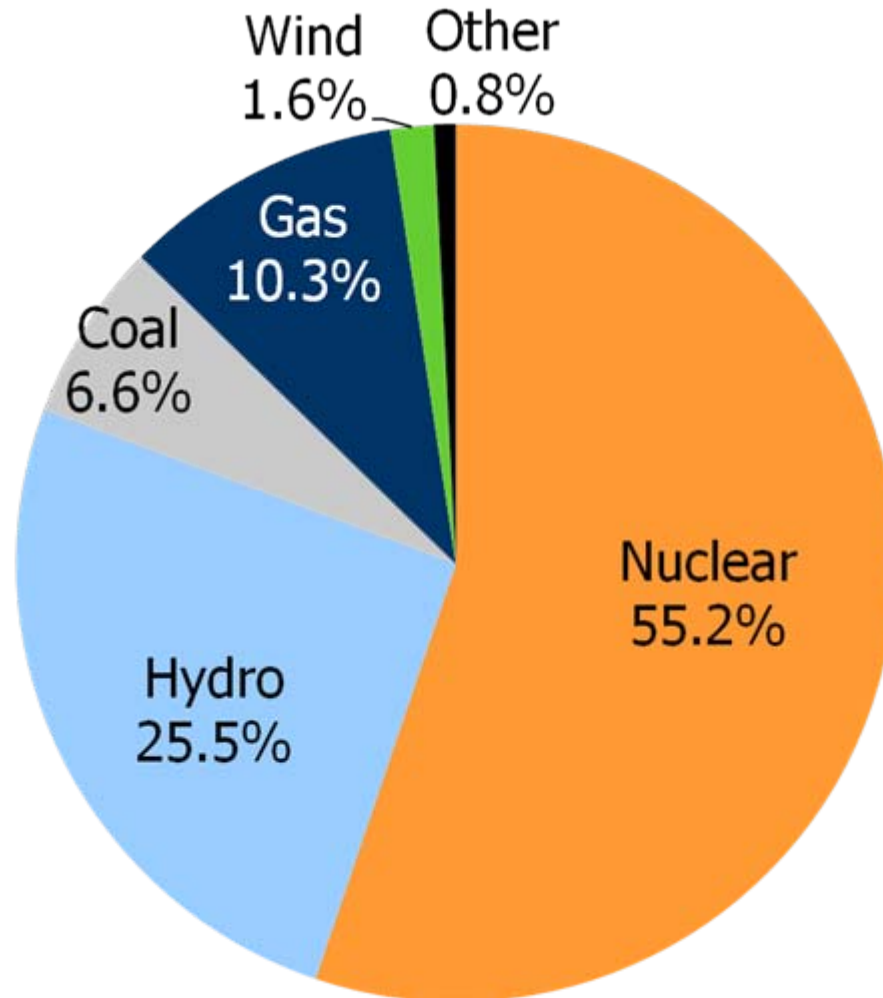


The IESO is the reliability coordinator for Ontario and works closely with other jurisdictions to ensure energy adequacy across North America.

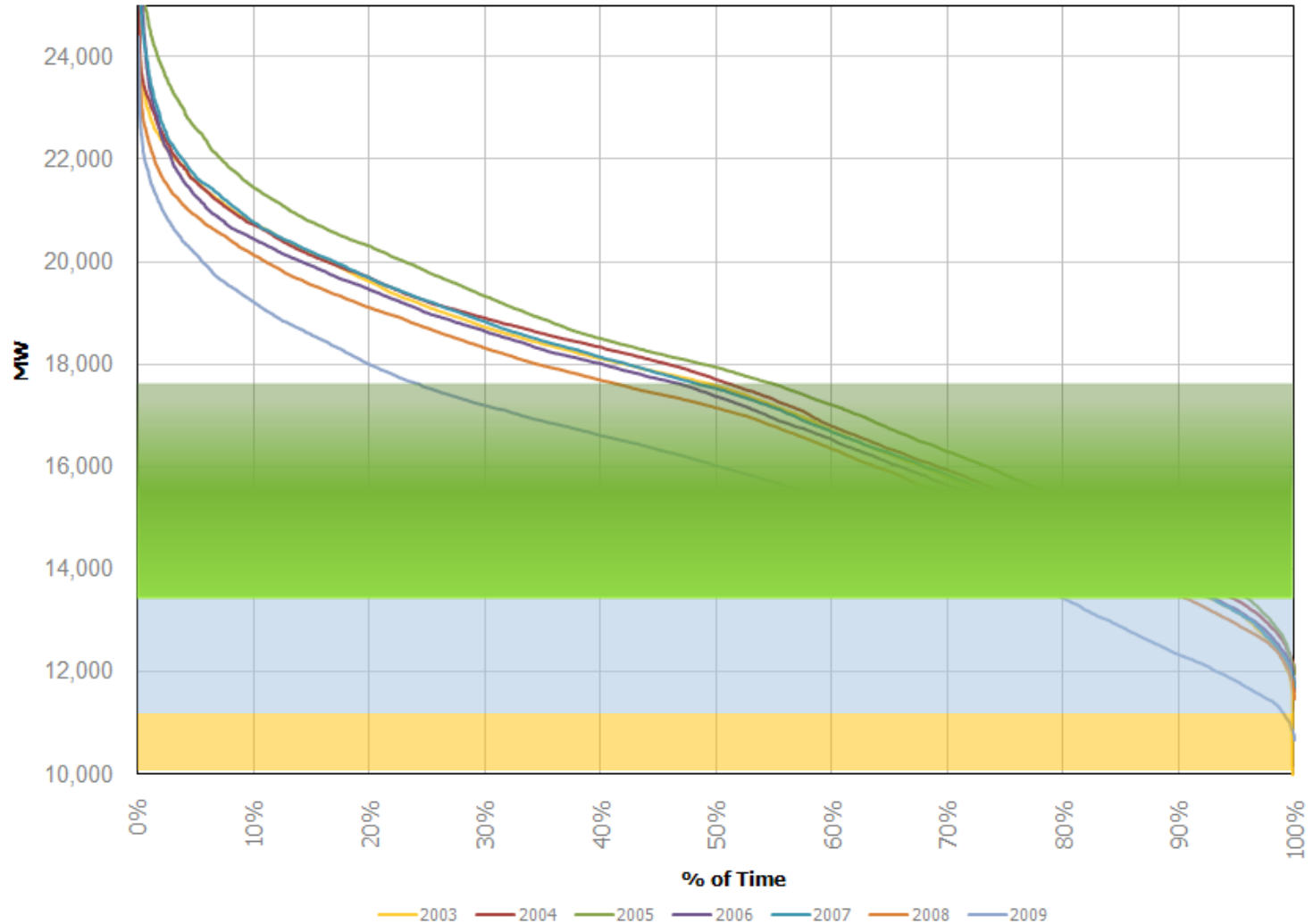
Ontario's Changing Fuel Mix



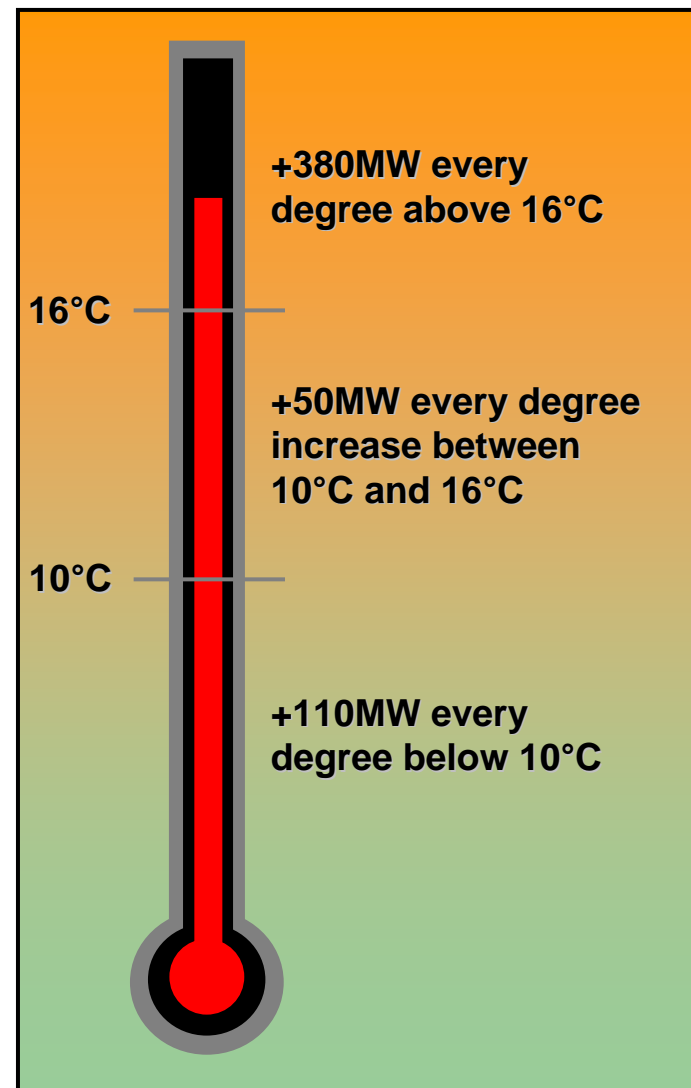
2009 Generator Output by Fuel Type



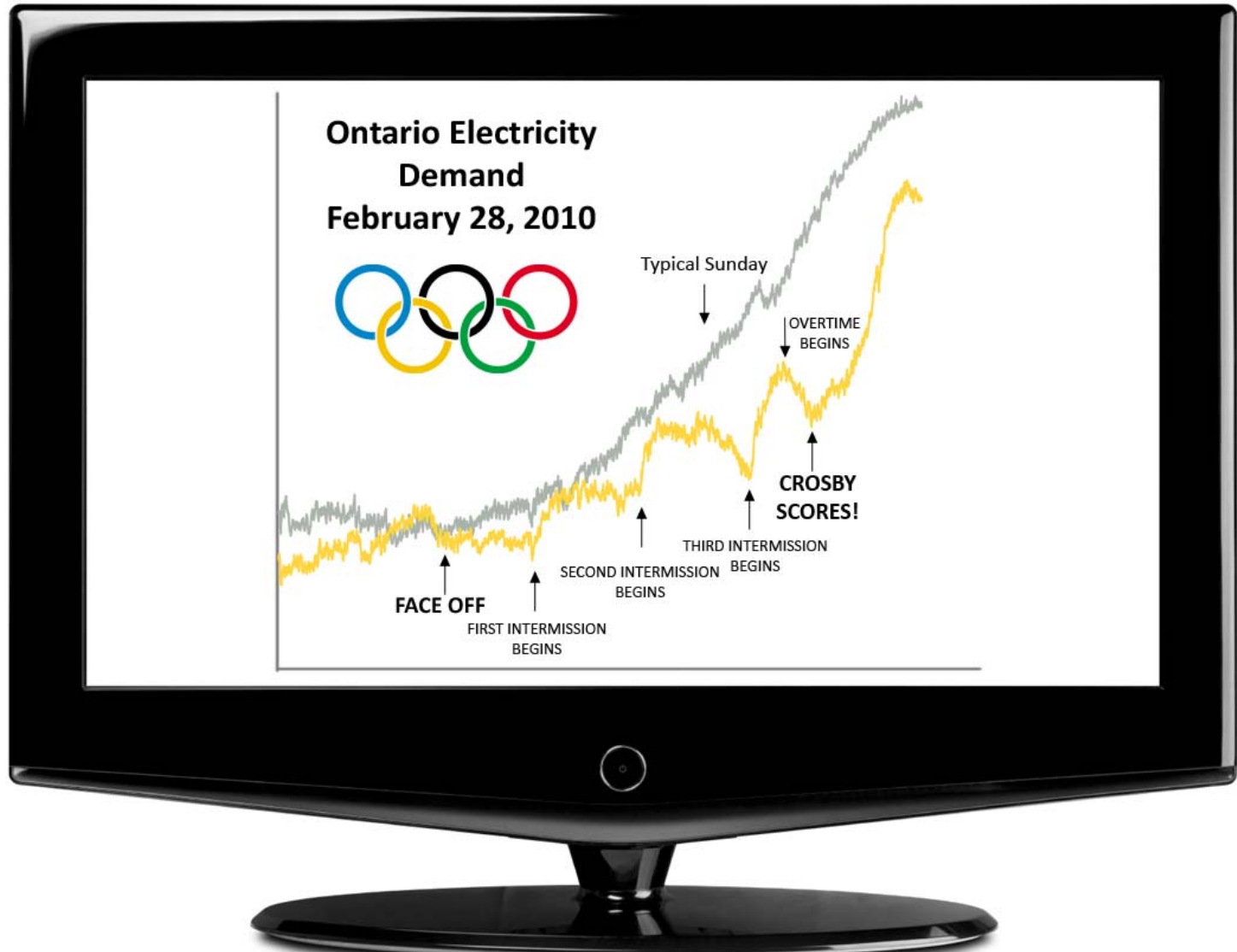
Minimum Demand and Base Load Generation



- Windchill adds over 100 MW per degree
- Humidity can add up to 3000 MW
- Cloud during the day increases lighting load in winter, reduces air conditioning in summer
- Rainfall affects hydro power



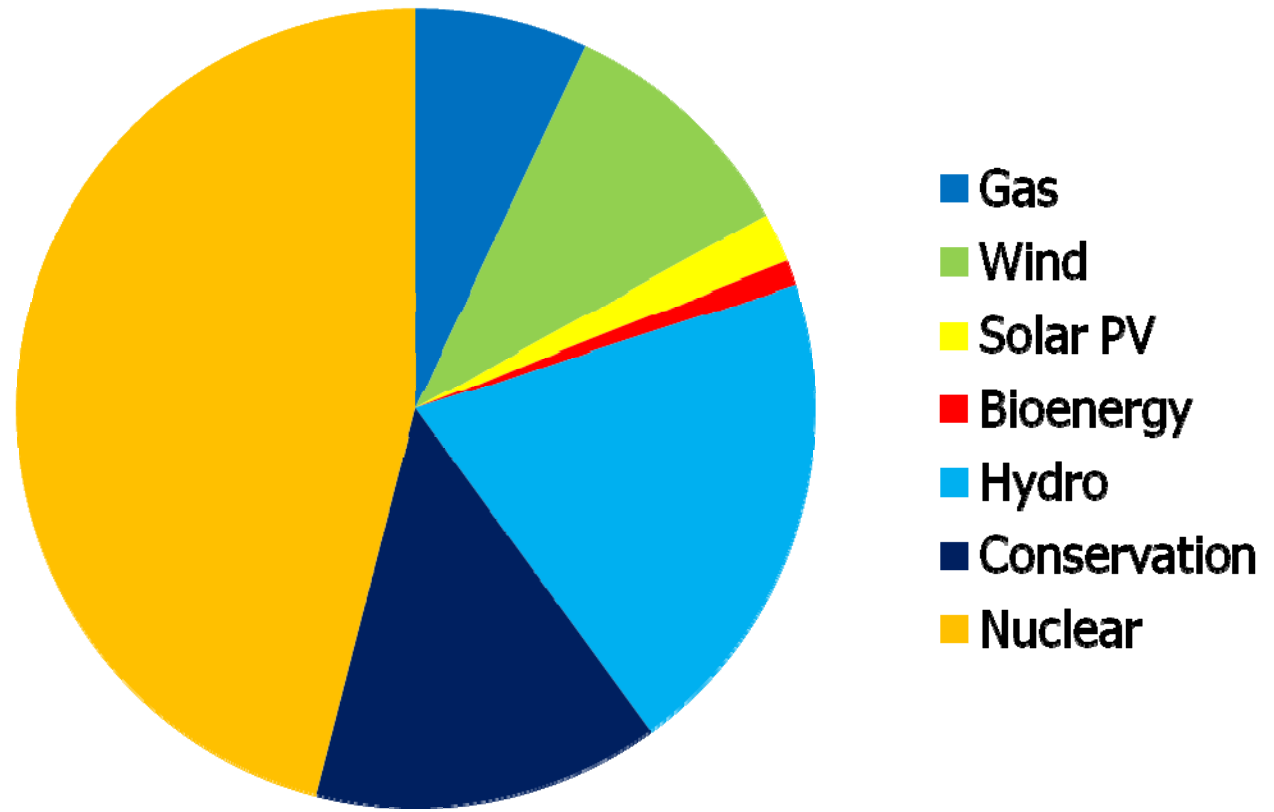
Demand for Electricity: The Impact of Consumer Behaviour



- Financial incentives
- Streamlined processes
- Foundation for a Smart Grid



2030 Projected Generation (TWh)



- Wind generation is playing an increasingly important role in meeting Ontario's electricity needs
- Ontario leads the country with roughly 1,200 MW of installed wind energy capacity
- Substantial number of new wind projects expected under Feed-in Tariff (FiT) program
- Wind's variability can be managed
- The IESO will launch a centralized wind forecasting service in 2012

IESO WIND TRACKER

See how wind power is helping to meet Ontario's electricity needs. This information does not include wind generation capacity located outside the transmission grid.



The graphic features a white wind turbine on a green hill against a blue sky. Text on the left reads 'Current Ontario Wind Output 463 Megawatts (MW) or enough to run 128,000 air conditioners'. The IESO logo is in the bottom left. The bottom right shows '3pm - 4pm Nov. 20'. A 'SHARE +' button is in the top right.

Current Ontario Wind Output
463
Megawatts (MW)
or enough to run
128,000 air conditioners

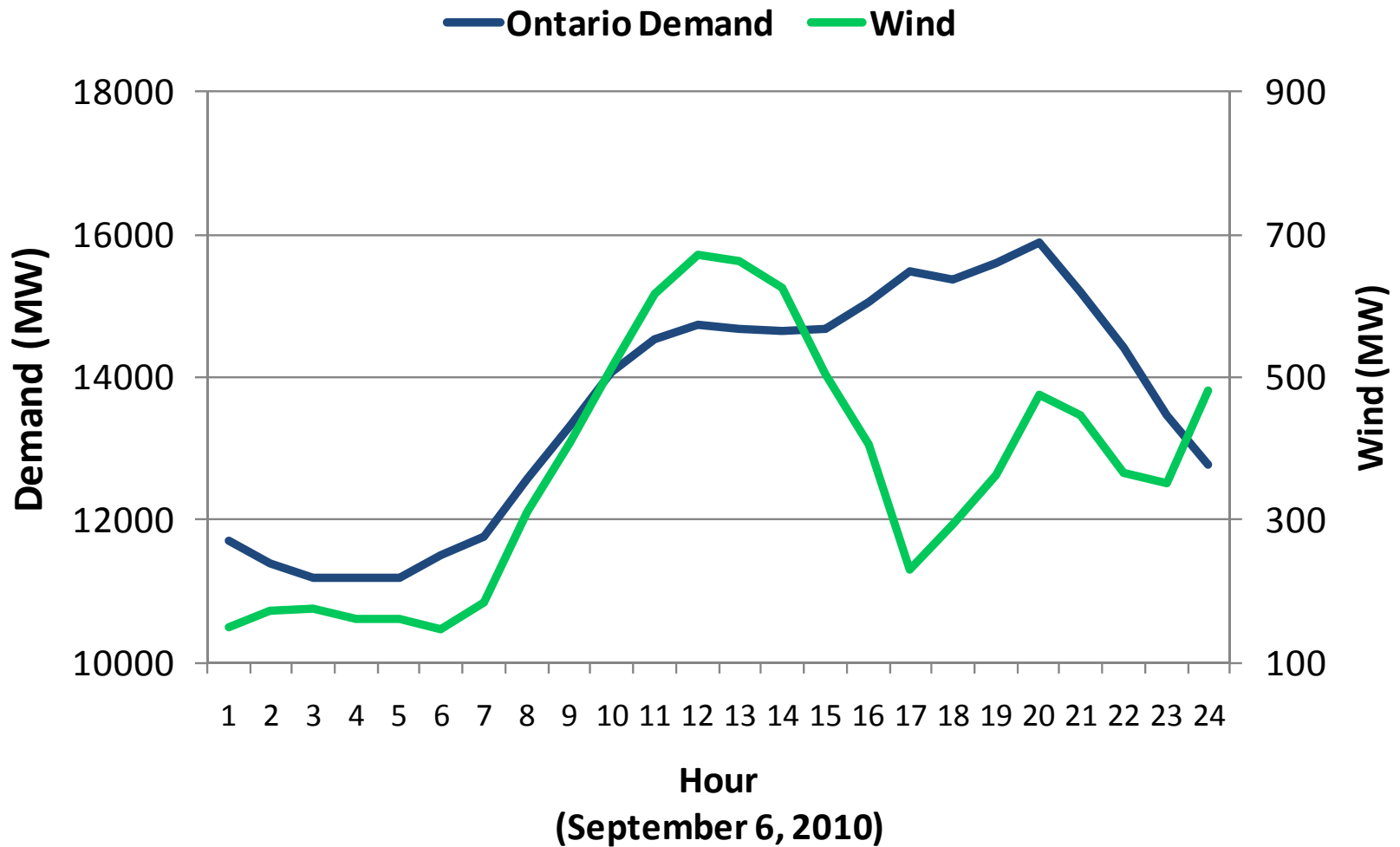
ieso

3pm - 4pm
Nov. 20

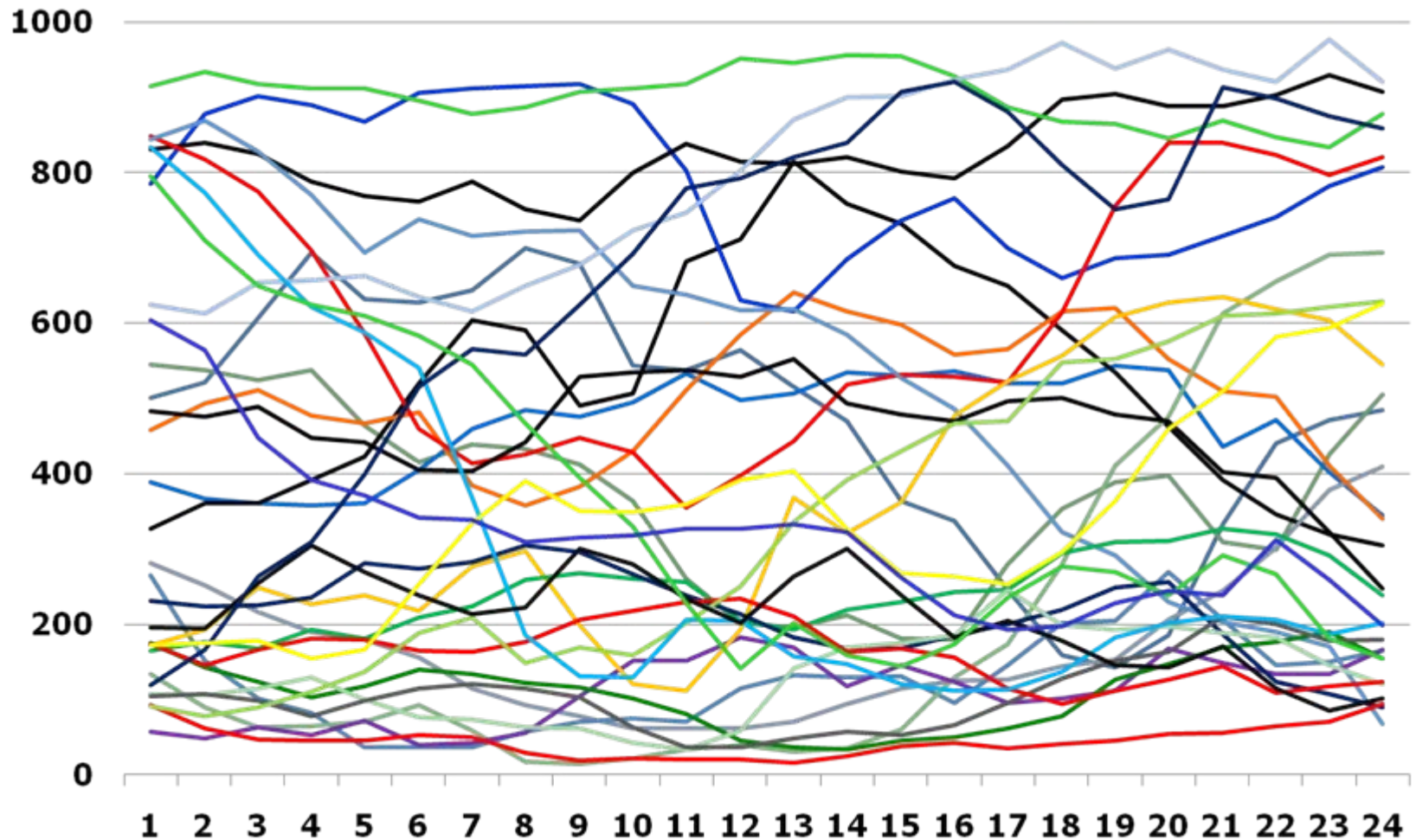
SHARE +

To embed the IESO Wind Tracker on your web page or blog post, click the 'SHARE +' button above.

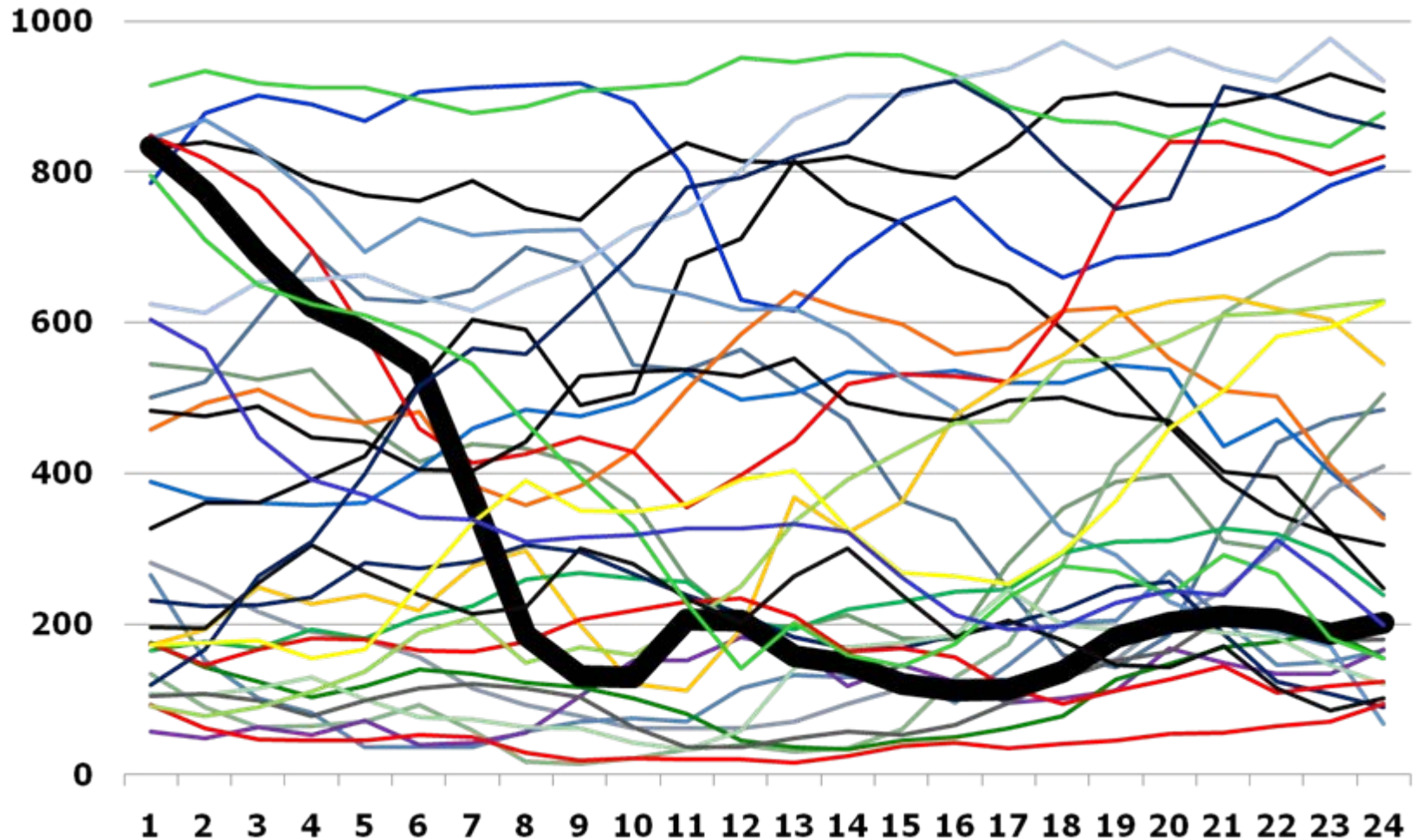
Note: This data is updated every hour, however, there is a one hour time delay in publishing the results.



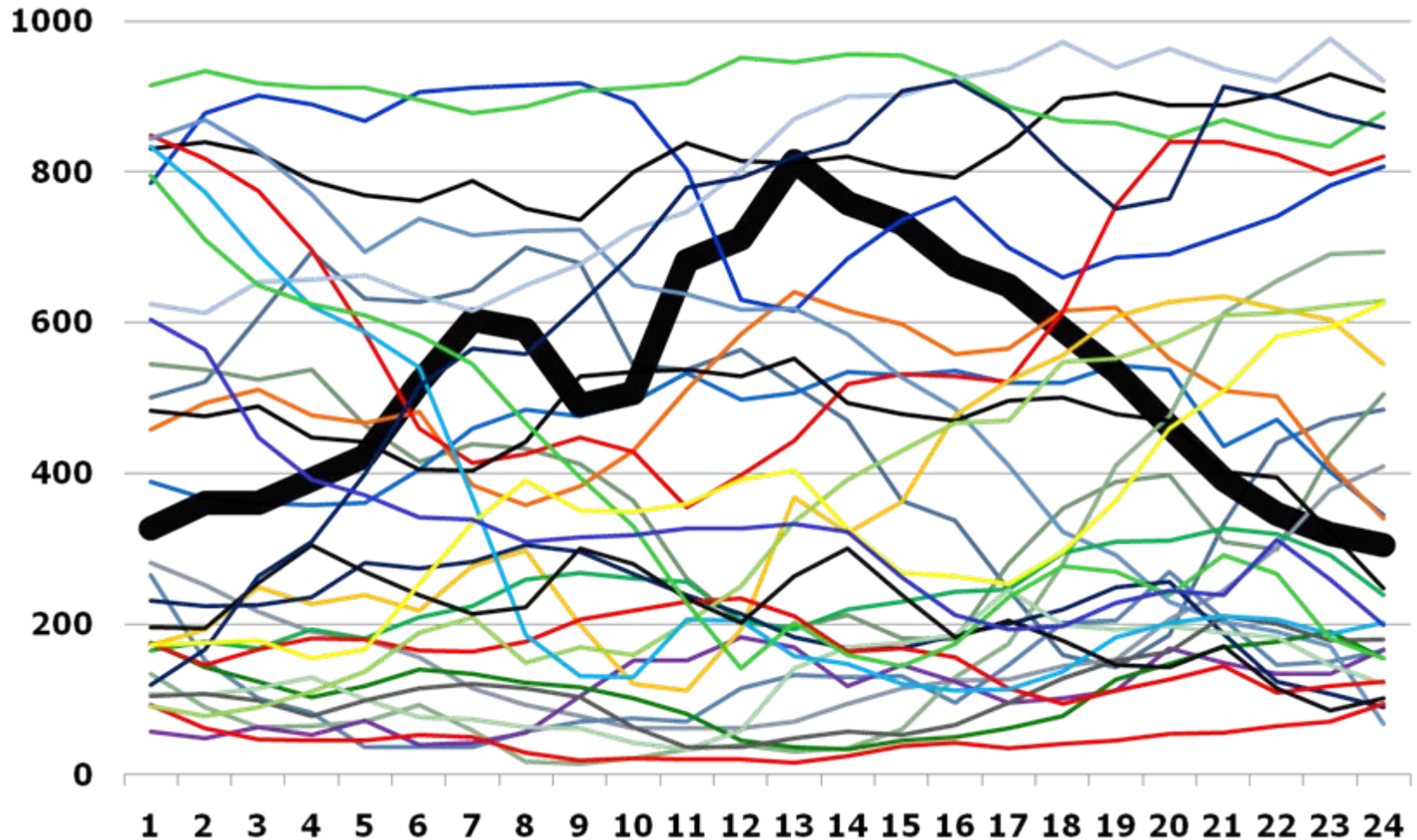
December 2009 Wind Production



December 2009 Wind Production

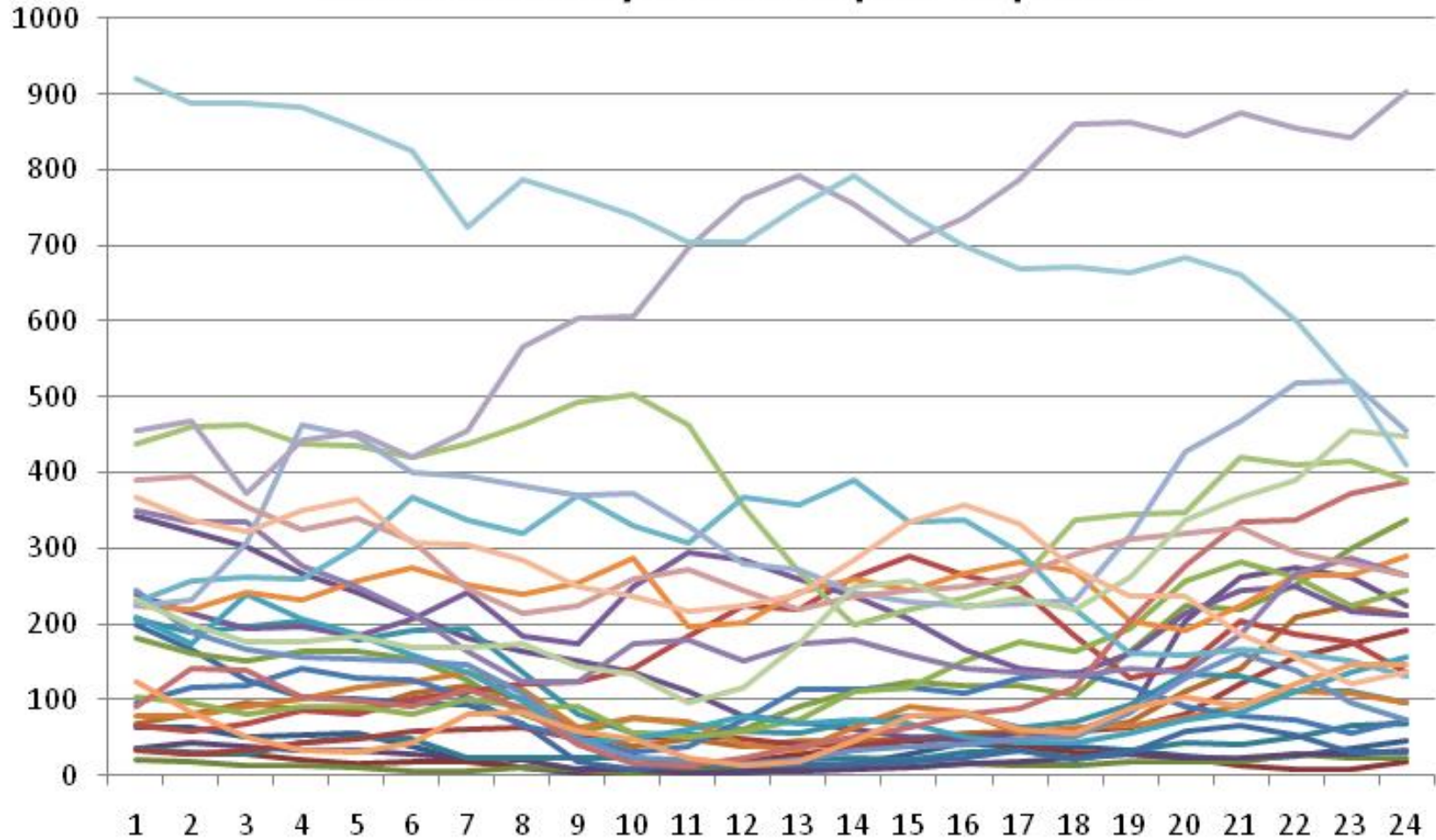


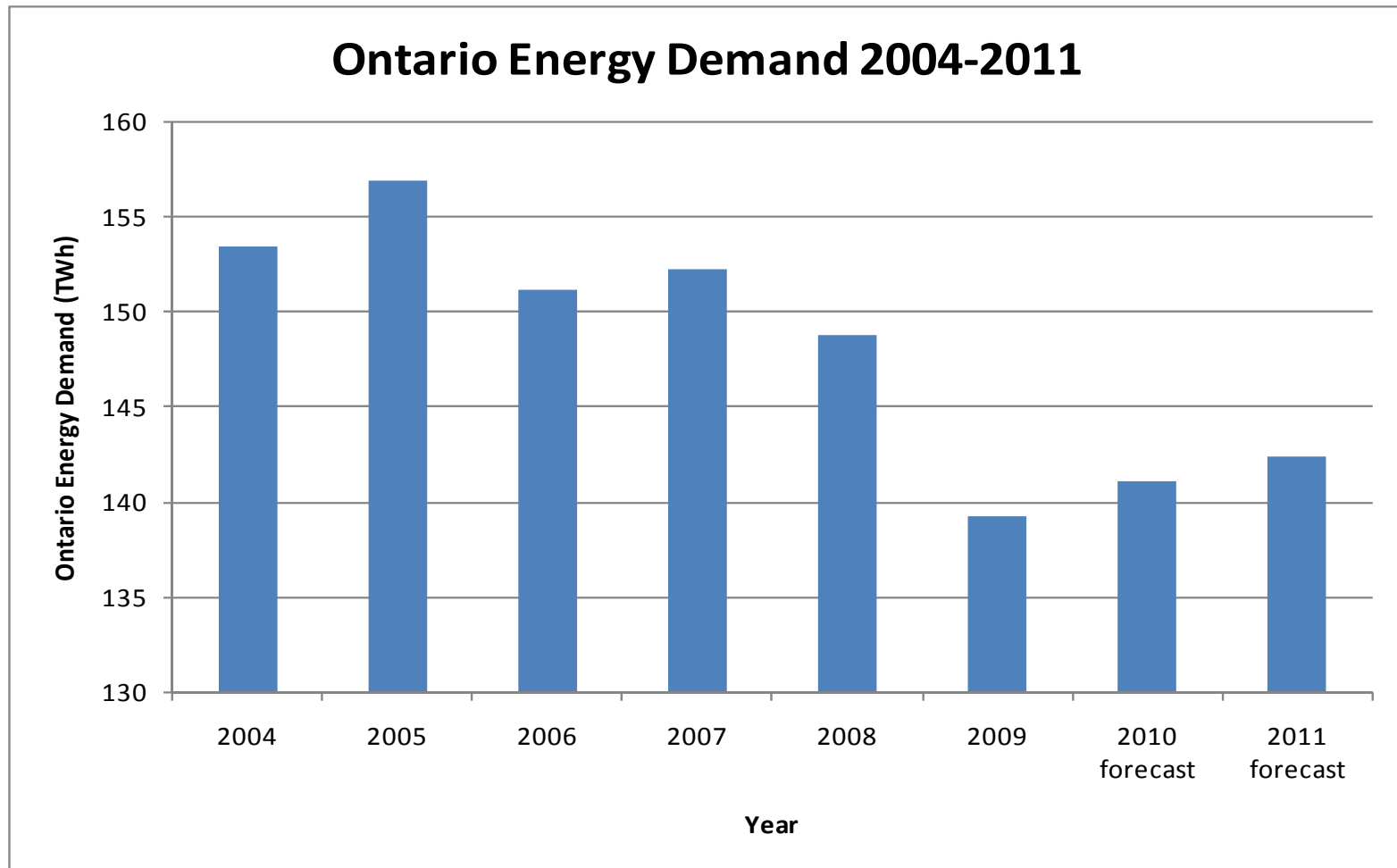
December 2009 Wind Production



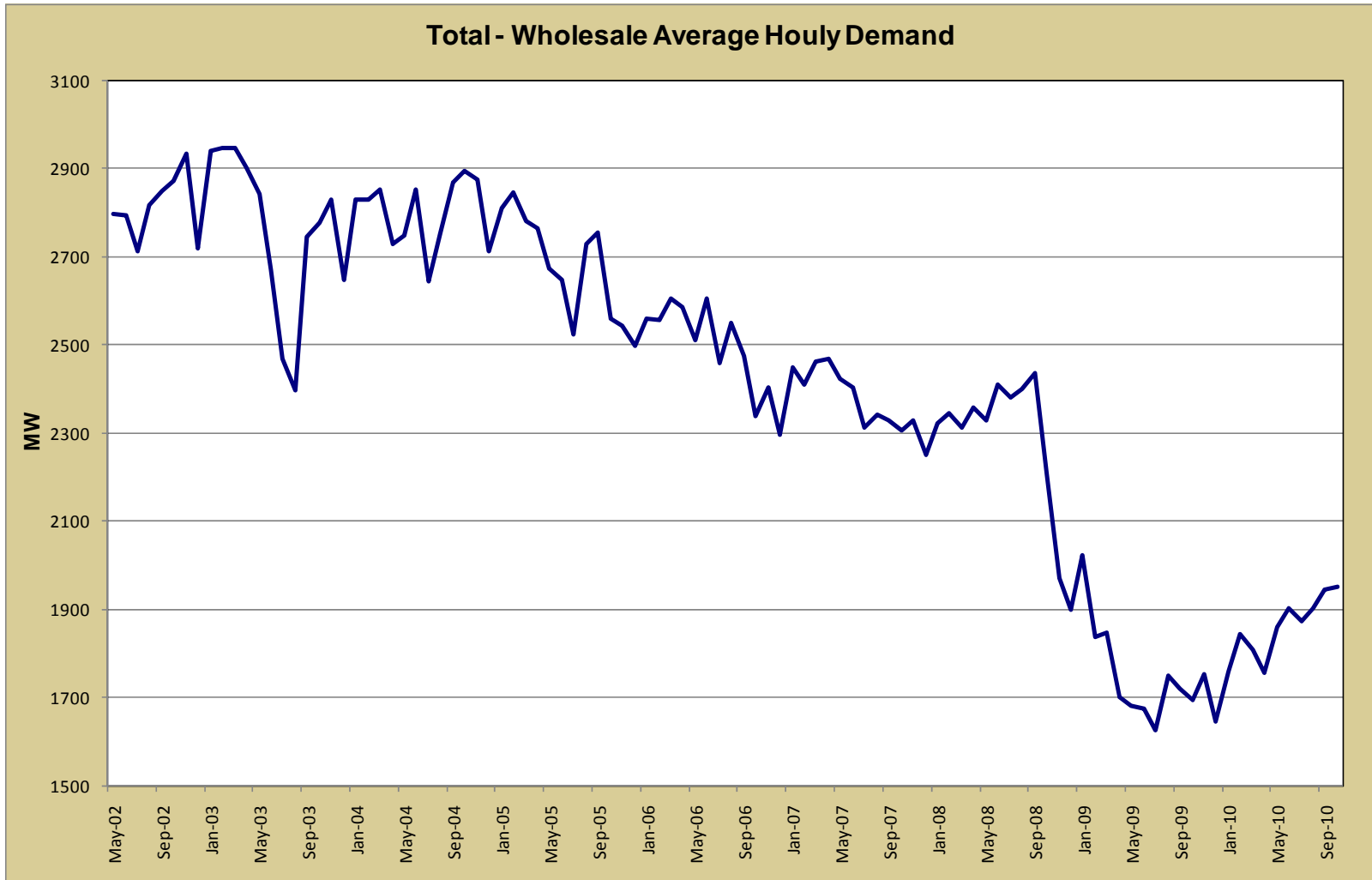
September, 2009 Wind Production

Ontario Hourly Wind Output: Sep 2009

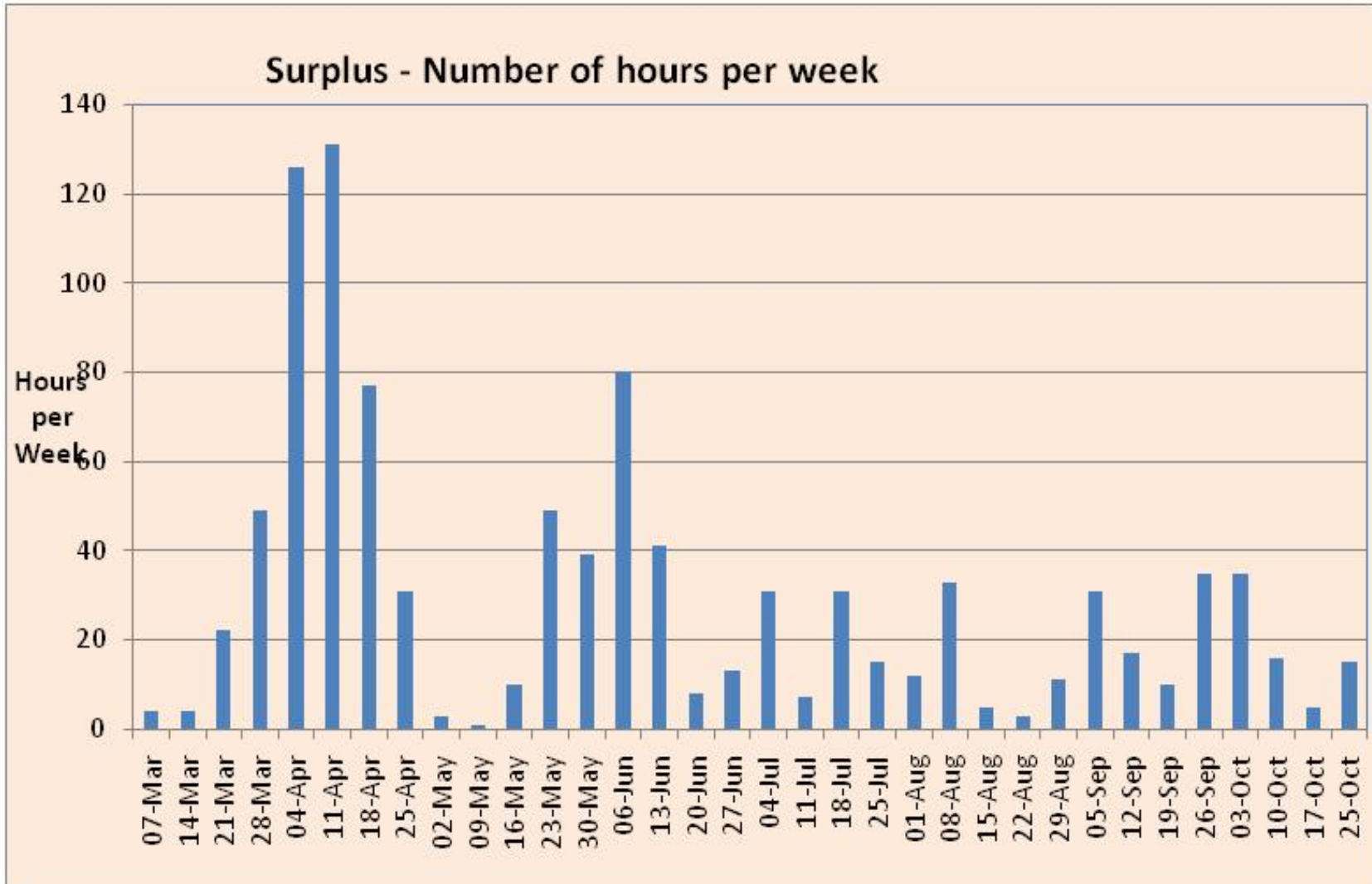




Wholesale Industrial Demand



Surplus Baseload Generation

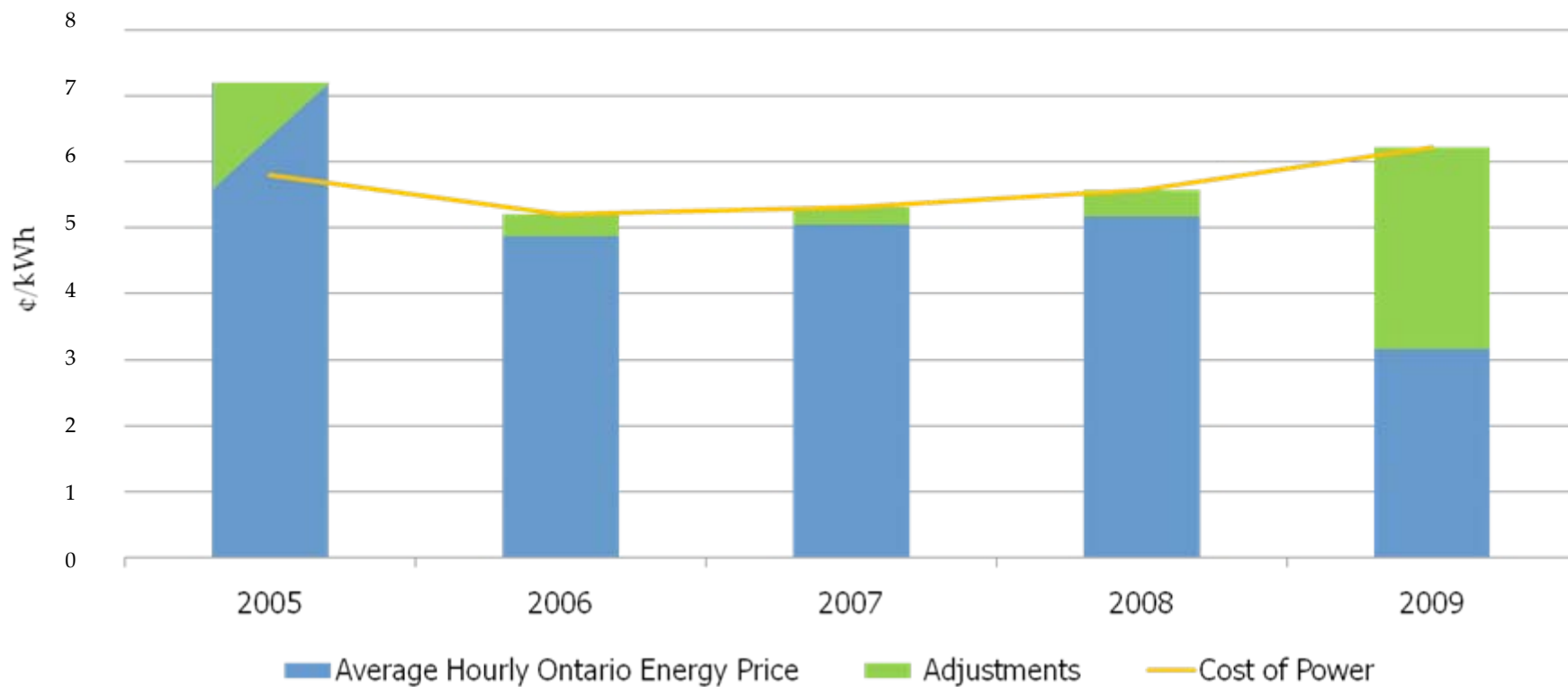


- Smart Metering Initiative encourages conservation and demand management
- 4.3 million homes already have a smart meter installed
- With a smart meter, most residential consumers will be billed using time-of-use (TOU) rates by June 2011
- 1.1 million Ontarians are already paying TOU rates
- IESO is responsible for centralized meter data management





Electricity Pricing Trends



The "Grand Plan"

Innovation

PEVs

Smart
Meters

Smart
Homes

Nuclear

Energy
Storage

Hydrogen

Windmills

Dynamic
Pricing

Solar
Panels

Micro
Grids

And Yes, It All Fits

(we have our work cut out for us)

