

# NERC Long-Term Reliability Assessment (LTRA)

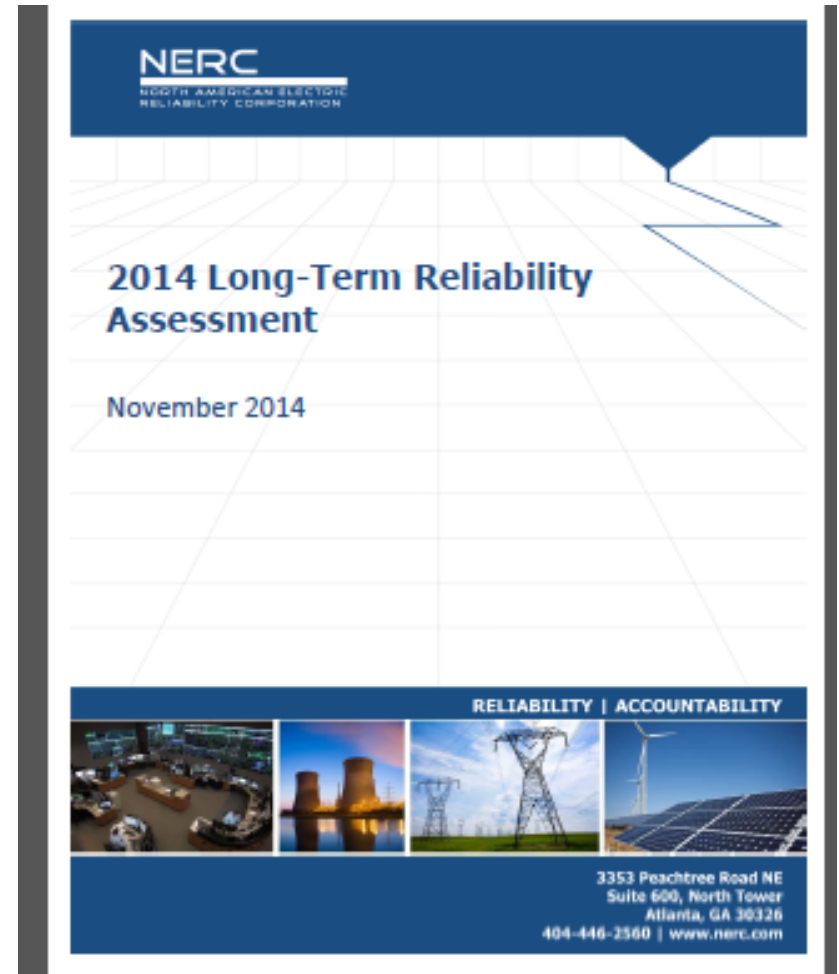
Anna Lafoyiannis, Reliability Assessments

May 5, 2015

---

# Overview

- Description of LTRA
- 2014 Key Reliability Findings
  - Declining reserve margins
  - Environmental regulations create uncertainty
  - Need for new approaches to assessing reliability
- Other observations
  - Demand forecasting uncertainties
  - Aging infrastructure
- Conclusions



# Description of LTRA

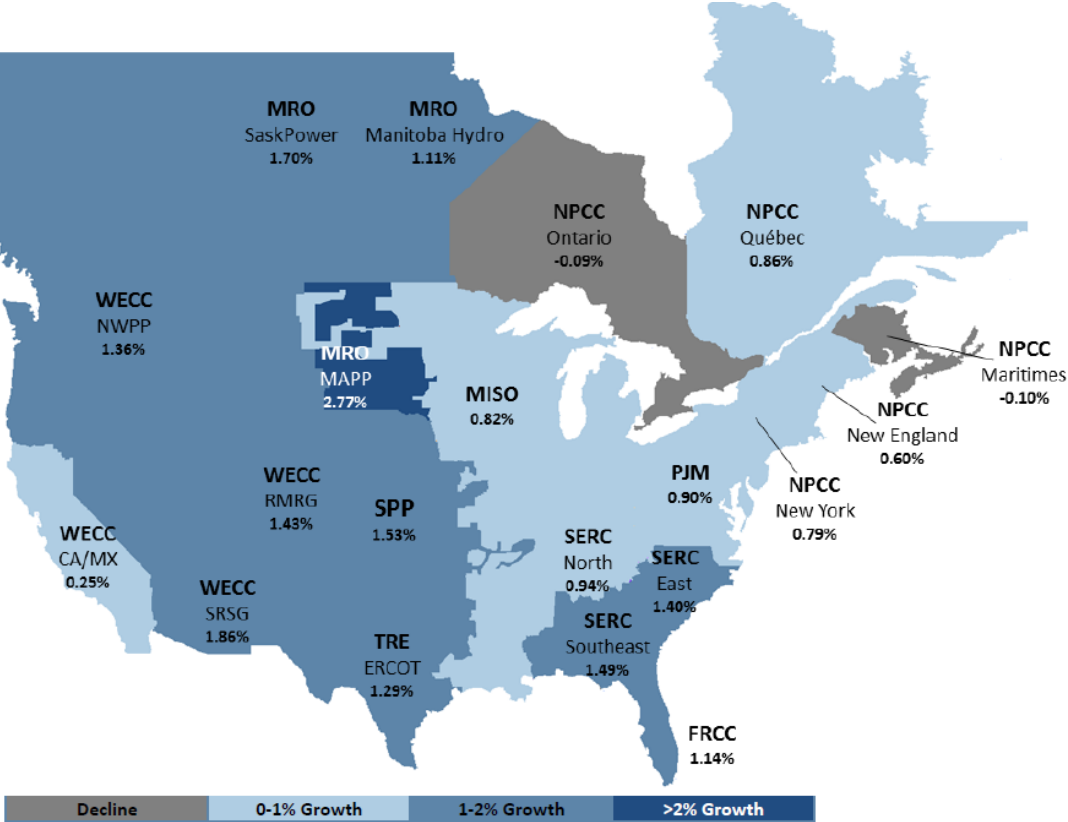
- Periodic assessment of the adequacy of generation, demand-side resources, and transmission systems necessary to meet system reliability needs over the next decade
- Issues that may impact the reliability of the North American grid
- Industry plans to maintain reliability during the next decade
  - Frequency: Annual
  - Horizon: Ten years
  - Area: NERC wide

# 2014 LTRA Key Findings

- Reserve Margins have been trending downward in some areas, despite low load growth
- Environmental regulations create uncertainty—need to identify and address potential reliability impacts
- Changing resource mix requires new approaches to assessing reliability

# Reserve Margins:

## Low Load Growth



10-Year Compound Annual Growth Rate  
(Peak Season)

### Current Trends:

- Economic factors
- Energy efficiency
- Conservation
- Distributed generation

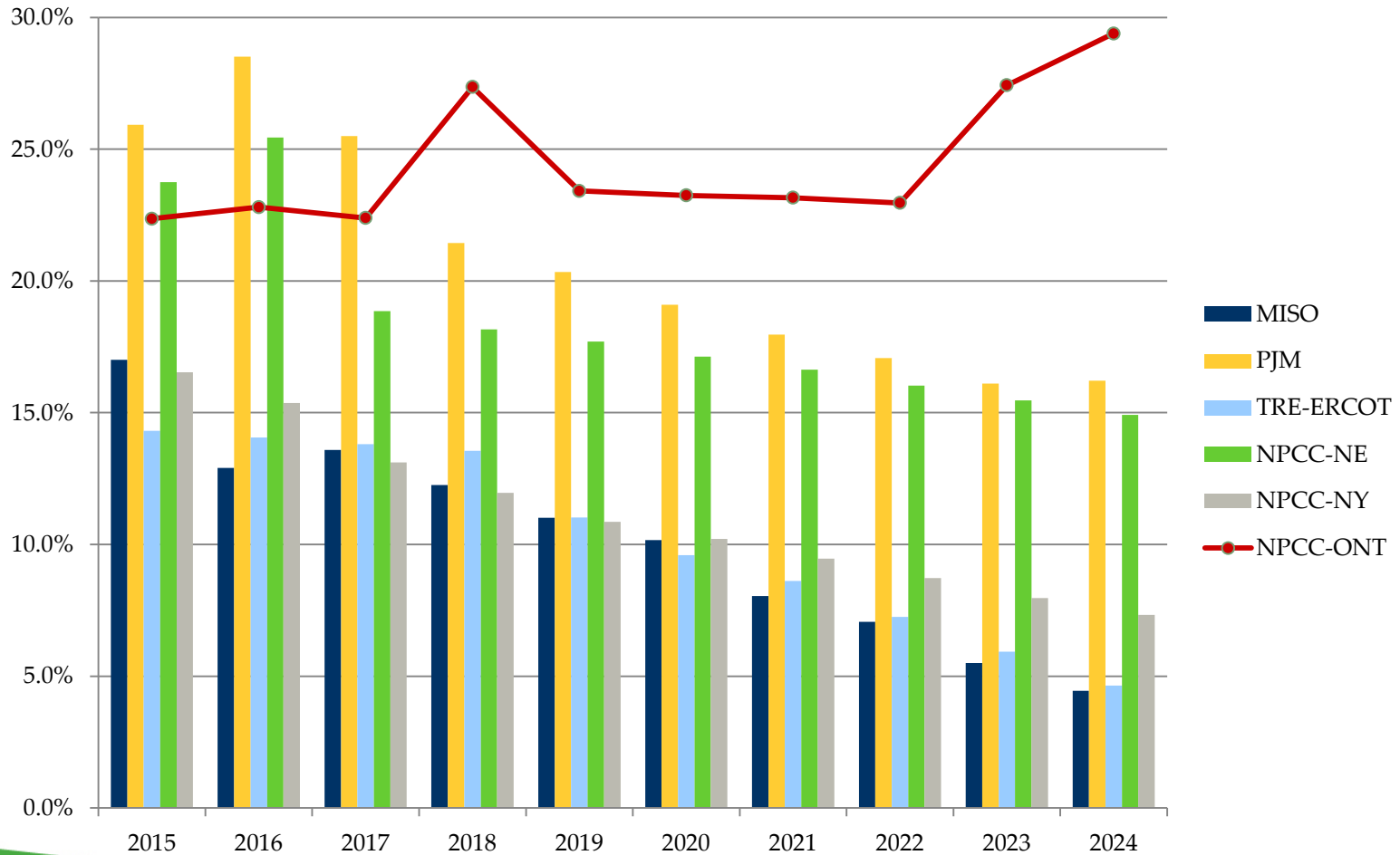
### NERC Findings:

- Most areas show growth below 2%

### Ontario Perspective:

- Low load partially driven by embedded generation, conservation & demand side management

# Reserve Margins: Declining in Some Areas

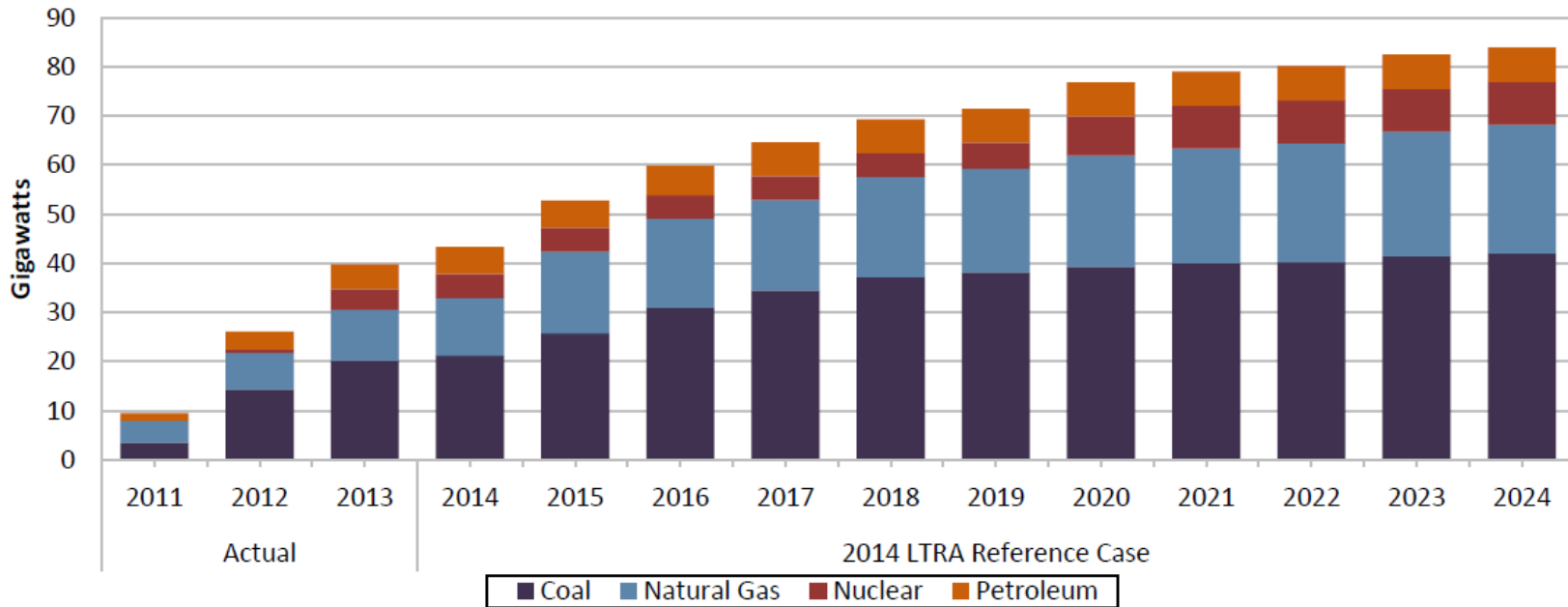


# Environmental Regulations

- Current Trend:
  - Variety of new environmental regulations
- NERC Findings:
  - Regulations can drive changes to resource mix
  - Industry should study the reliability impacts of regulations
- Ontario's Perspective:
  - Major regulation was directive to shut down coal
  - Reliability studies and other preparations took place to ensure reliability was maintained throughout the transition

# Changing Resource Mix:

## Expected Retirements

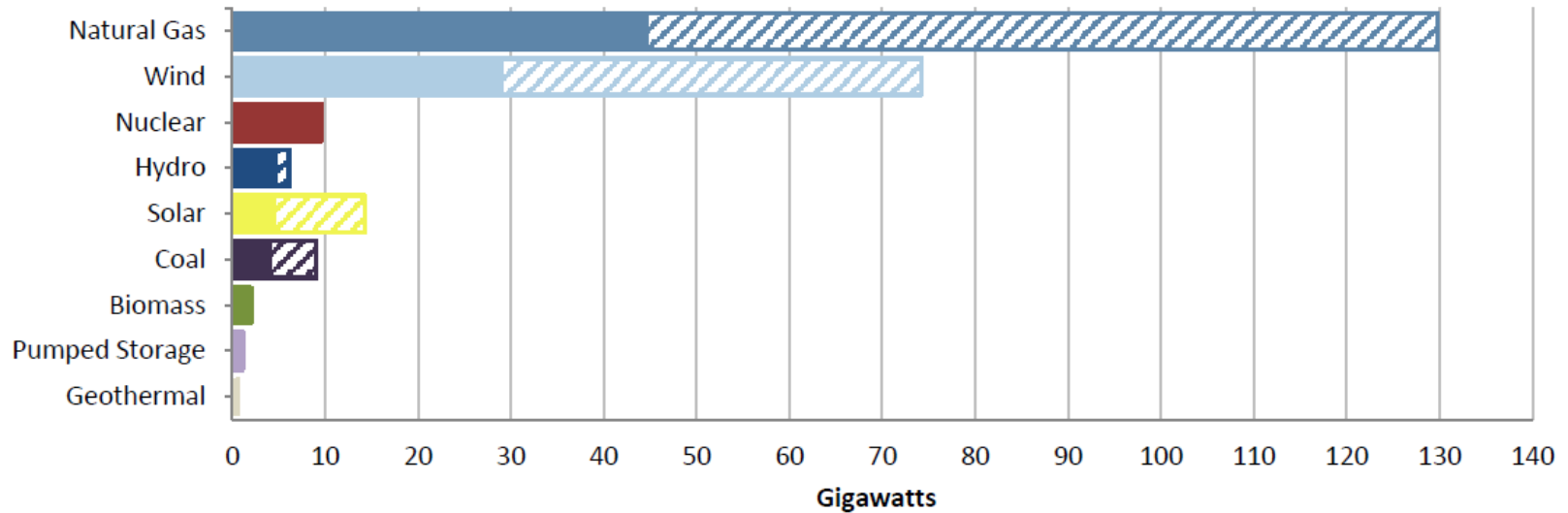


## Cumulative Fossil-Fuel and Nuclear Retirements between 2011 and 2024



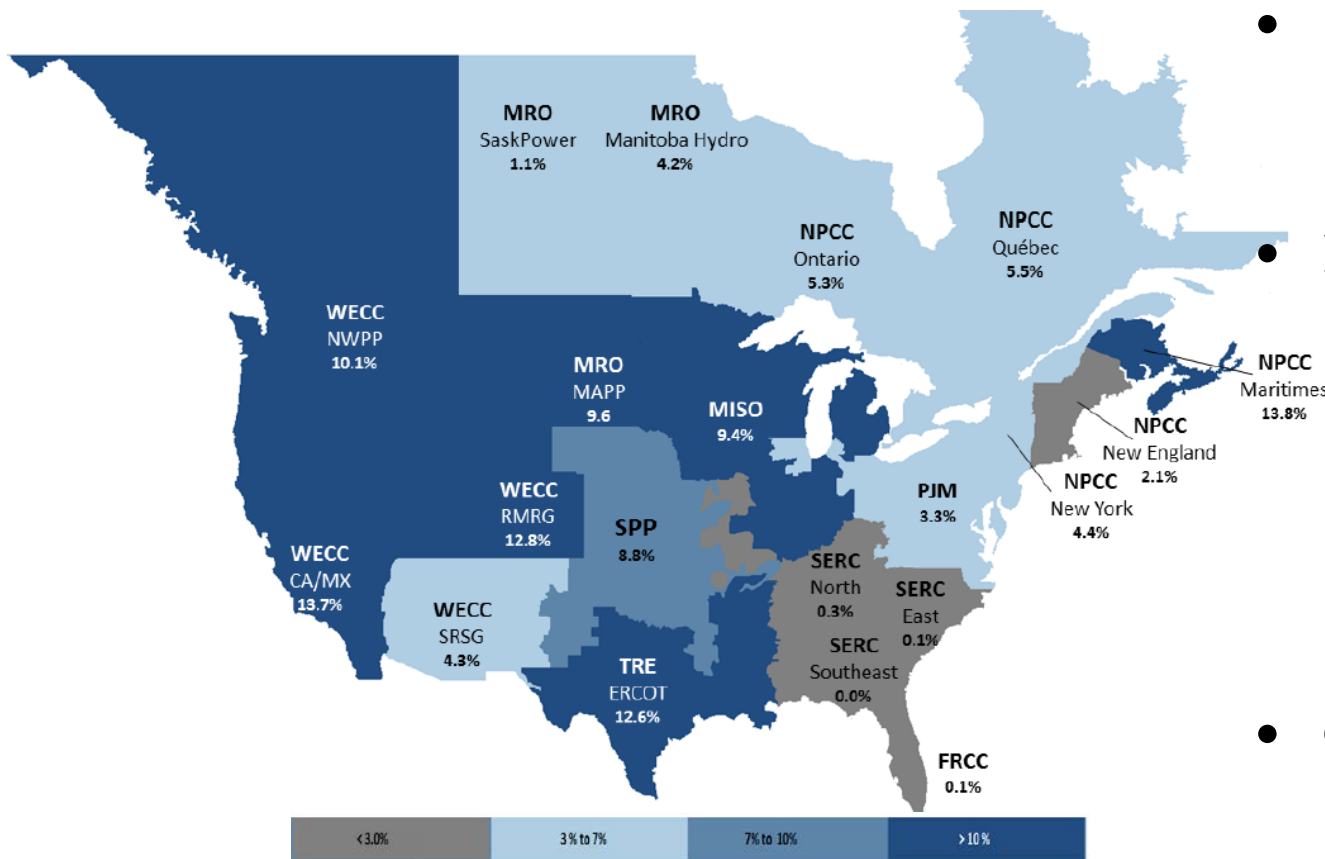
# Changing Resource Mix:

## Expected Additions



## NERC Wide Additions between 2015-2024 by Fuel Type

# Changing Resource Mix: Growth in Wind and Solar Generation



Existing Variable Energy Resources Penetration (Nameplate) as a Portion of the 2015 Generation Mix

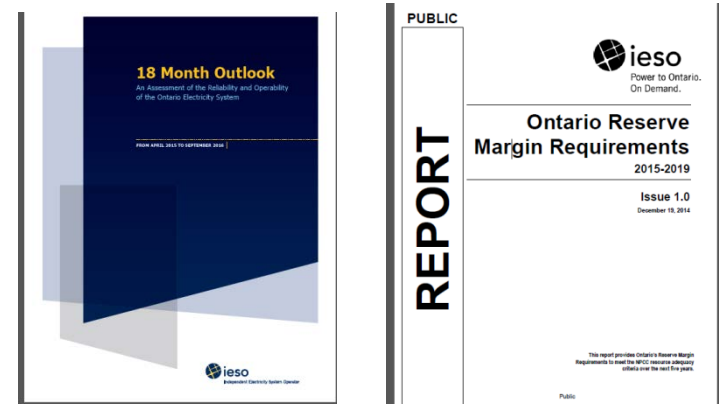
- Current Trend:
  - Policies encourage wind & solar
  - Decline in cost
- NERC Findings:
  - System Planners should account for:
    - On-peak availability
    - Ramping capability
    - Voltage & frequency support
  - Grid operators face challenges due to ramps in power output
- Ontario:
  - Renewable Integration Initiative
  - Performance Requirements

# Changing Resource Mix:

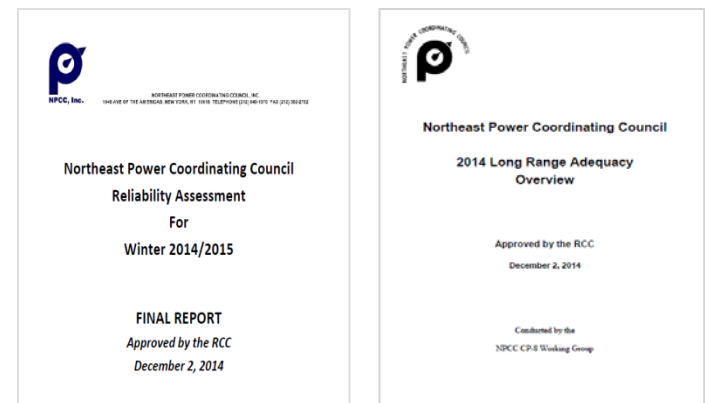
## Drives Need for New Approaches for Assessing Reliability

- Traditional adequacy assessments focus on peak requirements
- Suggested enhancements:
  - probabilistic assessments
  - correlation between fuel availability & weather
  - reliability of variable generation during off-peak hours
  - stresses during shoulder periods
  - transmission adequacy assessments

### Ontario Assessments



### NPCC Assessments



# Other Issues:

## Demand Forecasting Uncertainties

- Traditional demand forecasting concerned with uncertainty of weather and economic drivers
- Future demand forecasting will be concerned with uncertainty from:
  - Conservation programs
  - Smart grid technologies
  - Embedded generation
  - Real time pricing
  - Electric vehicles

# Other Issues:

## Aging Infrastructure

- Causes:
  - Unavailability of spare parts
  - Obsolescence of older equipment
  - Outage scheduling restrictions
  - Integration of new technology
- NERC Finding:
  - Investment has increased, but varies widely across regions
- Ontario Perspective:
  - Hydro One plans to invest \$688M in next 3 years on transmission renewal
  - Long Term Energy Plan to coordinate generation renewal

# Conclusions

- North America's grid is changing:
  - Some reserve margins are declining
  - New environmental regulations may drive retirements
  - Changing resource mix requires new approaches for managing reliability
  - Demand forecast uncertainty is more complex
  - Aging infrastructure requires investment
- Ontario is well equipped to address emerging reliability issues

# References

- 2014 NERC LTRA is located at:  
[http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/2014LTRA\\_ERATTA.pdf](http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/2014LTRA_ERATTA.pdf)