



# **Wind Integration and FERC**

**November 9, 2012**

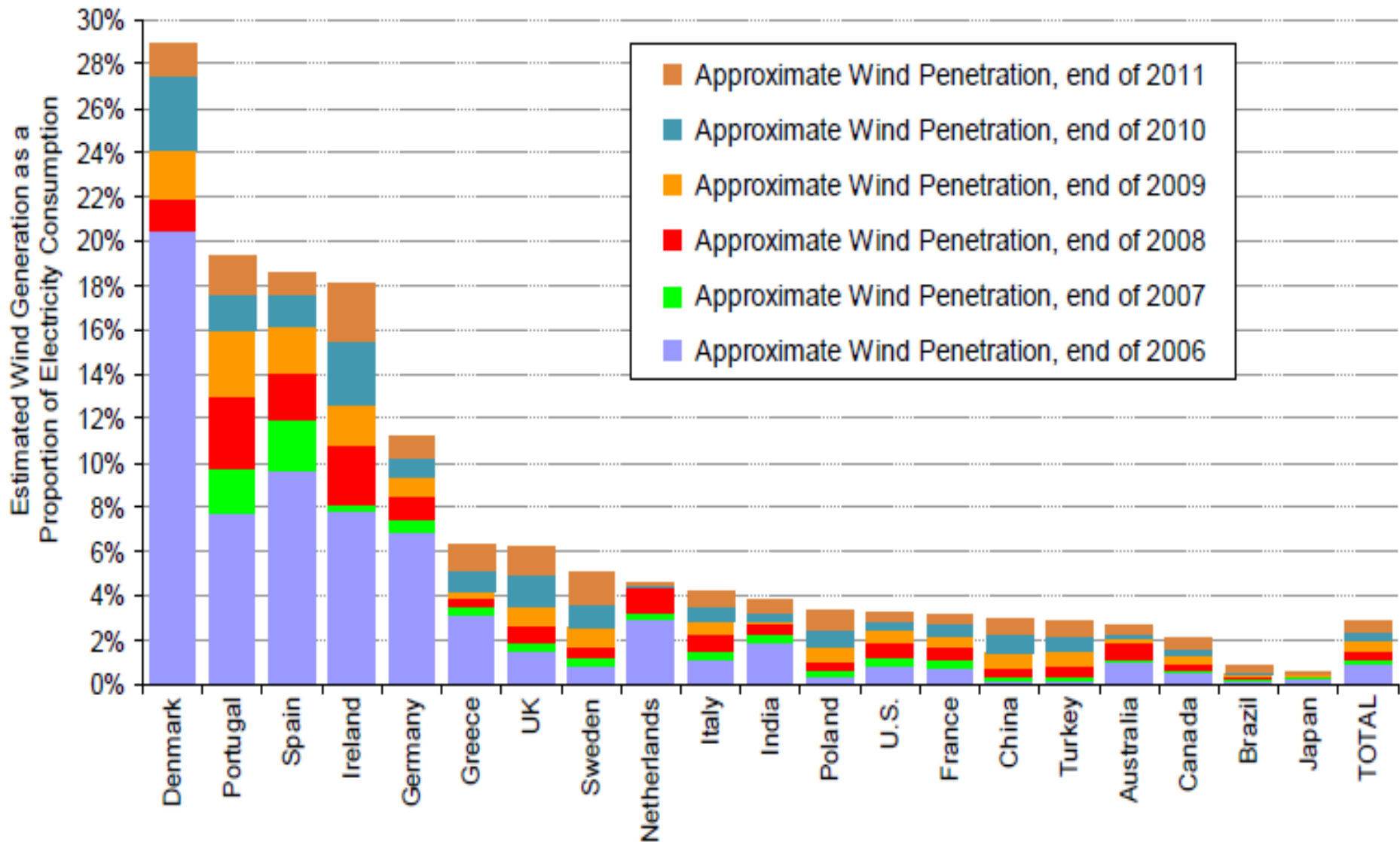
Michael Goggin

American Wind Energy Association

# Outline

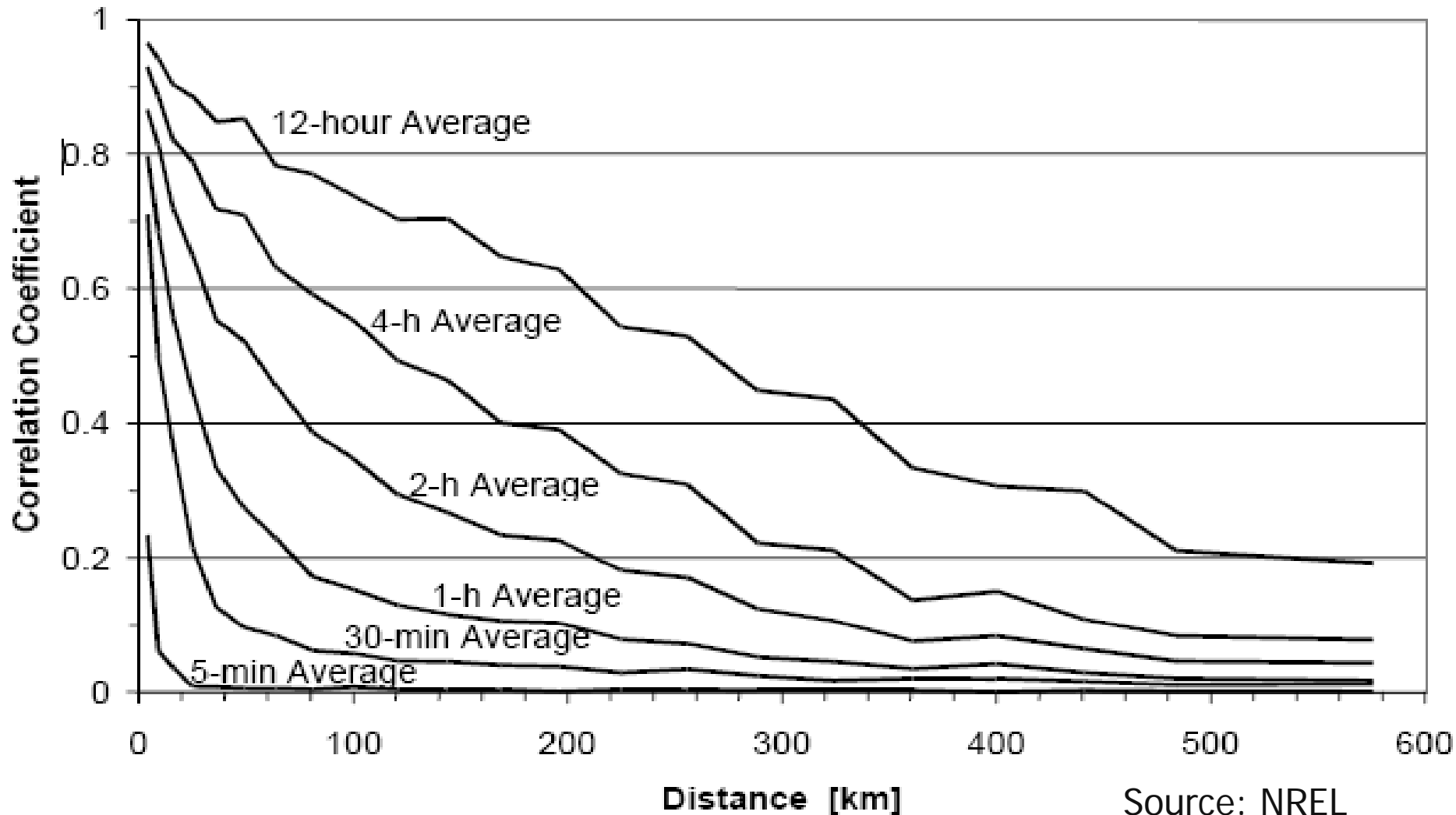
- Wind Integration: The Data
- Wind Integration Solutions
- Wind Integration at FERC

# World Wind Energy Penetration



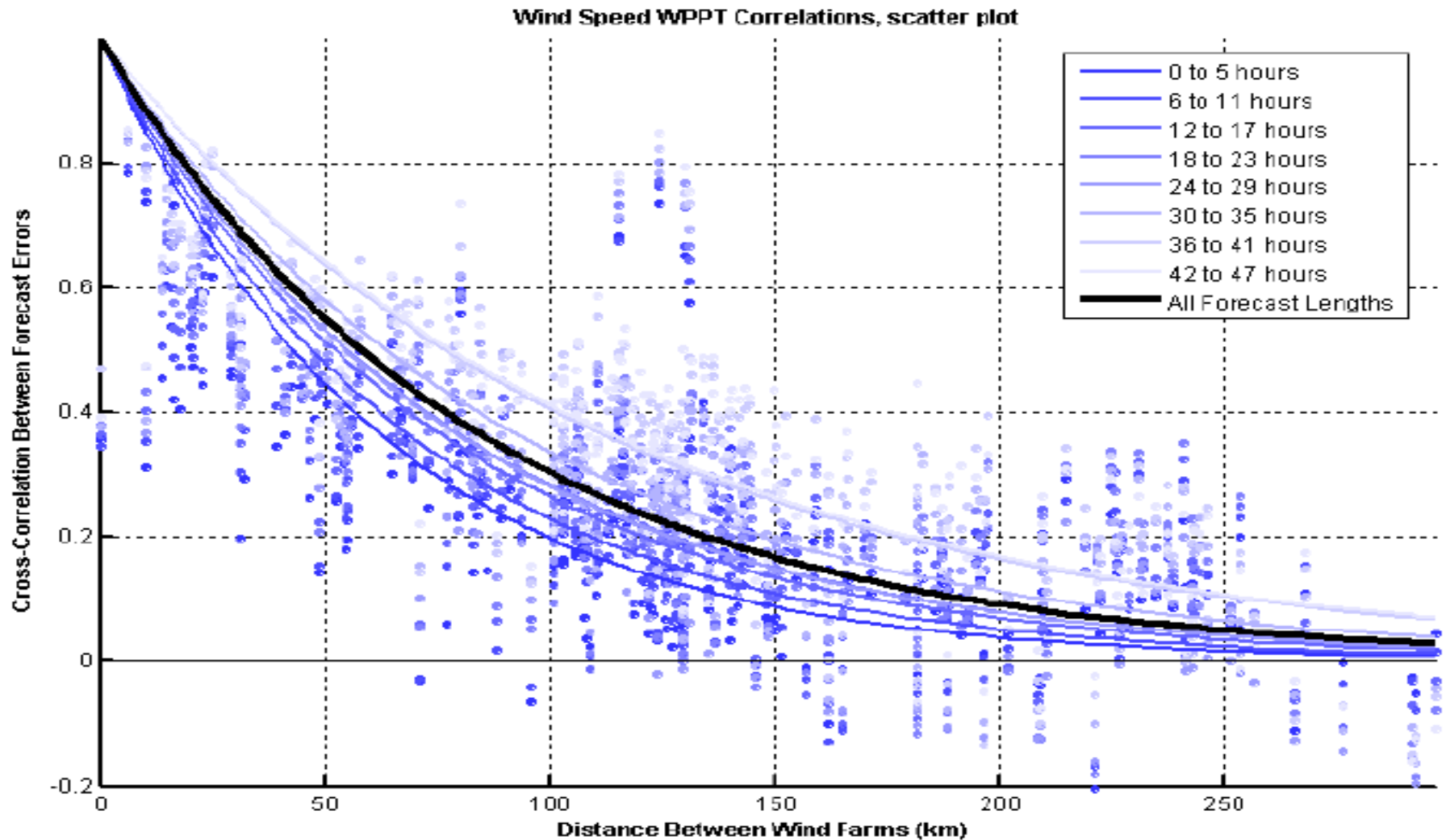
# The Time and Distance Element of Wind's Variability

Correlation in wind plant output as a function of time and distance





# The Time and Distance Element of Wind's Uncertainty



Source: Tradewind

# Incremental Variability Added by Wind (1 SD)

Study	Wind Penetration	1 minute	5 minute	1 hour
Texas 2008	15,000 MW	6.5 MW	30 MW	328 MW
California Energy Commission 2007	2,100 MW, +330MW solar	0.1 MW	0.3 MW	15 MW
	7,500 MW, +1,900 MW solar	1.6 MW	7 MW	48 MW
	12,500 MW, +2,600 MW solar	3.3 MW	14.2 MW	129 MW
New York 2005	3,300 MW	- -	1.8 MW	52 MW

# Variability Added by Wind: Westar

Category	Stand-alone variability (1 SD)	Variability Squared
Frequency dev.	10.5 MW	111.12
Generation	62.5 MW	3912.15
Load	28.7 MW	824.41
<b>Total</b>	<b>69.62 MW</b>	<b>4847</b>

**Without wind  
(5,400 MW system)**

← Take square root

Category	Stand-alone variability (1 SD)	Variability Squared
Westar wind	8.4 MW	71.29
Export wind	10.7 MW	115.18
Frequency dev.	10.5 MW	111.12
Generation	62.5 MW	3912.15
Load	28.7 MW	824.41
<b>Total</b>	<b>70.95 MW</b>	<b>5033</b>

**Add 400 MW of  
wind**

**Increase in  
regulation  
requirement:  
 $1.33 \times 2 = 2.66$  MW**

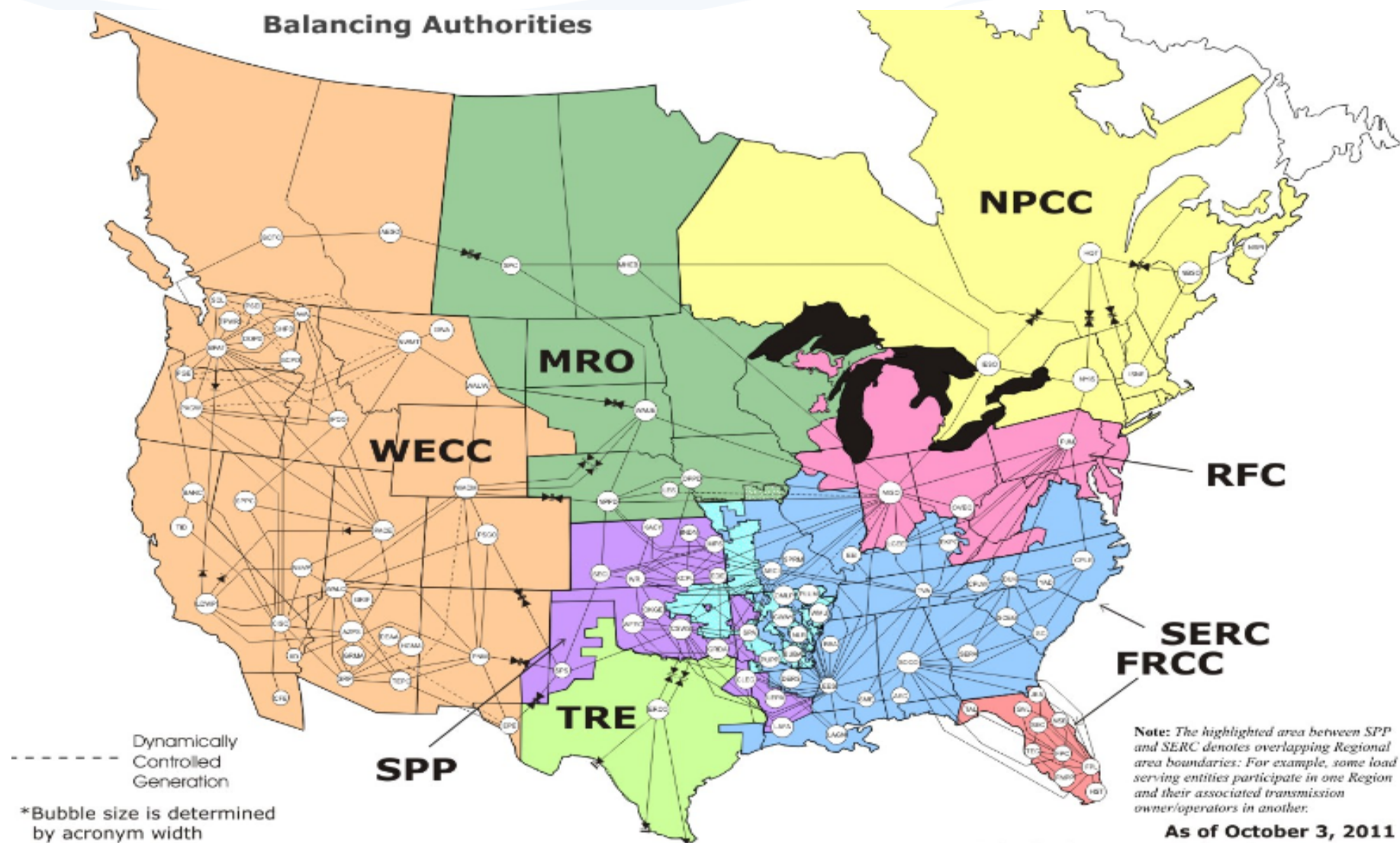
# Wind Integration Solutions



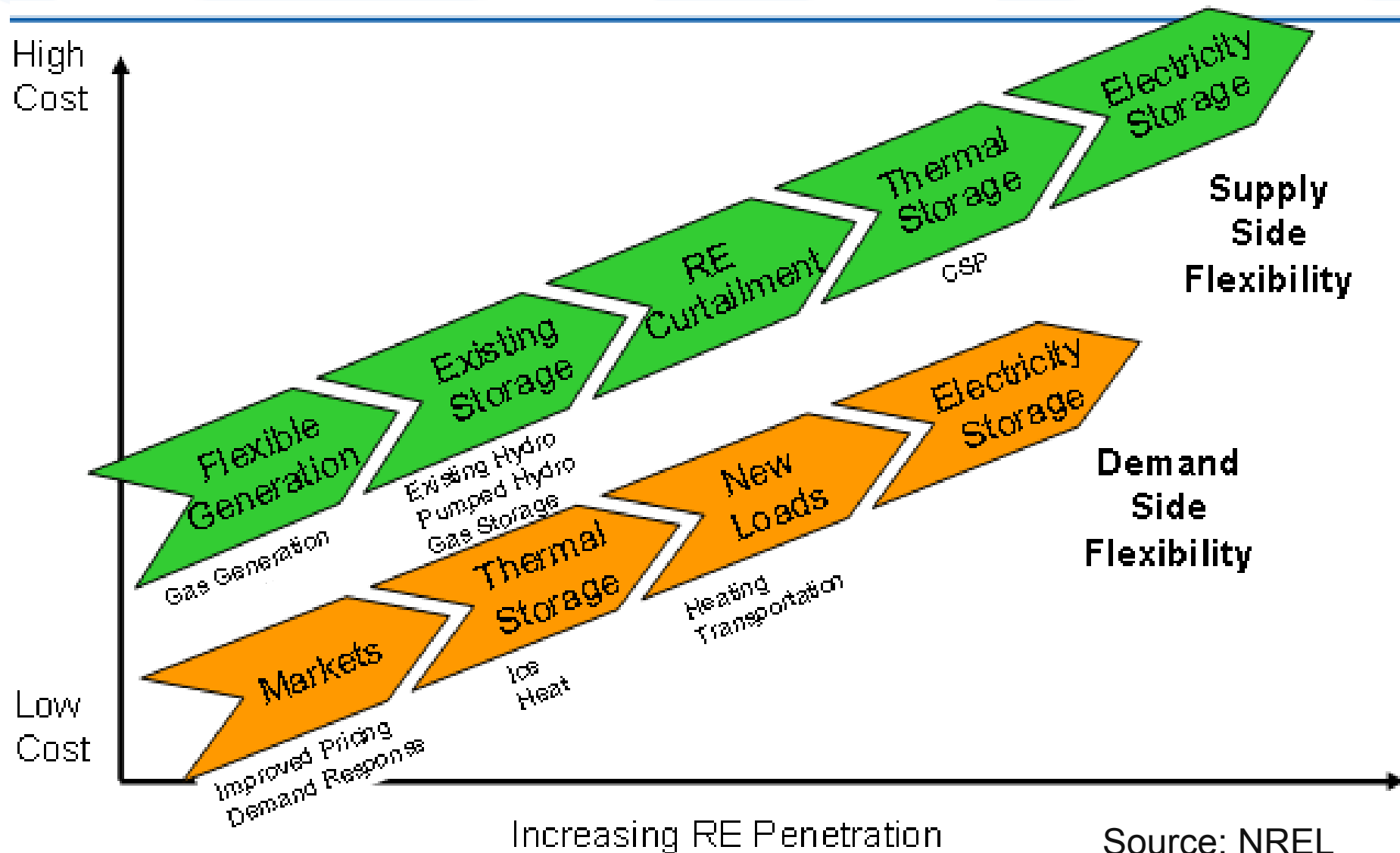
# Integration Solutions

- In ISOs
  - Better use of wind forecasting
  - Better coordination (including faster scheduling intervals) with neighboring balancing areas
  - Ancillary services market reform
- Outside of ISOs
  - Faster generator dispatch
  - Faster transmission scheduling
  - Larger or more coordinated balancing areas
  - Centralized markets

# Grid Balkanization Impairs Wind Integration



# The Flexibility Supply Curve



# Wind Integration at FERC

# FERC Integration Rulemaking

- Notice of Inquiry on integration issues in spring 2010, proposed rulemaking issued November 2010, comments submitted March 2011

## AWEA comments on FERC's three proposals:

- 1. Sub-hourly scheduling is a step in the right direction, should be expanded to include dispatch or full EIM
- 2. Wind energy forecasting proposal is helpful, wind industry willing to step up and provide data
- 3. Proposed generator regulation service needs changes:
  - Cost should be broadly allocated like other integration costs, FERC precedent; only allocating wind costs is discriminatory
  - Service should be non-spin, not regulation
  - Should not take effect until grid reforms are implemented

# Integrating Any Resource With The Grid Has Costs

- Large fossil and nuclear power plants frequently experience unexpected outages, taking 1000+ MW offline instantaneously
- Since these losses can occur at any time, grid operators must maintain expensive, fast-acting reserves 24/7/365 to backup the capacity of the largest power plant
- In contrast, changes in wind output typically occur gradually over many hours and are predictable, allowing grid operators to use 30-50x cheaper non-spinning reserves
- Wind integration costs, and grid operating costs in general, can be greatly reduced through a number of very cost-effective grid operating reforms, like better coordination among the U.S.'s 125 grid operating areas and using technology to dispatch power plants at faster intervals



# Order 764

- Final rule issued in June 2012, Compliance Filings due September 2013 (though EEI's 2-month extension request pending)
- Maintains 15 minute scheduling requirement
- Maintains forecasting data requirement for wind plants
- Requires utilities/ISOs to use wind forecasting to reduce reserve requirements before wind integration charge is imposed
- Does not implement standardized generator regulation service
  - Continues case-by-case approach
  - Establishes guidance for integration charge proposals

Questions?

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