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Presentation

Renewable Energy Development in the Shale Era

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La Capra Associates, Inc.

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La Capra Associates' Overview

La Capra Associates is an employee-owned, independent consulting firm which has specialized in the electric and natural gas industries for more than 30 years.

Though located in New England, we have a national practice with experience in a broad range of regulated and competitive market environments.

Special expertise includes:

- Regulated Rates, Cost of Service and Rate Design
- Renewable Energy Planning
- Energy Efficiency Planning
- Environmental Planning for Energy Systems
- Integrated Resource Planning
- Generation Planning and Asset Valuation
- Procurement and Portfolio Management
- Power System Planning
- Transmission Planning
- Market Analytics
- Competitive Bidding and Evaluation
- Utility Regulatory Policy
- Merger and Acquisition Analysis
- Retail Electric Markets Policy and Design
- Wholesale Electric Markets Policy and Design
- Utility Strategic Planning
- Expert Witness Services

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Introduction to Key Themes

1. Shale Gas "Era" Features Reduced Prices and Volatility

- Energy Revenues to Renewable Developers Anticipated to Fall
- Fuel Cost Volatility Benefit Has Been Mitigated (somewhat)

2. Other Factors need to be considered

- Policies (state and federal can mitigate Shale Impact)
- Low natural gas prices affecting baseload capacity decisions

3. What has happened since the start of the "Shale Era" and what will happen in the future?

- Renewable Energy Development Has Continued
- Outlook remains positive but may be regional

1. Shale Gas and Impacts on Developer Revenues

What is Shale Gas? *Pervasive – including Canada*

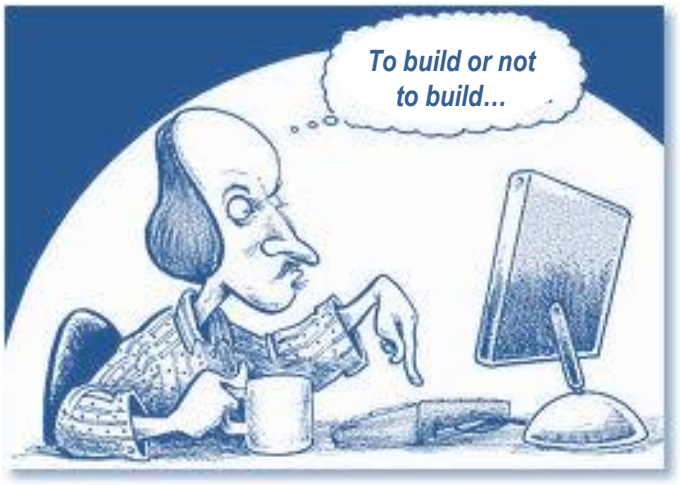
Source: U.S. Energy Information Administration based on data from various published studies. Canada and Mexico plays from ARI.
Updated: May 9, 2011

Natural Gas Market Impacts – "30,000 foot level"

- New supply push has *already transformed* markets
- Conventional Gas Supply 
- Unconventional (Shale) Gas 
- *"Shale Revolution"* has *already transformed* gas production
- *Infrastructure* additions across the US offer flexibility and reliability to meet peak demand and load growth…*except for New England!?*
- Utility purchasing trends
- DSM Implications and Impact on Renewables

To Build or Not to Build

- Revenues to Renewable Generation
  - Energy
  - Capacity
  - RECs
- Revenue levels and assurance influence ability to finance and obtain LTCs
- Other factors
  - Cost (capital, O&M)
  - Grants, tax credits, and other financial
  - assistance
  - Permitting, length of development cycle



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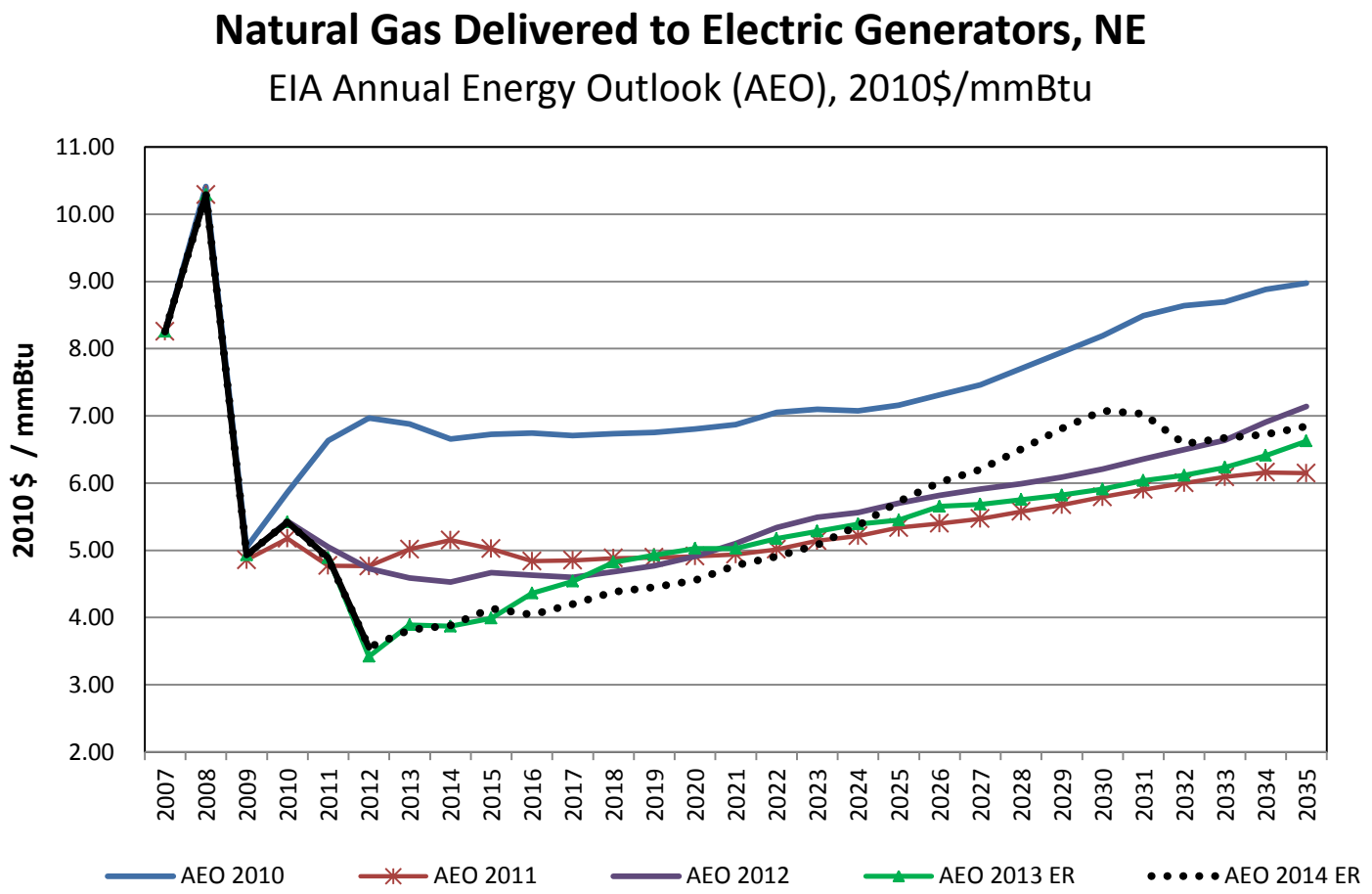
Drop in Gas Prices = Lower Energy Revenues



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New England Wholesale Prices Comparison

	2009 Reference* ($/MWh)	2013 Reference ($/MWh)
2012	62.65	n/a
2016	77.09	56.74
2020	107.23	66.22
2025	138.04	92.25
2035	176.09	140.81

* Shale era began in September 2009 with sub $3 NYMEX prices. 2009 reference forecast calculated prior (in early 2009)

2. Other Considerations

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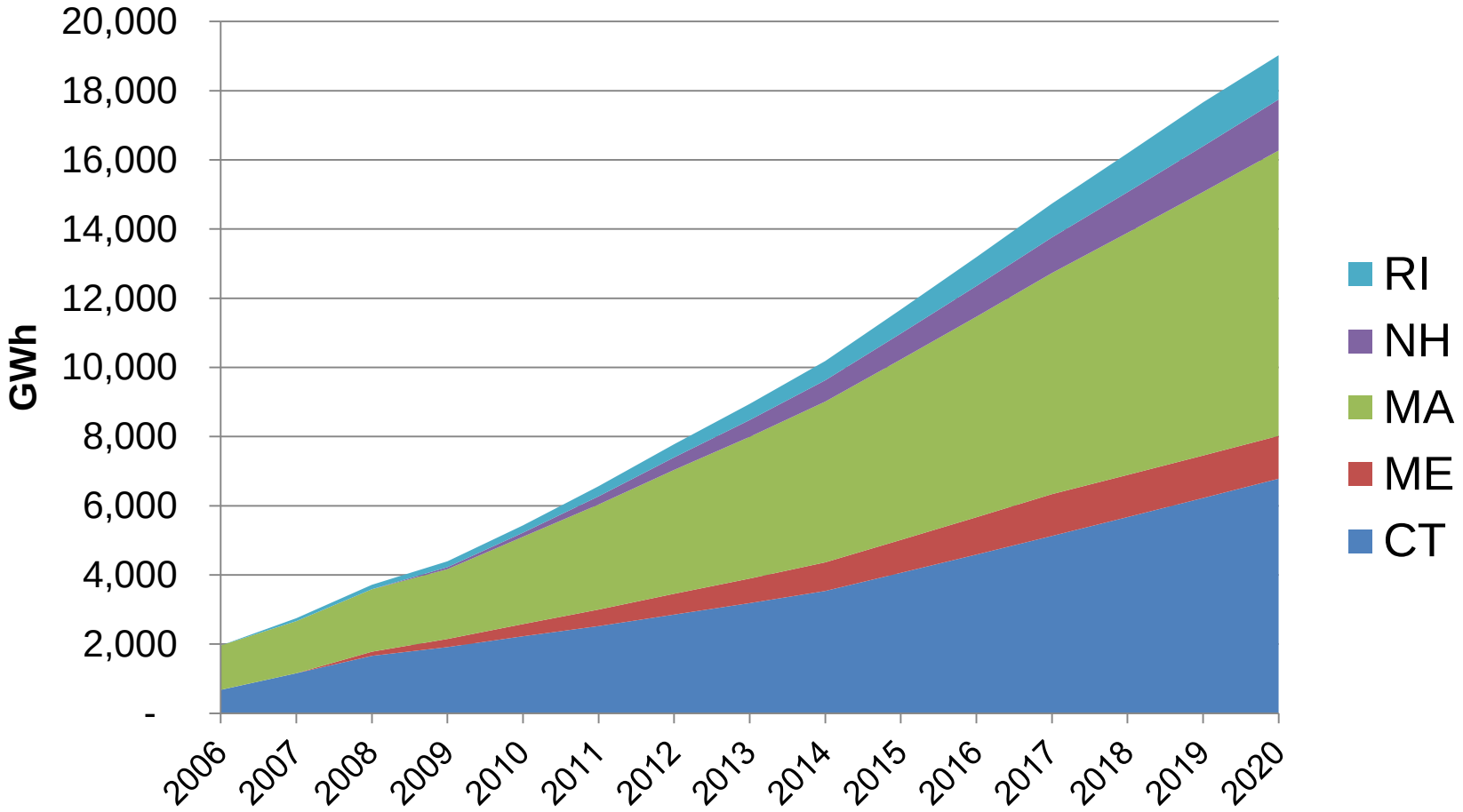
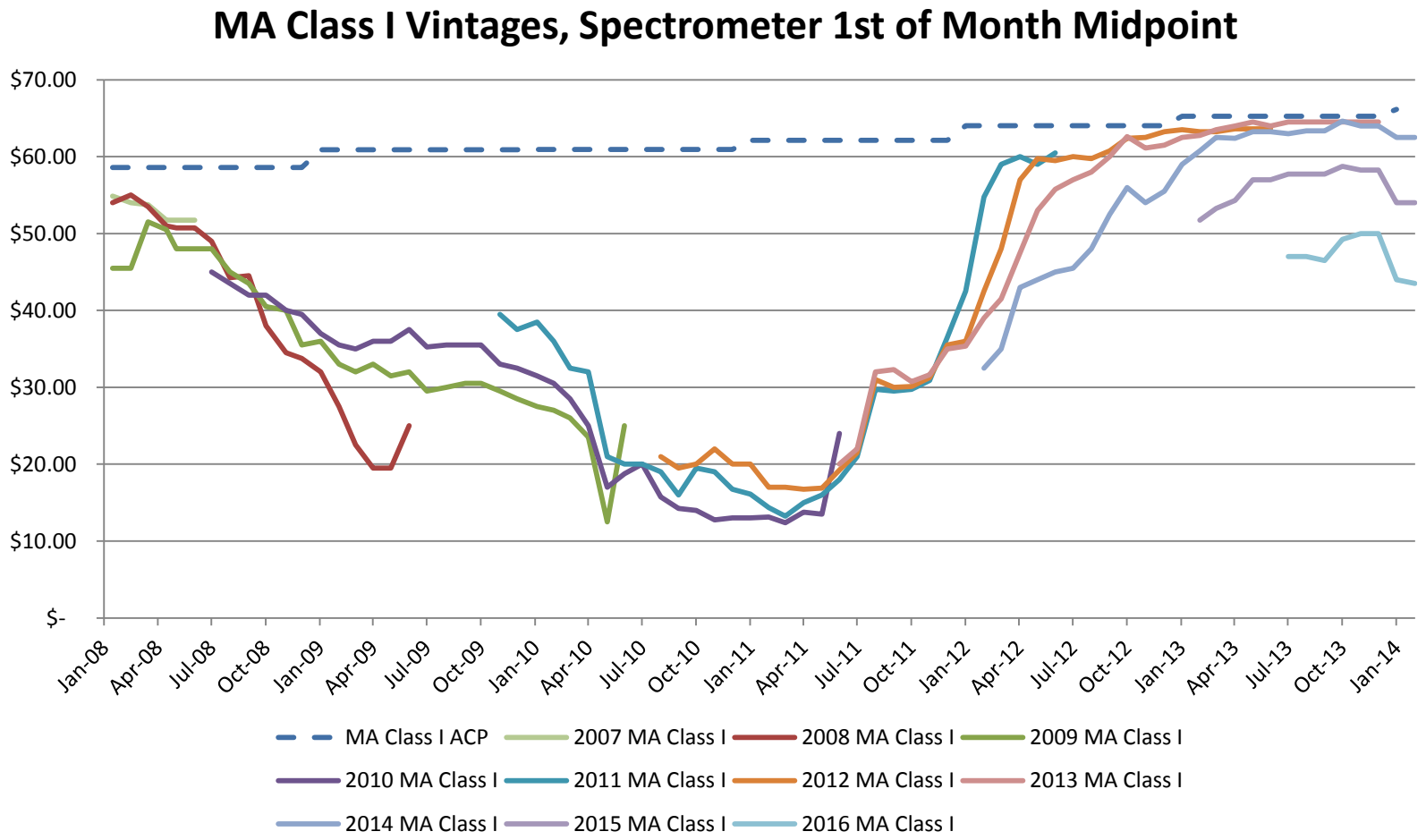
RPS Requirements are Ramping Up Quickly:

Approx. 1400 GWH/Year = A Cape Wind per Year!



REC Price History



Source: Marex Spectron, La Capra Associates

MA Class I REC Prices, Then and Now

	2009 Reference* ($/MWh)	2013 Reference ($/MWh)
2012	34.20	n/a
2016	23.83	47.36
2020	13.55	74.79
2025	15.33	83.77
2035	17.35	81.09

* 2009 reference forecast calculated in early 2009, not considering future ramp ups in regional RPS and not fully incorporating Shale effects.

Coal Retirements

- Utilities are recalibrating their supply portfolios with a greater focus on gas-power generators
- Natural gas plants inherently more flexible (operationally) and being used as baseload options—should facilitate integration of wind and other renewables efforts
- Examinations of integrated resource plans (IRPs) providing opportunity to investigate addition of renewable generation to provide fuel diversity and cost-effective energy

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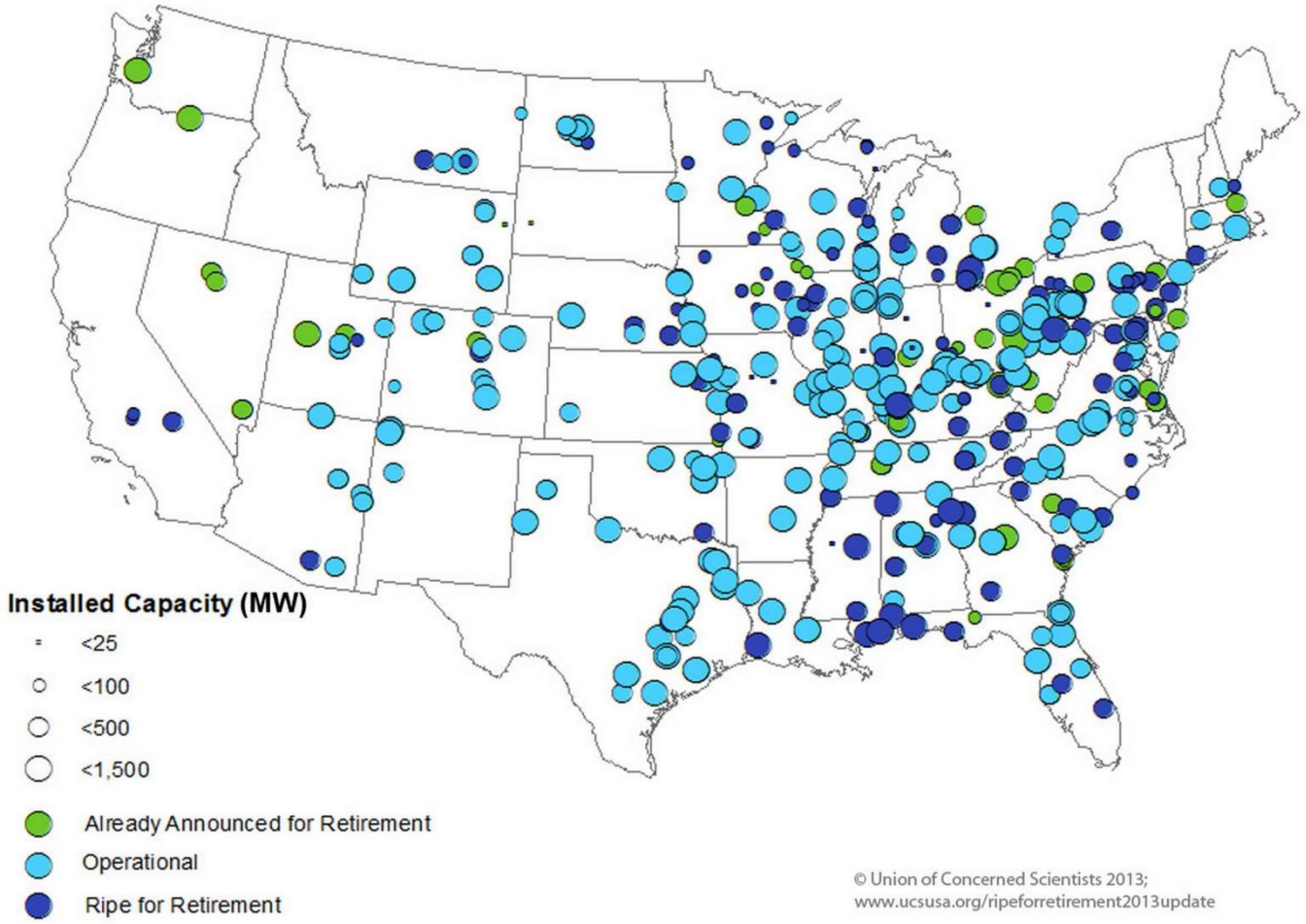
Coal Plants Retirement Potential Compared to NGCC



Source: Union of Concerned Scientists

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(Onshore) Renewable Costs Continue to Fall

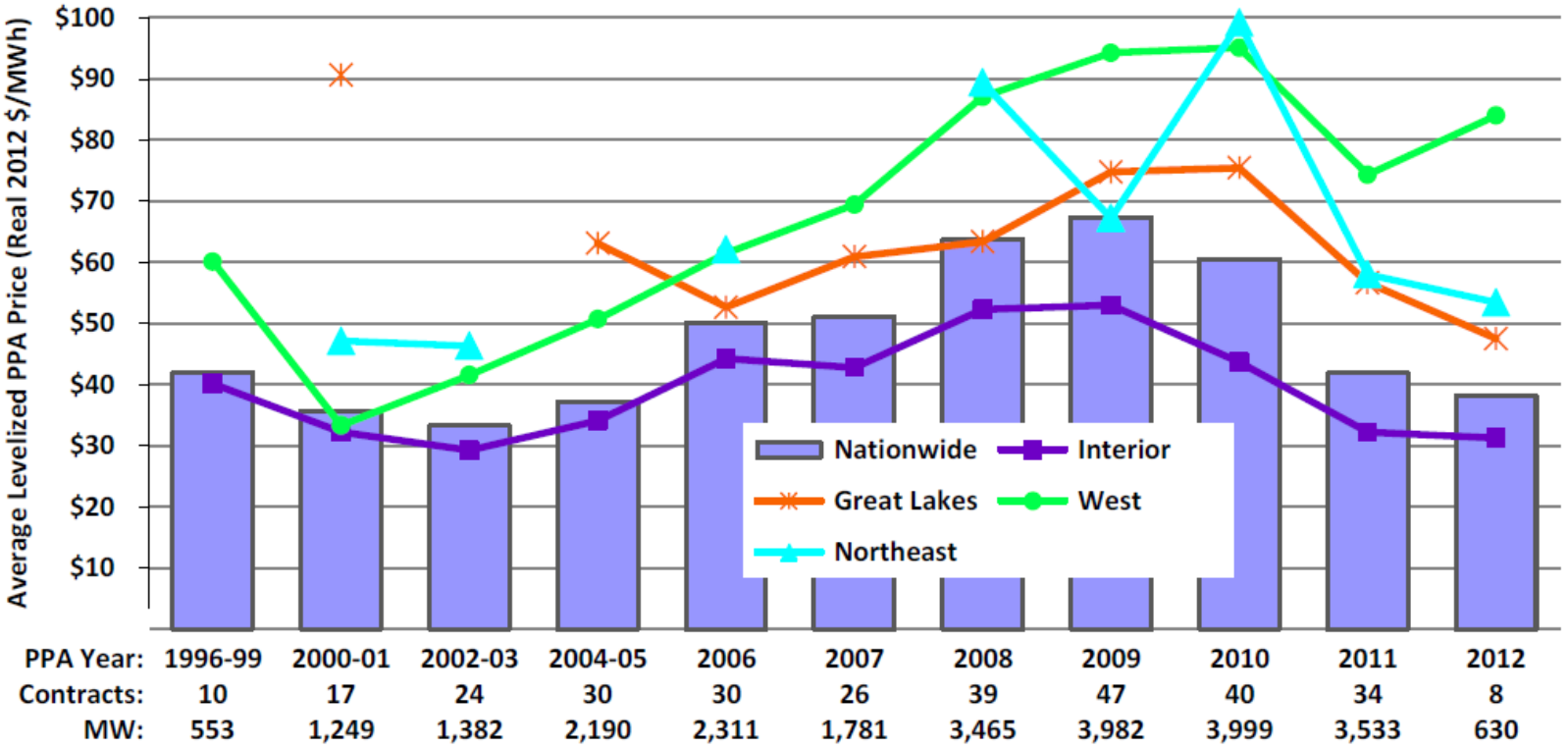
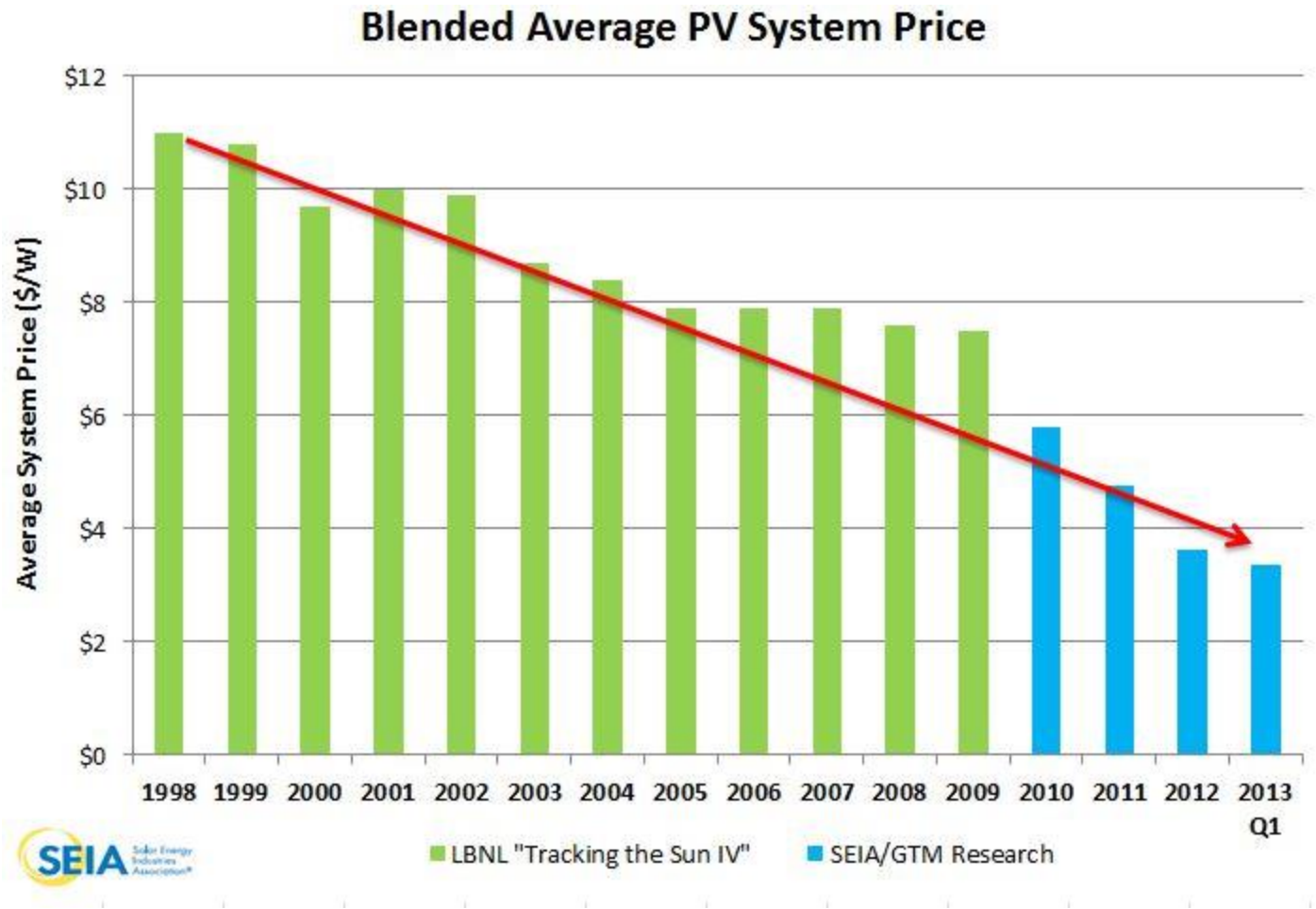


Figure 33. Generation-Weighted Average Levelized Wind PPA Prices by PPA Execution Date and Region

Source: NREL

(Onshore) Renewable Costs Continue to Fall



Source: Solar Energy Industries Association

3. Bottom Line Impacts?

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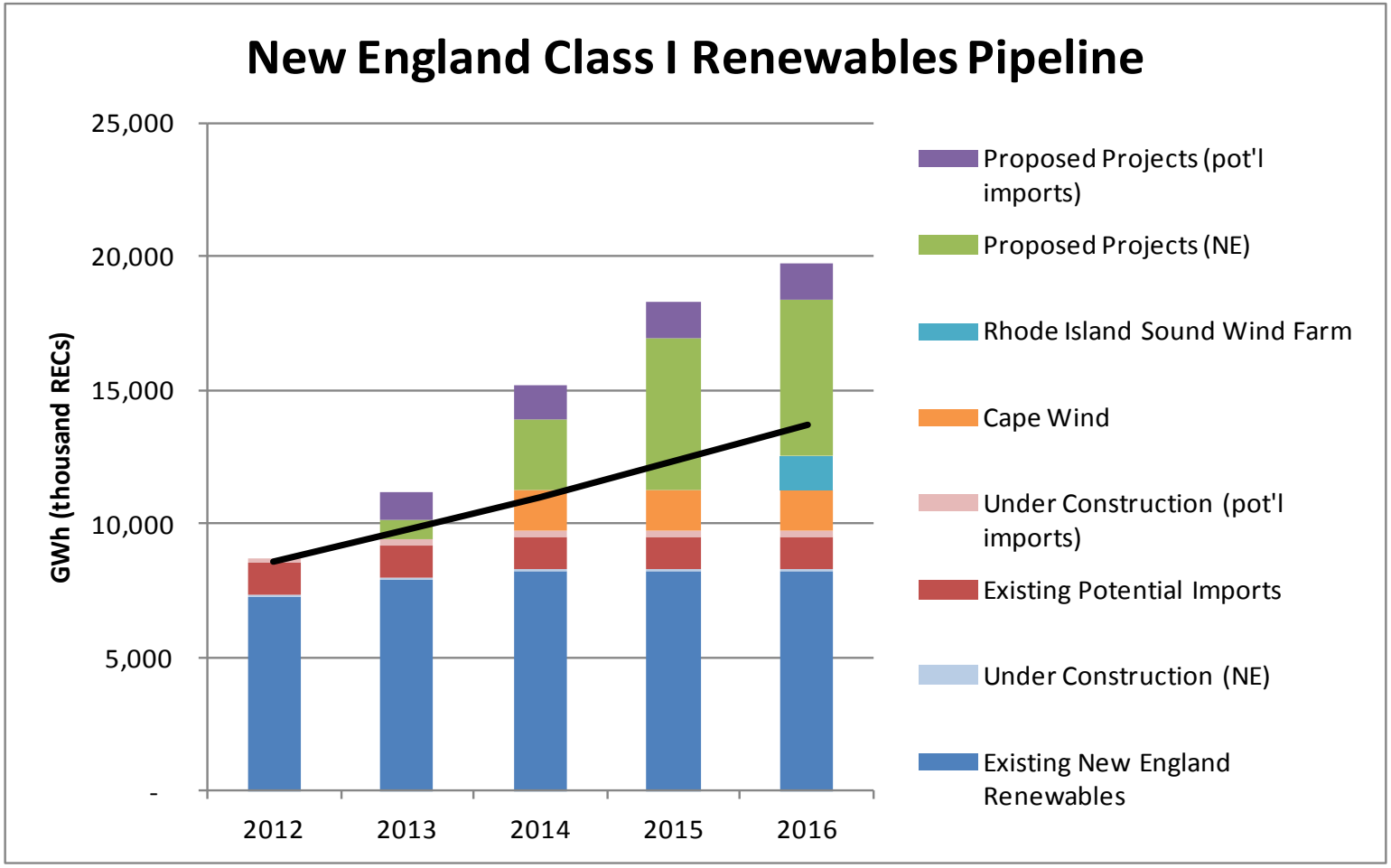
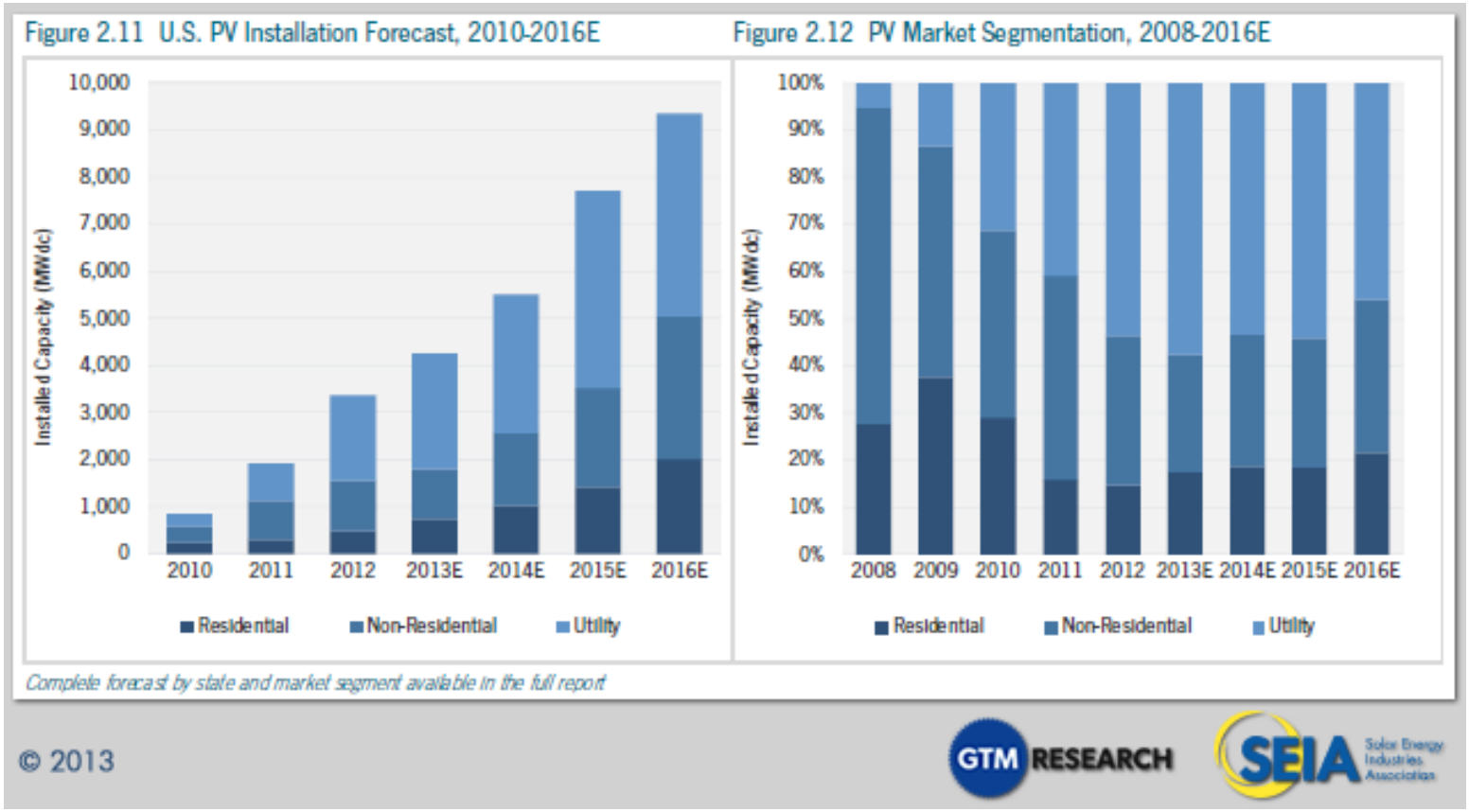
In New England, We've Had Success Building Projects,

But We Need to Increase Pace to Meet Future Requirements



Even More So Across The Country…



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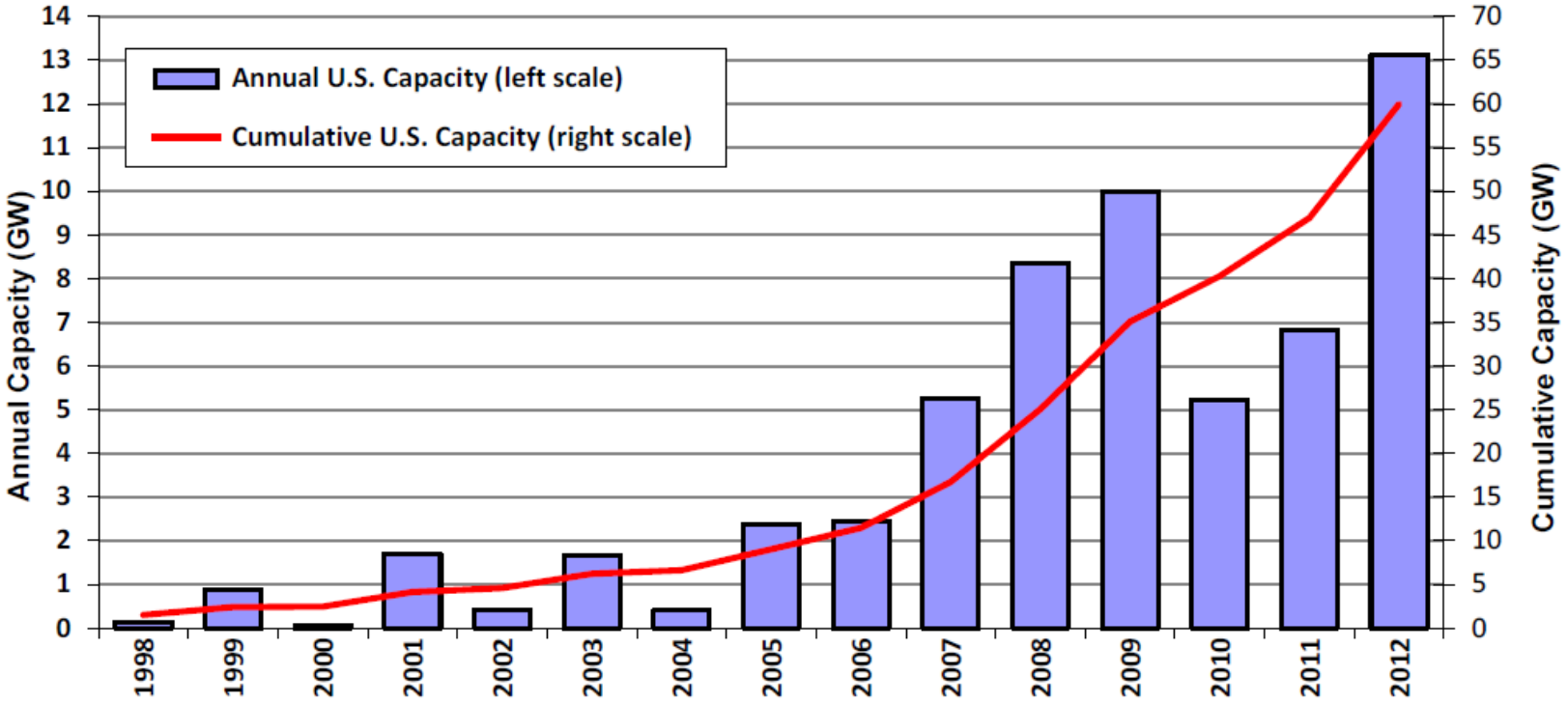

Source: AWEA project database

Figure 1. Annual and Cumulative Growth in U.S. Wind Power Capacity

Source: NREL

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Headwinds

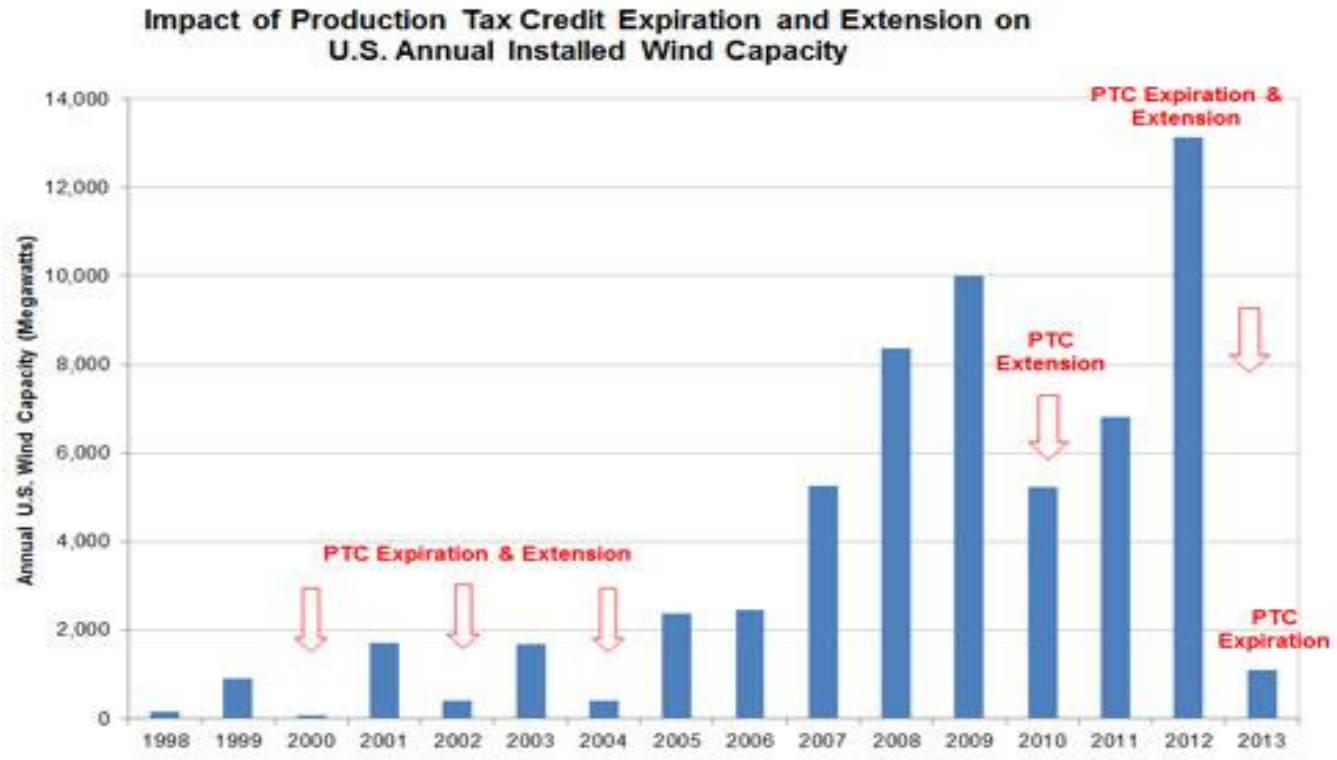
- Renewable developers facing challenges
  - Policy Uncertainty
  - Need for Long Term Contracts and/or Rate Base
  - Transmission planning
  - Reduced market revenues
  - MOPR(s) in Organized Markets

Long Term Contracts and/or Rate Base

- Financing a renewable project has become the major challenge
- Few projects (renewable or non renewable) being built without contracts or rate base
  - In New England, all recently built wind projects had long term contracts or owned by muni or IOU (Vermont)
- Locally, some allowances/requirements for LTCs
  - Massachusetts
  - Rhode Island
  - Vermont
  - Maine
- Not enough LTCs allowed/required to meet RPS requirements in New England

Federal - Production Tax Credit/Investment Tax Credit

- PTC/ITC expired in 2013 for wind/2016 for solar resources
- Losing PTC increases wind power levelized costs by ~ $25/MWh



Source: Union of Concerned Scientists, AWEA

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State Policy – Renewable Portfolio Size and Shape

- Re-evaluation of existing RPS
  - New Hampshire
  - Connecticut
  - Maine
- Expansion
  - Maine
  - Vermont
- States increasingly concerned about economic development
- Potential game changers
  - Energy Efficiency
  - Imported Large Hydro

Which Way From Here? Key Signposts to Watch

- States retreat/advance on RPS Policies?
- Shifting focus from RPS to long-term contract policy as key to development?
- Solving the transmission challenges
- Fracking Policy – Will continued low gas prices lead to low LMPs?
- Congressional Action on PTC Extension?
- Treatment of renewables in wholesale markets
- Continued penetration of natural gas

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End of Presentation

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Thanks!

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