Renewable Energy in PJM

John DiDonato
VP, Wind Development
 Agenda

• Corporate Overview
• Executive Summary
• PJM Overview
• RPS
• EPA Regulation
• Trends in Wind
• Pennsylvania Wind
• Questions
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NextEra Energy (NYSE: NEE) is comprised of two strong businesses supported by a common platform

- $42.4 B market capitalization (1)
- 43,798 MW in operation (2, 3)
- $72 B in total assets
- One of the largest U.S. electric utilities
- 4.7 MM customer accounts
- 25,581 MW in operation

(1) As of September 2, 2014; Source: FactSet
(2) As of July 1, 2014
(3) Includes NEE’s ownership share of NEP’s portfolio
Note: All other data as of June 30, 2014
NextEra Energy Resources’ generation portfolio consists of a diverse set of technologies positioned in a number of regions...

NextEra Energy Resources’ Generation Portfolio

- Wind: 10,210 MW
- Nat Gas: 3,990 MW
- Nuclear: 2,721 MW
- Oil: 796 MW
- Solar: 477 MW
- Coal: 9 MW

(1) As of December 31, 2013; excludes Spain solar project
...and has been largely built by the addition of wind assets in North America

**Energy Resources’ Wind Portfolio**

**Top U.S. Wind Developers/Owners(1)**

(1) As of December 31, 2013. Includes 367.5 megawatts of wind in Canada. Source: American Wind Energy Association for competitor megawatts
NextEra Energy Resources is the largest owner and operator of Wind energy assets in North America

NextEra Wind Operations

• Owns, operates and maintains over 10,210 MW of wind generation from over 8,500 wind turbines at 107 sites across North America
  – Largest owner of GE, Siemens and Vestas turbines
  – Operates 23 different technologies of turbines

• Over 950 teammates dedicated to Wind Operations
  – Dedicated engineering team with expertise in all major components (i.e. gearboxes, generators, blades, turbine controls, etc.)
  – Dedicated reliability engineers that specialize in data analysis and operations optimization

Our commitment to wind energy in North America is second to none – approximately 17% of all wind energy delivered in the U.S. in 2014 will come from our projects
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The energy markets in North America are experiencing the largest change in more than 50 years

Executive Summary

- Unlocking the cheap natural gas resources of the Bakken, Utica, and Eagle Ford shale formations is shifting the country away from coal and nuclear generation.
- Natural Gas fired generation is increasing as a percentage of U.S. generation, strengthening the link between $/MWh and $/MMBtu.
- Wind turbine manufactures have been advancing technology to compete in the current market, wind is at or below grid parity in many parts of the U.S.
- The combination of state RPS requirements, future EPA 111 (d) compliance, and inflation uncertainty in combination with an expiring PTC is driving a large wind build in the U.S.
- Across the U.S. utilities are purchasing wind to hedge against natural gas, inflation, and the cost of carbon.
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Low natural gas prices and tightening environmental regulations will drive 82 to 94 GW of generation retirements across the U.S. by 2017.

Retirements by Fuel

2010-2017 Cumulative Retirements (GW)

New supply to offset retirements

Retirements by Region

82 GW Total by 2017

PJM (14 GW), MISO (12 GW), and SERC (23 GW) account for the majority of expected coal retirements

1) Source: Ventyx
61 GW of new gas supply combined with 49 GW (11 GW derated) of solar/wind generation will largely offset expected retirements.

**New Entrants by Region**

- **MISO**: 8.2 GW
- **NY/NE**: 4.4 GW
- **PJM**: 16 GW
- **SERC**: 24.9 GW
- **WECC**: 19.5 GW
- **SPP**: 5.9 GW
- **ERCOT**: 12.3 GW

PJM (14 GW), ERCOT (8 GW), and SERC (19 GW), account for the majority of new gas-fired generation.

1) Wind and solar derated to 15% and 50% of nameplate respectively
2) Source: Ventyx
PJM, MISO, and SERC have lost capacity since 2010 while SPP and ERCOT have experienced large net supply growth

Market Entry and Exit by Region

PTC extension could trigger another wave of economic wind development in ERCOT, SPP, and MISO

1) Source: Ventyx
Retirements in PJM have been concentrated in NJ and MD; driven by low gas prices, NJ HEDD regulations, and MATS emissions requirements

**PJM Mid-Atlantic Retirements (GW; 2010-2017)**

<table>
<thead>
<tr>
<th></th>
<th>Retired</th>
<th>Expected</th>
<th>Add’l At-Risk</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Coal</td>
<td>2.1</td>
<td>2.1</td>
<td>1.1</td>
<td>5.2</td>
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<tr>
<td>Oil</td>
<td>1.3</td>
<td>0.6</td>
<td>1.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Gas</td>
<td>0.8</td>
<td>1.4</td>
<td>0.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>4.2</td>
<td>4.0</td>
<td>2.6</td>
<td>10.8</td>
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</tbody>
</table>

Additional 10 GW of coal retirements expected in ATSI and APS in this timeframe, limiting future energy imports.

Not shown – Oyster Creek (637 MW Nuclear unit in NJ) retires 12/31/2019.
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Renewable builds in the U.S. continue to be focused primarily in areas of strong wind resource rather than areas with net RPS demand.

**RPS Supply and Demand**
(PJM, NYISO, ISO-NE)

- Assumes 40% wind NCF

**RPS Supply and Demand**
(MISO, SPP, ERCOT)

- Flood of economic wind suppressing spark spreads throughout MISO, SPP, and ERCOT
- Contracts or high REC price needed to encourage builds
- Economic wind exceeding RPS requirements
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The prospect of EPA Section 111(d) compliance is creating uncertainty in the market, but will ultimately set the price of CO₂

**Proposed Section 111(d) Rule to Regulate CO₂ from Existing Generating Units (EGUs)**

- Published in Federal Register on June 18, 2013
- Proposes state-by-state CO₂ emission targets -- CO₂ per megawatt hour (lbs/MWh)
- **Based on four building blocks:**
  1) coal units efficiency improvements,
  2) natural gas re-dispatch
  3) renewable and nuclear energy
  4) energy efficiency
Section 111(b) and 111(d), unless litigated against, will be decided under the current administration.

**Timing of 111(b) and 111(d) Rules (Option 1)**

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</thead>
<tbody>
<tr>
<td>GHG NSPS regulations for new sources (with a separate proposal for modified and reconstructed sources)</td>
<td>Proposal</td>
<td>Re-Proposal</td>
<td>Final</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>GHG NSPS regulations for existing sources</td>
<td>Proposal</td>
<td>Final</td>
<td>Initial State Plans Due</td>
<td>1-yr Extension Available for Individual State Plans</td>
<td>Multi-State Plans Due</td>
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</table>

- ◇ Final Rule, estimated
- ● Proposed Rule *Option 1*, as announced
- ◆ Final Rule, as announced
- △ State Plans Due to EPA

Under Alternate Option 2 (not shown above), states would be required to achieve an interim emission target in 2020 and a final target in 2025.
Every major market will see the expansion of renewables based on the average of what states in each region have already committed to

For example, in the Southeast region, only North Carolina has adopted an RPS (10% in 2020), thus, all of the states in the region (including Florida) are expected to be able to meet a 10% renewable target in 2030.
EPA’s 111(d) 2030 greenhouse gas target requires significant coal to gas switching and modest clean energy or energy efficiency investment.

**RGGI+ (ISO-NE, NYISO, PJM)**

- **EPA’s specific plan for Pennsylvania**
  - 1,052/lb/MWh by 2030
  - 18% increase in NG
  - 10% decrease in Coal
  - 692% increase in renewables
  - 11.7% increase on demand response

PJM has the largest incremental need of renewables of any ISO in the U.S.

- High level analysis utilizes EPA’s estimate of coal to gas redispactch
- 2014 Baseline includes under construction renewables
- Energy Efficiency will reduce the need for incremental renewables
- RGGI+ states include 9 current RGGI states plus NJ, PA, VA, WV, OH, IL
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Renewable projects are increasingly price competitive with conventional generation

**U.S. Wind Delivered Cost of Electricity**

<table>
<thead>
<tr>
<th>Year</th>
<th>Levelized Cost ($/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>$67</td>
</tr>
<tr>
<td>2010</td>
<td>$55</td>
</tr>
<tr>
<td>2011</td>
<td>$39</td>
</tr>
<tr>
<td>2013</td>
<td>&lt;$35</td>
</tr>
<tr>
<td>2015E</td>
<td>&lt;$30</td>
</tr>
</tbody>
</table>

- Declining PPA price since 2009
  - Increasing NCF
  - Turbine pricing
  - YieldCo equity
  - Maturing market

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Turbine technology advancements from 2003 to 2014 at NEER’s Waymart Wind Project in Wayne County Pennsylvania would potentially increase the NCF by 71%.

**Technology Advancement** (1)

Increasing turbine efficiency is expected to continue for the next 3-4 years further increasing project’s NCFs.

(1) Based on NextEra Energy estimates
The value of a bundled product starting in 2016 with PTCs will provide value on day one to the off taker while hedging against energy and carbon.

**Wind as a Natural Gas (NG) Hedge**

- **(1)** Assumes 2014 NG at $3.50 MMbtu and an average 10 heat rate
- **(2)** Pace Global PJM Tier I/Class I REC Pricing Outlook
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PJM Wind (1)

PJM Queue Positions (Less PA)

PA Queue Positions

PJM Active Queue Positions

In-Service  Under Construction  Active Interconnection

Siting in Pennsylvania

Legend
- Indiana Bat Habitat
- Airport Zoning Restrictions
- PA Urban Areas
- PA State Lands

NEXTera ENERGY RESOURCES
The process to gain entitlements for a wind project in Pennsylvania is expensive and long with little certainty of completion.

Permitting in Pennsylvania

1. Permit met tower
2. Wind data collected
   1. Start land acquisition
   2. Start avian/bat Studies
   3. FAA screening
3. Avian/bat studies complete
   1. Consultation with USFWS – Endangered Species Act
   2. Consultation with Pennsylvania Game Commission
4. Start state & federal permitting
   1. Start Habitat Conservation Plan
   2. NEPA (if Federal nexus)
   3. Local permitting – NIMBY
5. Permitting
Endangered bats are the largest environmental concern for the development of wind projects in Pennsylvania

**Environmental Challenges**

- **Bats**
  - White-nose syndrome has decimated population
  - Federally Endangered Indiana and Virginia Big-Eared bats
  - Candidate Northern Long-Eared Bat
    -- USFWS listing anticipated April 2015
  - USFWS request for large buffers from hibernacula
To understand and mitigate avian impacts several years studies are required prior to starting the permitting process

**Environmental Challenges (continued)**

- **Avian**
  - Raptor migration corridors (Allegheny Front)
    -- Bald and Golden Eagles
Questions?