West Virginia Energy Plan and Becoming an Electric Generator
June 25th, 2013
Estimated Levelized Cost of New Generation Resources, 2018

<table>
<thead>
<tr>
<th>Plant type</th>
<th>Capacity factor (%)</th>
<th>Levelized capital cost</th>
<th>Fixed O&amp;M</th>
<th>Variable O&amp;M (including fuel)</th>
<th>Transmission investment</th>
<th>Total system levelized cost</th>
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</thead>
<tbody>
<tr>
<td><strong>Dispatchable Technologies</strong></td>
<td></td>
<td></td>
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<tr>
<td>Conventional Coal</td>
<td>85</td>
<td>66.7</td>
<td>4.1</td>
<td>29.2</td>
<td>1.2</td>
<td>100.1</td>
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<tr>
<td>Advanced Coal</td>
<td>85</td>
<td>84.4</td>
<td>5.8</td>
<td>30.7</td>
<td>1.2</td>
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<tr>
<td>Advanced Coal with CCS</td>
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<td>6.8</td>
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<td>1.2</td>
<td>135.5</td>
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<td>Natural Gas-fired</td>
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<tr>
<td>Conventional Combined Cycle</td>
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<td>1.7</td>
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<tr>
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<tr>
<td>Wind</td>
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<td>Wind-Maxpower</td>
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<td>Solar PV</td>
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<td>Solar Thermal</td>
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<td>76.1</td>
<td>4.1</td>
<td>5.1</td>
<td>2</td>
<td>80.1</td>
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</tbody>
</table>

Costs are expressed in terms of net AC power available to the grid for the installed capacity.

As modeled, hydro is assumed to have seasonal storage so that it can be dispatched within a season, but overall operation is limited by resources available by site and season.

Note: These results do not include targeted tax credits such as the production or investment tax credit available for new wind, geothermal, biomass, and landfill gas plants placed in service before the end of 2016, and 10 percent thereafter. New wind, geothermal, biomass, hydroelectric, and landfill gas plants are eligible to receive a 30 percent investment tax credit over the plant’s first ten years of service or (2) a 30 percent investment tax credit, if placed in service before the end of 2013, or (2012, for wind only).


WV Energy Plan Overview

- Directed by legislation that created the Division of Energy in 2007.
- WVDOE tasked to develop a 5-year energy plan that provides direction for the state in regards to energy development.
- Encompasses all facets of energy: fossil, renewable and energy efficiency.
- Reviewed by the public in order to obtain input on the included policies and development goals.

WVU’s BBER and Marshall’s CBER contracted by WVDOE to provide analyses of energy opportunities within West Virginia.
- WVU assessed fossil energy opportunities and Marshall assessed energy efficiency and renewable energy opportunities.
- Findings were presented to the public in fall 2012 at three locations around the state (Huntington, Morgantown and Martinsburg).
2013-2017 WV Energy Plan

- Plan preceded by specific recommendations by Governor Tomblin.
- Recommendations take into account what is feasible to accomplish in a 5-year period.
- In reference to today’s topics, promotion of the use of wood pellets and CHP can be found within the energy plan.

2013-2017 WV Energy Plan


WV Electric Market

- WV has a regulated utility market where prices are set by the PSC and retail customers are served through utility-owned electric generating units.
- In comparison, deregulated electric utilities purchase their electric from merchant plants. (Longview is a WV-based merchant plant.)
- PSC regulations allow independent generators to net meter electricity (up to 2 MW) or sell electricity directly into the regional grid.
Regional Electric Grid

- PJM is the Regional Transmission Organization (RTO) serving West Virginia.
- PJM operates from New Jersey to Illinois, the largest interconnection services operator in the country.
- Scheduling and dispatching of electricity and grid planning all done by PJM.
- Actual transmission grid remains owned by AEP and FirstEnergy.

Selling Electricity into PJM

- Requires studies to be paid for by generators.

Step 1

- Feasibility Study to Identify:
  - Direct connection costs
    - Transmission
    - Siting/right of way
    - Substation costs
    - Cost (dependent on generation size and queue timing) up to $130,000

Step 2

- System Impact Study:
  - Regional analysis of adding new generation/transmission
  - Identify system constraints
  - Cost of $50,000 plus $300/MW if wholesale generator system is greater than 100 MW; $10,000 for 20 MW system; $5,000 for 2 MW system
Selling Electricity into PJM

Step 3
 • Generation/Transmission Interconnection Facilities Study:
   • Identify engineering design work necessary to begin construction
   • Actual study done by PJM and charged to generator
   • For greater than 20 MW, $100,000 or study costs for three months; $50,000 for 20 MW; $15,000 for 2 MW or less

PJM Interconnection

• Small generation interconnection of 20 MW or less processed through expedited procedures
• Behind the meter generation required to submit a Generation Interconnection Request
• New generation may request two forms of interconnection services:
  • Energy Resource – participating in energy markets based on locational marginal pricing (required)
  • Capacity Resource – the right/obligation to schedule capacity and energy after satisfying deliverability issues

WV Net Metering Policy

<table>
<thead>
<tr>
<th>Customer Type</th>
<th>Utilities with 30,000 customers or more</th>
<th>Municipal utilities and electric cooperatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>25 kW</td>
<td>25 kW</td>
</tr>
<tr>
<td>Commercial</td>
<td>500 kW</td>
<td>50 kW</td>
</tr>
<tr>
<td>Industrial</td>
<td>2 MW</td>
<td>50 kW</td>
</tr>
</tbody>
</table>

• Program enrollment limit of up to 3% of utility peak load
• Excess generation carried over to customer’s next bill as a kWh credit at retail rate (perpetual rollover)
• Systems that generate electricity using "alternative" or "renewable energy" resources are eligible for net metering

Example Generators

• Wholesale:
  • Charleston Landfill Gas
  • Longview Power
  • Big Sandy Peaker Plant

• Net Meter:
  • WVU Book Exchange
  • Appalachian Offroad
  • Martin Distributing Company
Thank You!

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