Western Renewable Energy Zones

Meeting Transmission Challenges in the Rocky Mountain Region

Jeff Hein

June 21, 2011

NREL/PR-5500-52000

Composite photo created by NREL
Presentation Outline

• WREZ Vision;
• Chronology;
• WREZ Initiative Overview;
• Generation and Transmission Model;
• Lessons Learned;
• Future Activities.
WREZ Vision

• Western Governors’ Association and U.S. Department of Energy initiated effort to develop renewable energy resources and reduce GHG emissions.

• Develop a high level “screening tool” to identify potential projects that allows industry stakeholders to analyze and compare economics of multiple projects.

• Find the high quality, developable renewable resource zones (based on NREL data).

• Assume incremental transmission expansion to bring generation to load.

• Identify the areas where there are impediments.
WREZ: Why was it developed?

- **U. S. Utilities Must Install More Renewable Energy Generation**

  Nine western states have adopted targets for the percent of all electricity generation that must come from renewable energy:

  1. Arizona 15% by 2025
  2. California 33% by 2020
  3. Colorado 30% by 2020
  4. Montana 15% by 2015
  5. Nevada 20% by 2015
  6. New Mexico 20% by 2020
  7. Oregon 25% by 2025
  8. Utah 20% by 2025
  9. Washington 15% by 2020

- **Western states work together to develop most economical resources**

*Note: British Columbia is seeking renewables for all new generation.*
WREZ Chronology of Events

• 2005-2006 Western Governors’ Association Clean and Diversified Energy Initiative;

• 2007 - WREZ Concept Emerges (based largely on TX Competitive Renewable Energy Zones effort);

• 2008 – DOE WREZ Grant to WGA;

• 2009 – Transmission Planning FOA funds;

• 2010 – WREZ findings incorporated into interconnection-wide transmission planning (WECC).
WREZ Four Phases

- **Phase 1**: Identify renewable energy zones (REZs), estimate quantity of REZ resources, estimate busbar cost of REZ resources;

- **Phase 2**: Develop modeling tool to estimate delivered cost of energy from any REZ to any major load center in the West; submit scenarios to WECC for detailed study;

- **Phase 3**: Identify zones of common interest to multiple LSEs (foster regional renewable generation and transmission projects);

- **Phase 4**: Institution-building, address transmission siting and cost allocation issues.
WREZ Phase 1

• Include all states and provinces in the Western Interconnection

• “Filters” applied to eliminate certain land types (national parks, urban areas, etc.)

• Areas identified represented large resources, smaller areas still show potential for smaller local loads.
  – Wind Class Threshold
  – Solar DNI Threshold

• **Standard economic assumptions**
  • Capital cost of each technology
  • Capacity factor
  • Operation and maintenance costs

• Estimate typical annual production (MWh) - each technology at each quality level.
Western Renewable Energy Zones Initiative (WREZ)
Renewable Energy Zones

• A zone has no real boundary. Grid lines do not limit development. They are for the analytical purpose of estimating resources and deciding how large to build the transmission system.

• A hub is the center of a zone. It represents a transmission substation where the zone’s resources are collected and get onto the grid.

• All of the resources in the vicinity of the hub that passed screening are used to estimate the capacity available at the hub.
WREZ Phase 2

• Create Generation and Transmission Model (GTM)

• Calculates cost of delivered energy from 54 zones to 20 load centers in WECC.

• High level “screening tool” that performs a simplified economic analysis for quick project comparison.

• Easy-to-use spreadsheet downloadable from web.

• Anybody can download and use – LSEs, PUCs, Industry Stakeholders – and yes your dog.
**WECC Load Centers – GTM Screenshot**

**Identify Load Area**

**Select Load Area**

*Use dropdown or select from map on left*

**Load Area Assumptions**

<table>
<thead>
<tr>
<th>Integration Costs</th>
<th>Local Delivery costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind integration ($/MWh)</td>
<td>$50</td>
</tr>
<tr>
<td>Solar Integration ($/MWh)</td>
<td>$25</td>
</tr>
<tr>
<td>Solar Thermal</td>
<td>$25</td>
</tr>
<tr>
<td>Solar Thermal with Storage</td>
<td>$50</td>
</tr>
<tr>
<td>Photovoltaic</td>
<td>$25</td>
</tr>
</tbody>
</table>

**Resource Adequacy Cost**

$194/year

**Financing Assumptions**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Jan | 60 | 59 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 |
| Feb | 60 | 59 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 |
| Mar | 59 | 58 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 |
| Apr | 58 | 57 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 |
| May | 57 | 56 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| Jun | 56 | 55 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 |
| Jul | 55 | 54 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 |
| Aug | 54 | 53 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 |
| Sep | 53 | 52 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 |
| Oct | 52 | 51 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| Nov | 51 | 50 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 |
| Dec | 50 | 49 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 |

Multiply the above profile by 12.

**Select Peers**

- Phoenix
- San Diego
- Albuquerque

**National Renewable Energy Laboratory**
Resource Selection

• Build resource portfolio
  – Unlimited resources from 5 Zones or less
  – Resource energy profile exists and can be viewed (as shown)
  – Select zone, then resource

California West

<table>
<thead>
<tr>
<th>ID</th>
<th>Tech</th>
<th>Capacity Left (MW)</th>
<th>Capacity Factor</th>
<th>Busbar Cost ($/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA_WE.B_5</td>
<td>Biogas</td>
<td>76</td>
<td>85%</td>
<td>$1.32</td>
</tr>
<tr>
<td>CA_WE.S_1</td>
<td>Solar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Dry</td>
<td>26%</td>
<td>$1.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Wet</td>
<td>20%</td>
<td>$1.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Stor Dry</td>
<td>20%</td>
<td>$1.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Stor Wet</td>
<td>26%</td>
<td>$1.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tracking PV</td>
<td>26%</td>
<td>$1.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fixed PV</td>
<td>26%</td>
<td>$1.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Capacity</td>
<td>2019</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CA_WE.W_1  | Wind     | 58 | 47% | $47
CA_WE.W_2  | Wind     | 437 | 38% | $85
CA_WE.W_3  | Wind     | 1235 | 31% | $167
CA_WE.W_4  | Wind     | 1311 | 26% | $130
CA_WE.W_5  | Wind     | 345 | 23% | $128

CA_CT_5_6
Technologies: Solar Thermal
Capacity: 1,628 MW
Price: $160.71
Capacity Factor: 2796
Annual Generation: 3,888 GWh
Custom Resource Design – User Defined

- Users can enter custom resources at either generation point or load point.
- Multiple renewable technologies available.
Custom Resource Design – Conventional Generation

- Users can enter custom conventional resources at either generation point or load point.
- Multiple technologies available.

### Conventional Generation

<table>
<thead>
<tr>
<th>Resource Name</th>
<th>Define</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Other</td>
</tr>
<tr>
<td>Delivery Node</td>
<td>REPUECO</td>
</tr>
<tr>
<td>Capacity</td>
<td>160 MW</td>
</tr>
</tbody>
</table>

#### Cost of Carbon
- Carbon Price ($/tonCO2): $35
- Carbon Intensity ($/tonCO2/MMBTU): 0.58
- Additional cost: $14

#### Pre-Loaded Conventional Inputs
- Load CC Profile
- Load GT Profile

#### Busbar Cost
- User Defined Busbar Cost ($/MWh): $111
- Model-Defined Busbar Cost ($/MWh): $112
- Model-Defined Busbar Cost with Carbon Cost ($/MWh): $125

<table>
<thead>
<tr>
<th>Degradation</th>
<th>Cap Cost ($/kW)</th>
<th>FOM ($/kW/yr)</th>
<th>VOM ($/kW/yr)</th>
<th>Fuel Cost ($/MMBTU)</th>
<th>Heat Rate (BTU/kWh)</th>
<th>PTC (kW-hr)</th>
<th>PTC Term (yr)</th>
<th>Depreciation Schedule</th>
<th>Econ Life (yr)</th>
<th>Debt % 6%</th>
<th>Debt Term (yr)</th>
<th>Cost Equity</th>
<th>Tax Rate</th>
<th>Disc Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>120</td>
<td>10</td>
<td>5</td>
<td>8</td>
<td>670</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>25</td>
<td>20</td>
<td>12.5</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>1%</td>
<td>121</td>
<td>11</td>
<td>6</td>
<td>9</td>
<td>671</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>25</td>
<td>20</td>
<td>12.5</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>2%</td>
<td>122</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>672</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>25</td>
<td>20</td>
<td>12.5</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>3%</td>
<td>123</td>
<td>13</td>
<td>10</td>
<td>12</td>
<td>673</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>25</td>
<td>20</td>
<td>12.5</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>4%</td>
<td>124</td>
<td>14</td>
<td>12</td>
<td>14</td>
<td>674</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>25</td>
<td>20</td>
<td>12.5</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>5%</td>
<td>125</td>
<td>15</td>
<td>14</td>
<td>16</td>
<td>675</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>25</td>
<td>20</td>
<td>12.5</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

**Generation Profile**

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>1%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>2%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>3%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>4%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>5%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
</tbody>
</table>

0.5% Capacity Factor
Resource Portfolio

- Shows specifics of resource portfolio.
- Graphic representation of energy profile, capacity, and annual energy.
- Specific resources can be removed from portfolio (enter 0 for Cap (MW)).
Identify Incremental Transmission Path(s): REZ(s) to Load

- Select Point-to-Point or Multi-Area Transmission Path(s).
- User may define the route for each resource(s)

User defined Route: Select "Click" on Segments

Point-to-Point

Multiple-Area

Select Resource(s)

Save Route
Selected Transmission Route(s) Design

- Highlighted line segments shown.
- Line segment characteristics can be changed – all blue fields.
- Transmission costs combined with resource portfolio costs to estimate project cost.

<table>
<thead>
<tr>
<th>Line</th>
<th>Type</th>
<th>Capacity</th>
<th>No. lines</th>
<th>Project Cap</th>
<th>Utilization (%)</th>
<th>Distance (mile)</th>
<th>Cost per mile</th>
<th>Cap Cost</th>
<th>ROW Cost</th>
<th>Cost ($M)</th>
<th>Cost per kW</th>
<th>Leve Cost</th>
<th>Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLYTHE to DEVERS</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>4</td>
<td>6000</td>
<td>40.7%</td>
<td>114</td>
<td>$1,800</td>
<td>$205,400</td>
<td>$25,900</td>
<td>$231,300</td>
<td>$39</td>
<td>$2</td>
<td>1%</td>
</tr>
<tr>
<td>HARQUAHALA to WESTWING</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>4</td>
<td>6000</td>
<td>33.5%</td>
<td>54</td>
<td>$1,800</td>
<td>$37,414</td>
<td>$12,283</td>
<td>$109,698</td>
<td>$18</td>
<td>$1</td>
<td>0%</td>
</tr>
<tr>
<td>NEW SUB 31 to LAMAR</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>1</td>
<td>1500</td>
<td>12.3%</td>
<td>57</td>
<td>$1,800</td>
<td>$102,308</td>
<td>$12,900</td>
<td>$115,208</td>
<td>$77</td>
<td>$13</td>
<td>0%</td>
</tr>
<tr>
<td>TORTOLITA to GREENLEE</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>4</td>
<td>6000</td>
<td>33.5%</td>
<td>126</td>
<td>$1,800</td>
<td>$227,534</td>
<td>$28,691</td>
<td>$256,225</td>
<td>$43</td>
<td>$3</td>
<td>1%</td>
</tr>
<tr>
<td>SANTA ROSA to WESTWING</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>4</td>
<td>6000</td>
<td>33.5%</td>
<td>62</td>
<td>$1,800</td>
<td>$111,284</td>
<td>$14,032</td>
<td>$125,316</td>
<td>$21</td>
<td>$1</td>
<td>0%</td>
</tr>
<tr>
<td>DEVERS to SERRANO</td>
<td>600 kV AC Single</td>
<td>1600</td>
<td>4</td>
<td>6000</td>
<td>12.8%</td>
<td>70</td>
<td>$1,800</td>
<td>$126,324</td>
<td>$15,929</td>
<td>$142,253</td>
<td>$24</td>
<td>$1</td>
<td>0%</td>
</tr>
<tr>
<td>MOUNTAIN to DEVERS</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>1</td>
<td>1500</td>
<td>7.3%</td>
<td>85</td>
<td>$1,800</td>
<td>$153,176</td>
<td>$19,315</td>
<td>$172,490</td>
<td>$115</td>
<td>$32</td>
<td>1%</td>
</tr>
<tr>
<td>PISGAH to SERRANO</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>2</td>
<td>3000</td>
<td>20.8%</td>
<td>104</td>
<td>$1,800</td>
<td>$187,557</td>
<td>$23,850</td>
<td>$211,207</td>
<td>$70</td>
<td>$7</td>
<td>1%</td>
</tr>
<tr>
<td>HARQUAHALA to BLYTHE</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>4</td>
<td>6000</td>
<td>33.5%</td>
<td>92</td>
<td>$1,800</td>
<td>$164,848</td>
<td>$20,786</td>
<td>$185,634</td>
<td>$31</td>
<td>$2</td>
<td>1%</td>
</tr>
<tr>
<td>STERLING to LAMAR</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>1</td>
<td>1500</td>
<td>12.3%</td>
<td>172</td>
<td>$1,800</td>
<td>$309,502</td>
<td>$39,026</td>
<td>$348,529</td>
<td>$232</td>
<td>$38</td>
<td>1%</td>
</tr>
<tr>
<td>NEW SUB 31 to NEW SUB 28</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>4</td>
<td>6000</td>
<td>33.5%</td>
<td>214</td>
<td>$1,800</td>
<td>$384,712</td>
<td>$48,510</td>
<td>$433,221</td>
<td>$72</td>
<td>$4</td>
<td>2%</td>
</tr>
<tr>
<td>GREENLEE to NEW SUB 28</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>4</td>
<td>6000</td>
<td>33.5%</td>
<td>275</td>
<td>$1,800</td>
<td>$434,888</td>
<td>$62,400</td>
<td>$557,288</td>
<td>$83</td>
<td>$6</td>
<td>2%</td>
</tr>
<tr>
<td>SANTA ROSA to TORTOLITA</td>
<td>500 kV AC Single</td>
<td>1500</td>
<td>4</td>
<td>6000</td>
<td>33.5%</td>
<td>50</td>
<td>$1,800</td>
<td>$90,736</td>
<td>$11,441</td>
<td>$102,178</td>
<td>$17</td>
<td>$1</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Project Results – Generation Resource & Transmission

- Supply curve shows levelized cost of electricity to load from portfolio ($/MWh):
  - Detailed resource cost;
  - Detailed transmission cost.
Regional Transmission Scenarios

- Zone hubs and their supply curves went into a conceptual delivered cost model:
  - Excel-based;
  - Populated with busbar costs from Phase 1, but may be customized to capture user-defined projects or scenarios;
  - Delivered costs estimated on the basis of user-selected load hub and user-selected REZ hub;
  - Available to load-serving entities and regulators to test scenarios.
Western Renewable Energy Zones

• WREZ on the Western Governors’ web site:
  http://www.westgov.org/wga/initiatives/wrez/

• GIS portal for WREZ maintained by NREL:
  • http://mercator.nrel.gov/wrez/
    – Login “wrez”
    – Password “guest”
WREZ Phases 1 & 2 Lessons Learned / Impediments

• Transmission is the biggest obstacle to installing large amounts of new renewable energy generation.

• Wildlife sensitivity analysis did not get developed adequately, and is an impediment. Accordingly, this issue is not in the Phase 1 report.

• Wildlife issues can overwhelm renewable energy potential.

• The WREZ took on significant importance to developers and others.

• In the end, the policies of the individual states can drive project outcomes.
Multiple LSEs may benefit from the same regional transmission and REZ(s) project.

LSE and PUC interviews are completed:
- Regulatory Assistance Project;
- NREL/LBNL.

Initial finding – local resources sufficient to meet RPS requirements.

Funding under FOA 68, Area of Interest 2, 2010.
WREZ Phase 4 – Fostering Interstate Cooperation

• Develop environment for regional interstate transmission and REZ(s) projects.

• Address policy and regulatory obstacles to interstate transmission projects, such as:
  
  – Siting
    • Federal lands, protected lands, sensitive lands, etc.

  – Cost allocation
    • Energy recipient(s)
    • Reliability beneficiary(s)
WREZ General Lessons Learned:

• Most LSEs and states prefer to use in-state/local renewable resources due to transmission timing and state economic benefits.

• States with energy export potential want to see G&T projects developed in order to bring the resource to market.

• Disturbed lands with valuable renewable resources should be a priority.

• Renewable resources will increase if:
  – They are economical or required:
    • Greenhouse gas emissions;
    • Renewable portfolio standards;
    • Price signals;
    • Technology breakthrough.
WREZ Continuing Efforts:

• Update wildlife and water issues into the generation data.

• Improve the WREZ model:
  – Improved GTM functionality;
  – Improved annotation;
  – Updated/Improved data (e.g., replacing 50-m wind data w/ 80 m).

• Improved DG integration.

• Outreach to LSEs and states.
WREZ Additional Information:

• Data, Presentations, and Reports

• Questions?
  – Email: jeff.hein@nrel.gov
  – 303-384-7090
Questions / Comments