RES North American Construction Portfolio

>8,800 = MW

>380 = MW

>89 = MW

>1,000 = miles
RES’ Worldwide Presence

- Canada
- United States
- United Kingdom
- Ireland
- France
- Norway
- Finland
- Sweden
- Germany
- Turkey
- Japan
- Australia
Distributed or Utility Scale?
What RES looks for in a Renewable Energy Project

- Low cost renewable product
- Financeable
- The bigger the better
Wind resource depends on micro-geography
  – Can not finance w/o good expectation of production
  – Uncertain payback on homeowner investment

$1k to $10k investment
  – ~$750/MWh Cost of Power
**Distributed Wind: Up to 100kW Generation Capacity**

- Wind resource depends on micro-geography
  - More expensive turbines, but still not justifying a wind study

- $65,000 investment (12.5Kw Model)
  - ~$520/MWh Cost of Power
Utility Scale Wind: 2+MW units, 50+MW total facility

• Financeable
  – Investment can support extensive wind studies
  – Clear financial payback

• $20/MWh Cost of power in windy places ($50/MWh without PTC)
SOLAR
### Table 2: Levelized Cost of Utility- and Residential-scale PV ($ per Solar MWh)

<table>
<thead>
<tr>
<th>No</th>
<th>Scenario</th>
<th>Utility-scale</th>
<th>Residential-scale Purchase</th>
<th>Cost Difference (Res-Utility)</th>
<th>Residential-scale Lease</th>
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</thead>
<tbody>
<tr>
<td>Reference</td>
<td>2019 ITC @ 10%</td>
<td>83</td>
<td>167</td>
<td>83</td>
<td>182</td>
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<tr>
<td>Scenario 1</td>
<td>2019 ITC @ 30%</td>
<td>66</td>
<td>123</td>
<td>57</td>
<td>140</td>
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<td>Scenario 2</td>
<td>2019 Developer absorbs ITC</td>
<td>66</td>
<td>N/A</td>
<td>N/A</td>
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<td>Scenario 3</td>
<td>2019 Higher Inflation</td>
<td>95</td>
<td>187</td>
<td>92</td>
<td>206</td>
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<td>Scenario 4</td>
<td>2019 Lower PV Cost</td>
<td>69</td>
<td>137</td>
<td>67</td>
<td>149</td>
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<tr>
<td>Scenario 5</td>
<td>2014 Actual PV Cost</td>
<td>117</td>
<td>193</td>
<td>76</td>
<td>237</td>
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</tbody>
</table>

**Notes:**
1. All Scenarios other than Scenario 2 assume there is a tax equity partner.
2. In Scenario 1, 30% ITC assumption has been applied to all three cases uniformly.
3. Scenario 2 is only relevant to the utility- and residential-scale leased systems and does not to impact residential-scale purchases.

*Brattle Group, July 2015, Comparative Generation Costs of Utility Scale and Residential-Scale PV in Xcel Energy Colorado’s Service Area*
Why is utility scale solar power less expensive?

• Production efficiency
  – Trackers
  – No obstructions
  – Regular panel cleanings

• Balance of system efficiencies
  – Assembly line approach
  – Installation automation coming soon
Why does distributed get built?

• Competing in different markets:
  – Distributed is off-setting retail energy costs (~$120/MWh Austin Energy Home Rate)
  – Utility scale selling into wholesale power mkt (~$20/MWh ERCOT market)
How does energy storage change things?

• Further shift to utility scale projects
  – Greater transmission line efficiencies lower interconnection costs
  – Solve utility ancillary services challenges
  – Solar + Storage looks like a peaking gas plant
Thank you!

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