Renewables in Japan:

Why hardly Diffused?

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Renewables in Japan

- Accumulated Installed Capacity of Wind Power -

- Accumulated Installed Capacity of Photovoltaics -

Source: Agency for Natural Resources and Energy

Source: IEA, Trends in PV Applications, 2011
Renewables: Obstacles to Diffuse

Reactions by Other Countries

1. High Cost of Generation
- Feed-in Tariff
- Subsidies

2. Regulation/Local Opposition on Location
- Regulatory Reform
- Simpler Transaction
- Government’s Intermediation

3. Discretionary Refusal of Grid Connection
- Grid Unbundling
- Priority Access of RE (FIT)

4. Grid Instability due to Intermittent Generation
- Wide-area Grid Operation
- Pumped Storage Hydro
- Smart Grid/Demand Response
- Battery/EV

Japan

- (2012)
- (only for Nukes)
### Grid Access by “Lottery”

- Capacity of Grid Access for Wind Power allowed by Utilities -

<table>
<thead>
<tr>
<th></th>
<th>Access Capacity (October, 2010)</th>
<th>Ratio among Total Generation Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hokkaido Electric</td>
<td>360MW</td>
<td>6.36%</td>
</tr>
<tr>
<td>Tohoku Electric</td>
<td>1180MW</td>
<td>7.76%</td>
</tr>
<tr>
<td>Hokuriku Electric</td>
<td>250MW</td>
<td>4.39%</td>
</tr>
<tr>
<td>Chugoku Electric</td>
<td>620MW</td>
<td>5.04%</td>
</tr>
<tr>
<td>Shikoku Electric</td>
<td>250MW</td>
<td>4.17%</td>
</tr>
<tr>
<td>Kyusyu Electric</td>
<td>1000MW</td>
<td>5.65%</td>
</tr>
</tbody>
</table>

Source: Federation of Electric Power Companies
Limited Inter-regional Grid

Area
Peak Load in 2010

- DC line
- AC line

<table>
<thead>
<tr>
<th>Area</th>
<th>Peak Load in 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hokkaido</td>
<td>5,790MW</td>
</tr>
<tr>
<td>Tohoku</td>
<td>15,570MW</td>
</tr>
<tr>
<td>Tokyo</td>
<td>59,990MW</td>
</tr>
<tr>
<td>Chugoku</td>
<td>12,010MW</td>
</tr>
<tr>
<td>Kansai</td>
<td>30,950MW</td>
</tr>
<tr>
<td>Chubu</td>
<td>27,090MW</td>
</tr>
<tr>
<td>Shikoku</td>
<td>5,970MW</td>
</tr>
<tr>
<td>Kyushu</td>
<td>17,500MW</td>
</tr>
</tbody>
</table>

- 60Hz
- 50Hz

- 600MW
- 16,310MW
- 1,000MW
- 16,600MW
- 2,400MW
- 1,400MW
- 300MW
- 5,570MW
shaping tomorrow with you
Increasing Dependence on Nuclear

- Japan’s Power Source Mix -

Source: METI for Japan, IEA for Germany
Japan’s Closed Power Market

10 General Electric Power Suppliers

Vertical Integration

generate ↓
transmit ↓
distribute

Regional Monopoly

Small-size Consumers:
Households / Small Offices

Large-size Consumers:
Office Buildings / Factories

10.6%
PSS

Specified Power Producer

0.5%
JEPX

1.7%

1.8%