Climate Crisis = Economic Opportunity

Gordian Raacke
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Renewable Energy Long Island (reLI)

Source: National Climatic Data Center/NOAA
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2011 CO\(_2\) Concentration: 392

Source: National Climatic Data Center/NOAA
After 35 more years at the current rate of increase

Source: National Climatic Data Center/NOAA
The Maldives

October 17, 2009

© 2009 AP Photo/Mohammed Seeneen
Avoiding Tipping Points

- Limit warming to 2° C (3.6° F)
Greenland Seasonal Ice Melt

1979
1990
2007

Source: NASA/GSFC
Projected Sea Level Rise 2100

- IPCC 2007: 7 – 23 inches
- AMAP 2011: 35 – 63 inches

* Arctic Monitoring and Assessment Programme
Source: National Climatic Data Center/NOAA
80 x 50

“It shall be a goal of the State of New York to reduce current greenhouse gas emissions from all sources within the State eighty percent (80%) below levels emitted in the year nineteen hundred ninety (1990) by the year two-thousand fifty (2050).”
The Great Transition
100% Renewable Energy
## Existing Plans & Studies

<table>
<thead>
<tr>
<th>Organization</th>
<th>%</th>
<th>Sector and Area</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repower America</td>
<td>100 %</td>
<td>Electricity U.S.</td>
<td>2020</td>
</tr>
<tr>
<td>Beyond Zero Emissions</td>
<td>100 %</td>
<td>E/T/H/C* Australia</td>
<td>2020</td>
</tr>
<tr>
<td>Price Waterhouse Coopers</td>
<td>100 %</td>
<td>Electricity Euro/N. Africa</td>
<td>2050</td>
</tr>
<tr>
<td>SRU** Germany</td>
<td>100 %</td>
<td>Electricity Germany</td>
<td>2050</td>
</tr>
<tr>
<td>EREC/Greenpeace</td>
<td>100 %</td>
<td>E/T/H/C Europe</td>
<td>2050</td>
</tr>
<tr>
<td>WWF/Enerfys</td>
<td>100 %</td>
<td>E/T/H/C World</td>
<td>2050</td>
</tr>
<tr>
<td>Jacobson/Delucchi</td>
<td>100 %</td>
<td>E/T/H/C World</td>
<td>2030/50</td>
</tr>
</tbody>
</table>

*E/T/H/C = Electricity, Transport, Heat/Cool  
**German Advisory Council on the Environment
100% Renewable Energy
• 100% renewable world energy feasible by 2030
• Variable resources can reliably match demand
• Adequate availability of raw materials
• Additional land footprint/spacing 0.41%/0.59%
• Cost similar to today’s energy costs
• Barriers are social/political, not tech/economic

www.stanford.edu/group/efmh/jacobson/Articles/I/JDEnPolicyPt1.pdf
<table>
<thead>
<tr>
<th>Number</th>
<th>Type</th>
<th>Capacity</th>
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</thead>
<tbody>
<tr>
<td>590,000</td>
<td>Wind Turbines (5 MW)</td>
<td></td>
</tr>
<tr>
<td>110,000</td>
<td>Wave Devices (0.75 MW)</td>
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<tr>
<td>830</td>
<td>Geothermal Plants (100 MW)</td>
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<tr>
<td>140</td>
<td>Hydroelectric plants (1,300 MW)</td>
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</tr>
<tr>
<td>7,600</td>
<td>Tidal Turbines (1 MW)</td>
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</tr>
<tr>
<td>265 million</td>
<td>Rooftop PV Systems (3 kW)</td>
<td></td>
</tr>
<tr>
<td>6,200</td>
<td>Centralized PV Plants (300 MW)</td>
<td></td>
</tr>
<tr>
<td>7,600</td>
<td>Concentrated Solar Plants (300 MW)</td>
<td></td>
</tr>
</tbody>
</table>

100% Renewable Energy for the U.S.
How many RE systems on LI?

- **150,000** Residential PV Arrays (6.7 kW)
- **5,000** Commercial PV Arrays (100 kW)
- **25** Centralized PV Farms (50 MW)
- **75,000** Solar Hot Water Systems (64 sqft)
- **500** Small Wind Turbines (50 kW)
- **125** Wind Turbines (2 MW)
- **200** Offshore Wind Turbines (5 MW)
- **0.50** Off-Island Hydro Facilities (1,200 MW)
- **278** Off-Island Wind Turbines (3.6 MW)

100% Renewable Electricity for Long Island
Global Market Growth

PhotoVoltaics

• 16.6 GW of PV added in 2010 (7.2 GW 2009)
• 40 GW total installed PV capacity YE 2010
• 130 – 200 GW by 2015

Wind

• 36 GW of Wind added in 2010 (22.5% growth)
• 200 GW total installed capacity YE 2010
• 450 GW by 2015
• 1,000 GW by 2020
Thank You

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