Connecticut Energy, Environment and Economic Development Conference
Powering New England in the New Environment

Connecticut Power and Energy Society

Bryan Garcia
President
March 14, 2012
Daniel Halladay: Wind Turbine
Owned the Halladay Windmill Company in Coventry, CT
Built and manufactured the first commercially successful self governing new windmill in the U.S. in 1854
Relocated to Batavia, Illinois because of delays in production and shipping as a result of the Civil War.

Albert Pope: Electric Vehicle
Owned the Pope Manufacturing Co. in Hartford, CT
Built electric vehicles under the Columbia Automobile Co. in 1897
Was bought out by the Electric Vehicle Co. and went under in 1899

Bernard Baker: Fuel Cell
Founder, president and CEO of ERC in Danbury, CT
Builds molten carbonate fuel cells for low emission, baseload, distributed generation applications
Receives a two-year 70 MW order from POSCO Power, a South Korean independent power producer in 2011
Governor’s Goals
Financing the Clean Energy Goals of the State

Deliver Connecticut ratepayers cleaner, cheaper and more reliable sources of energy...and create jobs while we are doing that!

What is the role...not of technology innovation, but financial innovation?
Entrepreneurship and Innovation
Today’s Henry Ford

PayPal

SPACEX
Space Exploration Technologies

TESLA

SolarCity
...across the Country in 2008
Financial Innovation in Clean Energy
Connecticut Solar Lease Structure
Financial Innovation (Version 1.0)

EquityCo, LLC
(100% Equity)

AdminCo, LLC
(Program Admin)

CCEF
(Debt and Incentive)

DeveloperCo, LLC
(Developer)

CT Solar Lease, LLC

Home Owner

Installer
(Approved by CCEF)

Equity
ITC

Originate Note
Sells Note

Management Fee
Services

Lease
Payment

Solar PV System

Rebate/Incentive
$23,400,000

Debt Service
$15,200,000

REFERENCES
Design – 5.5% interest rate (4% to AFC First Financial for sourcing and servicing, 0.5% CT Solar Lease, and 1.0% to CCEF), secured, 200% of median income
Consumer Credit Guidelines – 640 if salaried, 680 if self-employed for at least 2 years, 720 if self-employed less than 2 years, no bankruptcy in last 7 years, debt to income or monthly obligations to monthly income 50% for all credit scores
Performance – 850 loans, 6.0 kW AC average system size, from $5,320/kW rebate in 2009 to $2,731/kW rebate in 2012, and 2 defaults.
# Residential Solar PV Economics

<table>
<thead>
<tr>
<th>Controllable Payback Drivers</th>
<th>Economic Variables</th>
<th>No Subsidy State (without ITC)</th>
<th>No Subsidy State (with ITC)</th>
<th>Current State (Step 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Installed Cost ($/kW_{STC})</strong></td>
<td>($5,000)</td>
<td>($5,000)</td>
<td>($5,000)</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>System Size (kW_{STC})</strong></td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>System Cost</strong></td>
<td>($25,000)</td>
<td>($25,000)</td>
<td>($25,000)</td>
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<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Ratepayer Subsidies</strong></td>
<td>$0</td>
<td>$0</td>
<td>$10,903</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Cost post Ratepayer Subsidies</strong></td>
<td>($25,000)</td>
<td>($25,000)</td>
<td>($14,098)</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Federal ITC</strong></td>
<td>$0</td>
<td>$7,500</td>
<td>$4,229</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Cost post EPBB and ITC</strong></td>
<td>($25,000)</td>
<td>($17,500)</td>
<td>($9,868)</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Debt Interest</strong></td>
<td>($8,728)</td>
<td>($6,110)</td>
<td>($3,445)</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Avoided Annual Costs</strong></td>
<td>$1,244</td>
<td>$1,244</td>
<td>$1,244</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Payback Period</strong></td>
<td>&gt;15 years</td>
<td>&gt;15 years</td>
<td>10.7 years</td>
</tr>
<tr>
<td><img src="on" alt="x" /> <img src="on" alt="x" /> <img src="on" alt="x" /></td>
<td><strong>Internal Rate of Return</strong></td>
<td>&lt;0</td>
<td>&lt;0</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

REFERENCES
$2,450/kW_{PTC}$ incentive from CEFIA in start state and $2,100/kW_{PTC}$ incentive in future state, 14% capacity factor, 0.5% degradation rate on solar PV panels, 2% inflation rate on electricity price, $0.1826/kWh, 4% interest rate
**Drivers of Customer Value**

**Sensitivity Analysis for Payback and IRR**

<table>
<thead>
<tr>
<th></th>
<th>Base Case</th>
<th>Installed Cost Decrease of 10%</th>
<th>Subsidy Increase of 10%</th>
<th>Electricity Price Increase of 10%</th>
<th>Energy Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Payback</strong></td>
<td>10.7 years</td>
<td>8.7 years</td>
<td>9.9 years</td>
<td>9.7 years</td>
<td>7.7 years</td>
</tr>
<tr>
<td><strong>IRR</strong></td>
<td>5.3%</td>
<td>8.8%</td>
<td>6.7%</td>
<td>7.0%</td>
<td>10.8%</td>
</tr>
<tr>
<td><strong>Payback %</strong></td>
<td>19%</td>
<td>7%</td>
<td>9%</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td><strong>IRR %</strong></td>
<td>66%</td>
<td>26%</td>
<td>32%</td>
<td>103%</td>
<td></td>
</tr>
</tbody>
</table>
Secret to success is that...
Arnold discovers insulation
Undertake Energy Efficiency Quick payback to finance solar PV
Undertake Energy Efficiency
Quick payback to finance solar PV
Job Creation in the Residential Sector
Combination of Energy Efficiency and Renewable Energy

Direct and Indirect Job Years Created per Million $ Invested

- Energy Efficiency - Residential
- Energy Efficiency - Small Business
- Geothermal Installation
- Energy Efficiency - C&I
- Solar Thermal Installation
- Fuel Cell Installation
- Solar PV Installation - Residential
- Solar PV Installation - Non-Residential

## Financial Innovation for Solar PV
Is there an Opportunity Again?

<table>
<thead>
<tr>
<th></th>
<th>Then in 2008 with CT Solar Lease</th>
<th>Today in 2012 if No Subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installed Cost ($/W)</strong></td>
<td>($9.00)</td>
<td>($5.00)</td>
</tr>
<tr>
<td><strong>Ratepayer Subsidy ($/W)</strong></td>
<td>$4.00</td>
<td>$0.00</td>
</tr>
<tr>
<td><strong>Cost to Household</strong></td>
<td>($5.00)</td>
<td>($5.00)</td>
</tr>
</tbody>
</table>
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