Growing the Solar Industry in Minnesota
AGENDA

Comments about solar
Business models
Incentives
Photovoltaics

- Photo $\rightarrow$ light
- Volts $\rightarrow$ electric force
  - = Magic !!
Solar Resource: Germany vs. US
“Highest Best Use”

Solar Energy is variable → Primary
Fossil Fuel is stored → Backup

→ Solar Energy is our Paycheck
→ Fossil Fuel our Savings Account
Utility Peak Load

Without PV

With PV

PV production on a hot summer day
Solar Electric System:
Energy from the sun is converted into electricity for your home.

Net Metering:
Energy you don’t use is credited to you as it passes through your utility meter and into the utility grid.
The Two Sides of Solar

Reduces Demand

Produces Energy
My Business Model: Design/build

- Marketing
- Sales
- Design
- Installation
- Customer service
My Business Model:
→ Design/build

- Site evaluation
- Concept development
- Sales process
- Design
- Installation
- Customer service
<table>
<thead>
<tr>
<th>Assumptions (Inputs)</th>
<th>Annual Cash Flow Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Installed Cost ($):</strong> $82,000</td>
<td><strong>Year</strong></td>
</tr>
<tr>
<td><strong>Allocation to Business (%):</strong> 100</td>
<td>0</td>
</tr>
<tr>
<td><strong>Annual KWH Output:</strong> 11,000</td>
<td>1</td>
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<tr>
<td><strong>Price/kwh ($)</strong> $0.0900</td>
<td>2</td>
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<tr>
<td><strong>Energy Inflation Rate (%):</strong> 5</td>
<td>3</td>
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<tr>
<td><strong>Loan Downpayment (%):</strong> 100</td>
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<tr>
<td><strong>Down Payment ($):</strong> $82,000</td>
<td>5</td>
</tr>
<tr>
<td><strong>Amount of Loan ($):</strong> $0</td>
<td>6</td>
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<tr>
<td><strong>Interest Rate (%):</strong> 4</td>
<td>7</td>
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<tr>
<td><strong>Loan Term (Years):</strong> 5</td>
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<tr>
<td><strong>Month Installed:</strong> 0</td>
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<tr>
<td><strong>Net Federal Tax Rate (%):</strong> 30</td>
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<tr>
<td><strong>Net State Tax Rate (%):</strong> 8</td>
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<tr>
<td><strong>O &amp; M Cost ($/kwh):</strong> $0.020</td>
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<tr>
<td><strong>O &amp; M Inflation Rate (%):</strong> 2</td>
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<tr>
<td><strong>State Rebate (%)</strong>: 20.00</td>
<td>14</td>
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<tr>
<td><strong>State Tax Credit (%)</strong>: 0</td>
<td>15</td>
</tr>
<tr>
<td><strong>Federal Tax Credit (%)</strong>: 30</td>
<td>16</td>
</tr>
</tbody>
</table>
Commercial Model: Design → Bid

- Design by others
- Competitive Bidding
- Installation
- Customer service
Islands of PV Modules
Market Growth
Is my model replicable?

- Early adopter  design/build
- Early business design/build
- Commercial  design → bid
Challenges for Solar Biz

1. Lower cost
2. Quality control
3. System performance
4. Business development
What Roles for Solar Biz?

1. Quality control
2. System performance
3. Business development
4. Aggregators
Utilities: Are we friends again?

- “25 by 25” is on their backs
- 30% by 2020 for Xcel Energy – 11 yrs!
- They know it can’t be ALL wind-based
- Utilities can buy solar attributes they need, at an agreed-upon market value
- Use this to leverage capital
The Attributes of PV:

- No emissions during operation
- No fuel cost!! Ever!!
- Very low maintenance cost
- Grid support at critical times
- Reduced risk of carbon costs
- Levelized peak power cost
- Lower transmission costs?
Summer Peak Shaving

Utility Peak Load

Without PV

With PV

PV production on a hot summer day
New Incentive Structure

- Performance-based = fair competition
Solar Incentives Should:

- put local resources to work
- create jobs at ALL levels
- be well-integrated with:
  - construction industry
  - energy conservation
- encourage utility partnerships
- bring orderly industry growth
- be scalable
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