What are the financial and social costs and benefits of different community-based solar approaches?

Dr. Sharon Klein
Ms. Stephanie Coffey
University of Maine School of Economics
Why Community-based Solar?

• Expand access to solar
  • Only ¼ of U.S. residential buildings suitable for solar (NREL)

• Capacity in the United States projected to increase by 1.8 GW through 2020 (Green Tech Media)

• Peer effects, social norms more effective than individual incentives/education

Source: https://ilsr.org
What is Community-based Solar?

Provides power or financial or other benefits to a group of people

• Common local geographic area (town level or smaller)
• Common set of interests
• Some costs and/or benefits shared by group

Coughlin et. al, 2012
Walker & Devine-Wright, 2008
Where are Community-based Solar Projects in the US?


NEW US Community Solar Database
(>5,000 Community-based Solar Projects in 48 States)

COMING SOON (December?): http://communityenergyus.net/
Projects per Million Residents

COMING SOON (December?): http://communityenergyus.net/
1. Solar Farm/Garden
(shared solar, community solar)

- Multiple people/businesses
- Single solar PV array
- Economies of scale

150 kW, Brattleboro VT, 6 residences & 3 businesses

Source: http://soverensolar.com/

http://energy.gov
2. Bulk Purchase
   *(Solarize, Solar Coops)*

- Multiple people/businesses
- Multiple solar PV (or thermal) arrays
- Reduced installation price – buying in bulk
- Urgency – limited time to participate
- Tiered pricing based on level of participation
  - More people = greater discount

http://energy.gov
3. Community-Serving Institutions (CSI)  
(Churches, Schools, Municipalities, etc)

• Single institution serving multiple people
• Single or multiple array(s)
• Provide a “service” to a “community”
• Most with non-profit status (exception: some schools)

[Image: Shaffer Landfill Photovoltaic System]

Community-based Solar Projects in New England

Number of Projects

- MA: 500
- CT: 200
- VT: 100
- ME: 50
- NH: 20
- RI: 10

Projects per 100,000 People

- VT: 15
- MA: 10
- ME: 5
- CT: 2
- RI: 1
- NH: 0.5
Organizational Structure
How Can We Evaluate the Cost-Competitiveness of Solar?

Net Present Value = $\sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_0$

$C_t = \text{net cash flow in year } t$

$C_0 = \text{initial project cost}$

$r = \text{discount rate}$

$T = \text{project lifetime}$

$t = \text{year } t$

Source: [http://solarpowerrocks.com](http://solarpowerrocks.com)
Why is Discounting Important?

• Time Value of Money
• Inflation
• Opportunity cost
• Risk
• $r = 5\%$

Now or in 10 years?

Simple payback period: discounting
Important Solar Incentives (All 3 States)

- 30% Federal Tax Credit (FTC)
- Renewable Energy Credits (RECs)
  - $40/MWh
  - >50 kW
Important Solar Incentives (Massachusetts)

Solar Renewable Energy Credits (SRECs)
- Solar PV only
- Only generated in MA
- Price set by policy
- $285/ MWh in 2015 (decreases to $180 by 2025)

15% State Tax Credit

Source: http://mysolar.com/solar-renewable-energy-credits/
Important Solar Incentives (Vermont)

Solar Adder
• Price guarantee for solar electricity
• $.20/ kWh for systems up to 15 kW
• $.19/ kWh for systems over 15 kW
• First 10 years of system operation

Source: http://isasolar.com/
## Other Solar Policies

<table>
<thead>
<tr>
<th>Policy</th>
<th>MA</th>
<th>VT</th>
<th>ME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Net Metering Cap (% of peak load)</td>
<td>9%</td>
<td>15%</td>
<td>1%</td>
</tr>
<tr>
<td>Program Designed to Encourage Community Energy</td>
<td>Yes</td>
<td>No</td>
<td>Yes¹</td>
</tr>
<tr>
<td>State Tax Credit/Rebate</td>
<td>15%²</td>
<td>$.50 - $2.10/W³</td>
<td>No</td>
</tr>
<tr>
<td>Sales Tax Exemption</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Property Tax Exemption</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Third Party Ownership</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Low Interest Solar Financing</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

2. Available for residential systems only
3. Closed January 1, 2015
## State Level Assumptions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Units</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maine</td>
<td>Massachusetts</td>
</tr>
<tr>
<td>$C_{\text{WATT}} &lt; 25$ kW</td>
<td>$$/W</td>
<td>$3.59^1$</td>
</tr>
<tr>
<td>$25$ kW $\leq C_{\text{WATT}} &lt; 500$ kW</td>
<td>$$/W</td>
<td>$3.20^1$</td>
</tr>
<tr>
<td>kW</td>
<td>$$/W</td>
<td>$2.03^1$</td>
</tr>
<tr>
<td>$P_{\text{RETAIL}}$</td>
<td>$$/kWh</td>
<td>$0.1577^2$</td>
</tr>
<tr>
<td>Solarize Discount</td>
<td>%</td>
<td>NA</td>
</tr>
<tr>
<td>Capacity Factor</td>
<td>%</td>
<td>13.2%$^3$</td>
</tr>
</tbody>
</table>

1. Lawrence Berkeley National Laboratory  
2. Energy Information Administration  
3. System Advisor Model
Results: NPV at 25 Years

Incentive | MA | VT | ME
---|---|---|---
FTC | ✓ | ✓ | ✓
STC | ✓ |
RECs | ✓ | ✓ | ✓
SRECs | ✓ |
Solar Adder | ✓ |
Results: Discounted Payback Period
Results: Simple Payback Period
Results: Total NPV

<table>
<thead>
<tr>
<th>State</th>
<th>Total NPV (millions $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA</td>
<td>676</td>
</tr>
<tr>
<td>VT</td>
<td>2</td>
</tr>
<tr>
<td>ME</td>
<td>0.2</td>
</tr>
</tbody>
</table>

- Municipal Solar
- Solarize
- Solar School
- University
- Non-Profit Solar
- Solar Farm

- Massachusetts
- Vermont
- Maine
## Tri-state survey 2015

<table>
<thead>
<tr>
<th>Community Solar Category</th>
<th># Sent</th>
<th># Complete</th>
<th># Partial</th>
<th>Completed Survey Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solarize</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maine</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>38</td>
<td>4</td>
<td>4</td>
<td>11%</td>
</tr>
<tr>
<td>Vermont</td>
<td>24</td>
<td>1</td>
<td>0</td>
<td>4%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>62</td>
<td>5</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Solar Farms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maine</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>50%</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>Vermont</td>
<td>18</td>
<td>5</td>
<td>1</td>
<td>28%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>23</td>
<td>6</td>
<td>2</td>
<td>26%</td>
</tr>
<tr>
<td><strong>COMMUNITY-SERVING INSTITUTIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maine</td>
<td>36</td>
<td>4</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>287</td>
<td>19</td>
<td>7</td>
<td>7%</td>
</tr>
<tr>
<td>Vermont</td>
<td>37</td>
<td>3</td>
<td>0</td>
<td>8%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>360</td>
<td>26</td>
<td>9</td>
<td>7%</td>
</tr>
<tr>
<td><strong>ALL SURVEYS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maine</td>
<td>38</td>
<td>5</td>
<td>2</td>
<td>13%</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>328</td>
<td>23</td>
<td>12</td>
<td>7%</td>
</tr>
<tr>
<td>Vermont</td>
<td>79</td>
<td>9</td>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>445</td>
<td>37</td>
<td>15</td>
<td>8.3%</td>
</tr>
</tbody>
</table>
Who is participating (responding)?

• Wealthy (income > median)
• Educated (bachelor’s degree or higher)
• Democrat
• Caucasian
• Older (77% >50 yrs old)
• Mixed gender (20 men, 15 women)
• Homeowners (33, vs 2 renters)
Why are they doing it?

Average of All Respondents

1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree
How are they doing it? (Organizational structures)

Grassroots (bottom-up) community-engagement

“I expressed my interest, along with others. We then invited ReVision Energy to attend a meeting to discuss the details of the project. I was very interested in advancing the solar farm, and so volunteered to become the President of the association. I kept potential members informed (by email) until nine individuals were willing to commit to the project by placing a deposit with ReVision. I then assisted in moving the project along until final closing in April of 2015. We are the first member-owned community solar farm in Maine.”
How are they doing it?
(Organizational structures)

New business model

“We learned about Vermont's net metering law, learned that GMP allows solar and pays a premium for it. We learned that multiple people can participate in one project. We knew that the IRS allows tax credits to be taken for off-site renewable energy assets. We then bought land, found an installer, applied for a permit, marketed our offering and took on customers. It is the customers who finance the project. We use E-mail to communicate our progress and encourage folks to follow through on their interest”

*Solar farm*
How are they doing it? (Organizational structures)

Top-down, Existing organization

“I procured grant funding and carried out the program as part of my job” Solarize, Vermont

“Wrote application, recruited solar coach, generated marketing ideas, executed some marketing campaigns, spoke at public meetings.” Solarize, MA
Conclusions – US Community Solar:

• Quickly growing in US

• Many varieties
  • Organizational
  • Financial
  • Host
  • State-based policies

• More cost-competitive than individual residential (3 states)
  • Depends on financial incentives
  • MA most profitable
  • Alternative financial structures needed to make non-profit cost competitive
    • Solar Farms most profitable
    • Individual Residential profitable in all 3 states
Conclusions – US Community Solar:

• Similar demographics to residential PV adopters
• Motivated by environmental benefits more than financial/social
• Perceived ripple effect
• Participants are likely to engage in energy efficiency
Future Work

• Launch website – grow database
• National survey (larger sample size)
• Access real energy use data
• National policy/financial analysis
• Estimate net cost/benefit to state for incentives
• Multi-criteria decision analysis tool
Acknowledgements

This work is supported by...

• The USDA National Institute of Food and Agriculture, Hatch project 0230040.

• The Senator George J. Mitchell Center for Sustainability Solutions at the University of Maine
Want to learn more?


• **COMING SOON (December?):** [http://communityenergyus.net/](http://communityenergyus.net/)

Sharon.klein@maine.edu
Extra Slides
Why are they doing it?

“Promoting solar is as much personal as it is part of my job to reduce the cost of running the library for the taxpayers. Working in a building with solar panels is very satisfying for me as my personal values align every sunny day with my investment in my work.”

– Municipal Solar Participant

“It became apparent to me that citizens could not rely on the government to advance clean energy. In order to... wean ourselves from the fossil fuels that are causing climate change, then, individuals must take the initiative.”

-Solar Farm Participant
Possible Effects of Community Solar Participation

**Ripple Effect:** the “halo” associated with engaging in pro-environmental behavior may encourage an individual to subsequently adopt additional pro-environmental behaviors. *(decrease energy use)*

Possible Effects of Community Solar Participation

Rebound Effect: gains in the efficiency of energy consumption result in an effective reduction in the per unit price of energy services. As a result, consumption of energy services should increase, partially offsetting the impact of the efficiency gain in fuel use. (increase energy use)


Licensing Effect: Individuals establish moral credentials, and thus feel less obligated to scrutinize the moral implications of their actions immediately after receiving a moral boost by performing a good deed. (increase energy use)

<table>
<thead>
<tr>
<th>I conserve energy by...</th>
<th>Before</th>
<th>After</th>
<th>Sig. (1-tailed)</th>
<th>95% LCB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Turning off lights when not needed</td>
<td>4.692</td>
<td>0.471</td>
<td>4.769</td>
<td>0.429</td>
</tr>
<tr>
<td>Adjusting my thermostat when no one is in the home</td>
<td>4.615</td>
<td>0.496</td>
<td>4.692</td>
<td>0.471</td>
</tr>
<tr>
<td>Turning off electronics when not needed</td>
<td>4.423</td>
<td>0.857</td>
<td>4.577</td>
<td>0.703</td>
</tr>
<tr>
<td>Conserving water</td>
<td>4.308</td>
<td>0.618</td>
<td>4.423</td>
<td>0.578</td>
</tr>
<tr>
<td>Using more energy efficient transportation</td>
<td>3.962</td>
<td>1.038</td>
<td>4.153</td>
<td>1.047</td>
</tr>
<tr>
<td>Shutting down the computer when not in use for several hours</td>
<td>3.885</td>
<td>1.336</td>
<td>4.038</td>
<td>1.148</td>
</tr>
<tr>
<td>Buying local food</td>
<td>3.808</td>
<td>0.939</td>
<td>4.038</td>
<td>0.958</td>
</tr>
<tr>
<td>Unplugging appliances/electronics when not in use (or shutting off the power strip)</td>
<td>3.615</td>
<td>1.267</td>
<td>4.038</td>
<td>1.0786</td>
</tr>
</tbody>
</table>

*indicates significance at the .05 level
**indicates significance at the .01 level
LCB = Lower Confidence Bound
I have made attempts to reduce fossil fuel energy in my home, including...

<table>
<thead>
<tr>
<th>Change Description</th>
<th>Before Participating in Project</th>
<th>While Participating in Project</th>
<th>After Participating in Project</th>
<th>Have Not Made Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Updating to more efficient lighting</td>
<td>74%</td>
<td>13%</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Buying energy efficient appliances</td>
<td>74%</td>
<td>6%</td>
<td>3%</td>
<td>16%</td>
</tr>
<tr>
<td>Adding insulation and/or weather-stripping</td>
<td>71%</td>
<td>0%</td>
<td>6%</td>
<td>23%</td>
</tr>
<tr>
<td>Reducing heat transfer through existing windows</td>
<td>65%</td>
<td>6%</td>
<td>6%</td>
<td>23%</td>
</tr>
<tr>
<td>Replacing old windows with more energy efficient windows</td>
<td>60%</td>
<td>3%</td>
<td>10%</td>
<td>27%</td>
</tr>
<tr>
<td>Upgrading heating system to more energy efficient technology</td>
<td>57%</td>
<td>3%</td>
<td>13%</td>
<td>27%</td>
</tr>
<tr>
<td>Installing an programmable thermostat</td>
<td>57%</td>
<td>0%</td>
<td>10%</td>
<td>33%</td>
</tr>
<tr>
<td>Having an energy audit conducted</td>
<td>48%</td>
<td>10%</td>
<td>10%</td>
<td>32%</td>
</tr>
</tbody>
</table>
# General Assumptions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Units</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_{INV}$</td>
<td>Cost of inverter replacement</td>
<td>$</td>
<td>9.5% of $C_{SYS}$&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>$d$</td>
<td>Annual system degradation</td>
<td>%</td>
<td>0.50%&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>None</td>
<td>Annual electricity price escalation</td>
<td>%</td>
<td>1.6%&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>$P_{REC}$</td>
<td>REC price in year t</td>
<td>$/MWh</td>
<td>$40</td>
</tr>
<tr>
<td>$r$</td>
<td>Discount Rate</td>
<td>%</td>
<td>5%</td>
</tr>
<tr>
<td>$T$</td>
<td>System lifetime</td>
<td>years</td>
<td>25 years</td>
</tr>
</tbody>
</table>

<sup>1</sup> Swift and Kenton, 2012  
<sup>2</sup> SAM  
<sup>3</sup> Energy Information Administration
Capacity Factor

System Capacity * 8760 hours/year * Capacity Factor = Annual Production

Example: 10 kW * 8760 hours/year * .136 = 11,914 kWh/year
Results: NPV at 25 Years

Discount rate = 5%

Net Present Value ($/W)

No Incentives

Solar Farms
Municipal Solar
Solarize
University
Solar Schools
Non-Profit Solar
Individual...

- Massachusetts
- Vermont
- Maine
Results: NPV at 25 Years

Discount rate = 5%

FTC Only

Net Present Value ($/W)

Solar Farms  Solarize  Municipal Solar  Individual...  University  Solar Schools  Non-Profit Solar

Massachusetts  Vermont  Maine
NPV at 30 Years: No Incentives

Net Present Value ($/W)

No Incentives

- Solar Farms
- Municipal Solar
- Solarize
- University
- Solar Schools
- Non-Profit Solar
- Individual...

- Massachusetts
- Vermont
- Maine
NPV at 40 Years: No Incentives

Net Present Value ($/W)

-1.00 -0.50 0.00 0.50 1.00 1.50

Solar Farms  Municipal Solar  Solarize  University  Solar Schools  Individual...  Non-Profit Solar

- Massachusetts  Vermont  Maine
NPV at 30 Years: Current Incentives

Current Incentives

Net Present Value ($/W)

Solar Farms Solarize Municipal Solar Individual... University Solar Schools Non-Profit Solar

Massachusetts Vermont Maine
NPV at 40 Years: Current Incentives

Current Incentives

Net Present Value ($/W)

- Solar Farms
- Solarize
- Municipal Solar
- Individual...
- University
- Solar Schools
- Non-Profit Solar

Massachusetts
Vermont
Maine
## Varied Inputs for Sensitivity Analysis

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Units</th>
<th>Minimum</th>
<th>Nominal</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Elec. Escalation</td>
<td>%</td>
<td>1%</td>
<td>1.6%</td>
<td>3%</td>
</tr>
<tr>
<td>CF</td>
<td>Capacity Factor</td>
<td>%</td>
<td>12.6%</td>
<td>13.6%</td>
<td>14.9%</td>
</tr>
<tr>
<td>$C_{INV}$</td>
<td>Inverter Cost</td>
<td>% of system cost</td>
<td>0%</td>
<td>9.5%</td>
<td>20%</td>
</tr>
<tr>
<td>$C_{WATT}$</td>
<td>Base Purchase</td>
<td>$/W</td>
<td>3.55</td>
<td>4.44</td>
<td>5.33</td>
</tr>
<tr>
<td>d</td>
<td>System Degradation</td>
<td>%</td>
<td>0.2%</td>
<td>0.5%</td>
<td>0.8%</td>
</tr>
<tr>
<td>None</td>
<td>Capacity for price decrease</td>
<td>kW</td>
<td>10</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>None</td>
<td>Capacity for RECs</td>
<td>kW</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>None</td>
<td>Solarize Discount</td>
<td>%</td>
<td>15.0%</td>
<td>25.2%</td>
<td>40.0%</td>
</tr>
<tr>
<td>$P_{REC}$</td>
<td>REC Price</td>
<td>$/MWh</td>
<td>30</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>r</td>
<td>Discount Rate</td>
<td>%</td>
<td>0%</td>
<td>5%</td>
<td>15%</td>
</tr>
</tbody>
</table>
Sensitivity Analysis (Current Incentives)

Massachusetts Solar Farms

Discount Rate (A2)
Base Purchase Price (A15)
Elec. Escalation Rate (A5)
Capacity Factor (F10)
Inverter Cost (A13)
System Degredation (A9)
REC Price (F2)

Value of Solar Farms

Base Value = 3.8166

$1.00 $2.00 $3.00 $4.00 $5.00 $6.00 $7.00 $8.00
Monte Carlo Simulation (Current Incentives)

Massachusetts Solar Farms

Discount Rate
Purchase Price
Elec. Escalation Rate

@RISK Course Version
University of Maine
Sensitivity Analysis (Current Incentives)

Discount Rate (A2)
Base Purchase Price (A15)
Capacity Factor (H10)
Elec. Escalation Rate (A5)
Capacity for REC Income (A14)
Inverter Cost (A13)
System Degredation (A9)
REC Price (F2)

Maine Solar Farms

Value of Solar Farms

Base
Value=0.7223
Monte Carlo Simulation (Current Incentives)

Maine Solar Farms

Discount Rate
Purchase Price
Capacity Factor
Individual vs. Institutional Motivations

1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree
Individual vs. Institutional Motivations

1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree
Individual vs. Institutional Motivations

Non Profit

1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree
Individual Motivations

Solarize

1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree
Individual Motivations

Solar Farm

1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree
How are they doing it? (Organizational structures)

**Grassroots (bottom-up) community-engagement**

“I attended Midcoast Green Collaborative meetings for several months. Discussion turned to formation of a community solar farm for those of us whose properties are not suitable for solar panel installation. I continued to meet with the group that formed around that topic and decided to join in and become a solar farmer. At one of the organizational meetings I agreed to become an officer (Secretary) of the association that was formed to operate this particular community solar farm”

Vermont
How are they doing it? (Organizational structures)

Grassroots (bottom-up) community engagement

“Stated interest to follow-up recommendations in "The Inconvenient Truth" and solicited others in the congregation to come together to discuss, assigned individuals fact-finding responsibilities on hardware, vendors, contractors, state policy, etc. Eventually combined information and had a financial professional design a comparative spreadsheet to evaluate bids.”

CSI – Non-profit
How are they doing it? (Organizational structures)

**Top-down, Existing business**

“I conceived of this model of Community Solar in which participants own panels in the field. I leased the field, my company built the project and sold the panels”

*Solar farm*

*Vermont*
How are they doing it? (Organizational structures)

**Top-down, Existing organization**

“My role was to follow up on the initial lead from the minister; see if the appropriate committee wanted to proceed; administer the project and determine costs and options; tee it up for a church vote; negotiate the contract and oversee installation”  CSI Non-profit, MA

“Our Head of School took on this project and initiated it. I was involved in the scheduling of the contractor, meter installment from State and payment.”  CSI School, VT