Shekóli

Solar Deployment on Tribal Facilities

Department of Energy
Tribal Energy Program Review
Denver, CO
November 14-17

Michael Troge
Oneida Nation
AGENDA

• Past work
• Solar project update
• MTERA
Thank you!


• Larger Team: Oneida Tribe Energy Team, Business Committee, Land Commission, Finance, Legal, Land Management, Public Works, Engineering, Environmental Division, Environmental Resource Board, Planning, Staff

• Project Team: Oneida Engineering, Oneida Legal, OEI/NREL (START program), Ater Wynne, BDO Consultants

• Investor partner: SunVest, Inc.
1 QUAD is enough energy to power 32 million homes.

https://flowcharts.llnl.gov (Lawrence Livermore National Laboratory)
Pre-Oneida Energy Team

• 1995 to 2005
• Support received from Tribal contribution, DOE, WI Focus on Energy, others
• 11 + 2 kilowatts solar electric demonstration
• Solar hot water on 18 residences
• Residential energy audits
• Some facility work
• Education
Some lessons learned...

• Anticipate budget needs for life of projects.
• Maintenance, maintenance, maintenance!
• 1 big project or many small projects?
• The right project,
  • in the right place,
  • for the right application!
• Follow up.
Oneida Energy Team

• Formed in 2007
• EE & RE an important combined strategy
• Supported Brown County, WI (2008)
  • Energy Independent Community, RPS25 by 2025
• Wind study (2009 – 2011; TC, FOE)
• SHW upgrades (2010; FOE)
• Energy Crop Study (2011 to present; TC, DOE, EPA, UWGB)
• Pellet boiler at Conservation Dept. to supplement LP (2014 to present; Focus on Energy)
Oneida Energy Team (continued)

- Anna John Resident Centered Care Community SHW (2009-2013; TC, EECBG, WPS, FOE, TC)

- Energy Audit Program (2012-2014, DOE)

  - No obvious RE winner – solar, wind, bio, ground
  - Grants and financial creativity

- Solar Deployment on Tribal Facilities (2015 to now)
**Energy Team Projects**

**Energy Audits & Upgrades**
- Improved lighting
- Decreased energy use

**Wind Power Study**
- Wind best in the west
- Part of clean energy strategy

**Biomass Energy**
- 100,000 Btu biomass boiler demonstration

**Energy Crop Study**
- Locally grown energy crop for heat, fuel
- UWGB partner

**Anna John Solar**
- 48 collectors, 75% of hot H2O
- 75% grant funded

**Solar Deployment Project**
- Application to DOE for $1 M
- Solar electric on 9 buildings

Turtle School Gym

Darker color means better wind resource

Wind resource map of the area showing wind resource distribution.
More technical lessons...

• Provide and pay for training for facility personnel.

• Find someone on the inside that has “feelings” for the technology.

• Form project team early, and get commitment.
More financial lessons...

• Oneida is in a place with “cheap” natural gas and electricity.
• RE at mercy of market forces.
• So much depends on if the utilities want to play ball.
• Grants aren’t likely to last forever.
• Real need for project managers to become financial “experts”
• Tribe gets skiddish with large, “mysterious” monetary commitments/deals!
Watching where we spend!

• **Finance Operations (our CFO)**
  – A tight ship
  – Due diligence
  – Fiscal responsibility
  – 3-bid procurement
  – Audit trail
  – Maximize value to the Tribe
  – “trust, but verify”
Staying Competitive

• Economic path
  – “Economy strong, gaming strong”
  – “Economy weak, gaming weak”
  – Tied to a global economy
  – Economic collapse of 2007/8 was a direct hit
  – Need diversification
  – Need savings
Oneida Energy Situation
(results from EOM RFP)

Current Tribal community energy usage as of 2011 = 412,000 MMBtu.
= 121 million kWh

Institutional electricity: 31,000,000 kilowatt-hours = 105,000 MMBtu
Institutional natural gas: 540,000 therms = 54,000 MMBtu
Institutional transp fuel: 145,000 gallons = 5,000 MMBtu
Housing electricity: 16,000,000 kilowatt-hours = 48,000 MMBtu
Housing natural gas: 2,000,000 therms = 200,000 MMBtu

5% RPS = 20,600 MMBtu = 6 million kWh
10% RPS = 41,200 MMBtu = 12 million kWh
20% RPS = 82,400 MMBtu = 24 million kWh
Electricity Use by Building (not therms)

- Main Casino: 17%
- IMAC: 13%
- Main Casino Parking Ramp: 11%
- Mason Street Casino: 10%
- Oneida Nation Elementary School: 4%
- Anna John Nursing Home: 3%
- Social Services & 4 Cottages: 4%
- Oneida Community Health Center: 4%
- Norbert Hill Center: 4%
- One Stop Hwy 54: 2%
- Wastewater Treatment Facility: 2%
- Travel Center Casino: 2%
- Gaming Warehouse: 2%
- Remaining 77 Buildings: 19%
WE ENERGIES

WISCONSIN PUBLIC SERVICE

Natural Gas 70%

Coal 71%

Natural Gas 23%

Oneida Energy Mix

Coal 71%

Natural Gas 23%

Wind 4%

Peaking 1%

Hydro 3%

Wind 3%

Hydro 3%

Peaking 1%

Natural Gas 90%

Coal 16%
Project Title:
SOLAR ELECTRIC DEPLOYMENT ON TRIBAL FACILITIES IN THE ONEIDA RESERVATION

System size = 695 KW on 9 facilities
That’s enough energy for 100 homes.

Example of facility solar electric in Wisconsin.
Kohl’s Dept. Stores is an EPA Green Power Partner.
Photo of Milwaukee store with a 200 kilowatt array on the roof.

PHOTOVOLTAIC DEPLOYMENT ON TRIBAL FACILITIES
1 = Irene Moore Activity Center, 170 kw
2 = Turtle School, 100 kw
3 = Community Health Center, 100 kw
4 = Norbert Hill Center, 90 kw
5 = Gaming Warehouse, 80 kw
6 = Elder Services, 95 kw
7 = Department of Land Management, 20 kw
8 = Food Distribution Center, 20 kw
9 = Oneida Police Department, 20 kw

Contact Information
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220-869-4572, mtruog@oneidanation.org
<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Application</td>
<td>Oct, 2014</td>
</tr>
<tr>
<td>Notification</td>
<td>Apr, 2015</td>
</tr>
<tr>
<td>Acknowledged</td>
<td>Sept, 2015</td>
</tr>
<tr>
<td>RFP</td>
<td>Nov, 2015</td>
</tr>
<tr>
<td>ITC extended</td>
<td>Dec, 2015</td>
</tr>
<tr>
<td>Selection</td>
<td>Mar, 2016</td>
</tr>
<tr>
<td>Final site list</td>
<td>(Dec, 2016)</td>
</tr>
<tr>
<td>PPA documents</td>
<td>(Jan, 2016)</td>
</tr>
<tr>
<td>Approvals</td>
<td>(Apr, 2016)</td>
</tr>
<tr>
<td>Installation</td>
<td>(Summer, 2016)</td>
</tr>
</tbody>
</table>
Grant Application Prep

• **Project**: 700 kilowatts for $2 million
• **Budget**: DOE $1M + Investor $1M + Oneida $45k
• **Project plan**: initial project proposal
• **Soft cost budget items**:
  – Set aside grant funds for Electrician training (?)
  – Set aside grant funds for Legal consultant (????)
  – Set aside grant funds for Finance consultant (????)
• **TC**: Set aside enough staff in-kind time to match soft cost budget items
• **Project team**: convene main stakeholders
• **Contracts**: Meet all grant and contract requirements
• **Tribe**: Due diligence
Oneida Elementary (Turtle) School

<table>
<thead>
<tr>
<th>Facility</th>
<th>Usage</th>
<th>Size PV</th>
<th>Cost</th>
<th>% of Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turtle School</td>
<td>1,373,600 kWh</td>
<td>550 kw</td>
<td>$1.65 million</td>
<td>49%</td>
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</tbody>
</table>

662 kW total, 510 kW on the shell, 107 kW on the head, 45 kW on the tail.

**Assumptions:** 60 cell modules (avg. 265 watts each), 25 deg tilt, ballasted design, no inverter site constraints
Elementary School

Benefits

• Favorable utility
• Favorable rate
• Large load
• Large roof
• In Central Oneida
• High visibility
• Excellent educational opportunity

Challenges / Unforseeables

• Facilities folks leery of roof mount and warranties
• Snow and drifting
• Existing roof maintenance challenges
• Limited space for ground mount (1.6+ acres)
• Only modest support from the school board
• BIA/BIE agreement for energy compensation
# School options

<table>
<thead>
<tr>
<th>Option</th>
<th>Array Location</th>
<th>Power Rating (kW)</th>
<th>Number of Modules</th>
<th>Array Height Above Surface</th>
<th>Number of Inverters</th>
<th>Inverter Location</th>
<th>Production/year (kWh)</th>
<th>Production/Year (kWh-hours)</th>
<th>Annual Value @ $0.07/kWh</th>
<th>Preliminary Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>South half of roof</td>
<td>368.6</td>
<td>1,182</td>
<td>6 inches above roof</td>
<td>8</td>
<td>on roof</td>
<td>1,218</td>
<td>448,955</td>
<td>$31,427</td>
<td>$381,372</td>
</tr>
<tr>
<td>#1</td>
<td>North field, north of basketball courts</td>
<td>368.6</td>
<td>1,182</td>
<td>36 inches above ground</td>
<td>8</td>
<td>at each sub-array</td>
<td>1,283</td>
<td>472,914</td>
<td>$33,104</td>
<td>$381,372</td>
</tr>
<tr>
<td>#2</td>
<td>North field, north of basketball courts</td>
<td>322.6</td>
<td>1</td>
<td>36 inches above ground</td>
<td>8</td>
<td>at each sub-array</td>
<td>1,191</td>
<td>416,477</td>
<td>$29,153</td>
<td>$322.6</td>
</tr>
<tr>
<td>#3</td>
<td>South lawn, between parking lot and road</td>
<td>322.6</td>
<td>1</td>
<td>36 inches above ground</td>
<td>8</td>
<td>at each sub-array</td>
<td>1,327</td>
<td>428,090</td>
<td>$29,466</td>
<td>$322.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Security</th>
<th>Roof mount discourages free access</th>
<th>Chain link fence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>Annual inspection of all components; Annual roof inspection; inverter replacement at year 12 to 15</td>
<td>Annual inspection of all components; Mow between sub-arrays; inverter replacement at year 12 to 15</td>
</tr>
<tr>
<td>Maintenance costs @ $13/kWh</td>
<td>$4,792</td>
<td>$4,792</td>
</tr>
<tr>
<td>Inverter replacement costs</td>
<td>$96,573</td>
<td>$96,573</td>
</tr>
</tbody>
</table>
Other challenges/lessons

• **Project**: Financial consultant contract was delayed
• **Project**: Some personnel changes
• **Tribe**: Concerns coming to the surface
• **Tribe**: Long-term maintenance questions
• **Utility**: Different interconnection terms between utilities
• **Utility**: Few buildings in the favorable service territory
• **Overall**: Despite the suspected benefits of ITC, a relationship between taxable and non-taxable entities is not a certainty.
• **Overall**: Fortunately, the ITC extension allowed us to push construction to 2017.
• **Lesson**: The longer the project, the more expensive it gets!
Latest Project Details

- Project design: 800 kilowatts on 6 buildings
- Project hard costs: $1.96 million
- DOE grant: $1 million
- Investor/partner: $1 million
- Tribe’s contribution: $80,000/yr for 8 years
  - Estimated maint: $20,000/year (maint. agreement & TC)
  - Tribal solar costs: $60,000/year
- Install cost: $2,556 / kilowatt
- Flip: year 9
- Selling point: solar costs = utility costs
Funding Diagram

Now

 Tribe

$73,000 per year

Utility costs

PPA

Tribe

$73,000

for 8 years

Utility Costs

Investor Loan & energy

$73,000
## Renewable Energy Funding Matrix

<table>
<thead>
<tr>
<th>Financing Method</th>
<th>Risk</th>
<th>Likelihood of Success</th>
<th>Rates of Return</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tribe Self-Funds Projects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Bond/Debt</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Grants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOE Tribal Energy Grant</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Focus on Energy (State-Level) Grant</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td><strong>Partnership with Taxable Investor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sale Leaseback</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Partnership Flip</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>
Main reasons these technologies are not adopted...

- Competitive markets don’t recognize social/env. Benefits.
- Utilities don’t want to play – RE a competitor.
- Fossil fuel industry firmly established.
- Price we pay for energy does not reflect the cost of producing it.
- How can RE be cost competitive in a stacked system?
- Subsidies, taxes, policies are supremely inconsistent.
- WI uses Canadian hydro to fulfill its RPS.
Exploring other support mechanisms

• **GET CREATIVE!**
• 3rd party ownership
• Bulk purchase programs
• Community investment
• Solar gardens
• Renewable Energy Credits
• PACE – Property Assessed Clean Energy
• Energy efficiency is still the primary goal
MTERA

- Midwest Tribal Energy Resources Assoc.
- Voice for Tribes & Midwest energy
- Increasingly difficult for individual Tribes to pursue energy projects.
- Recent DOE grant
- Aim to provide cost-share for activities leading up to construction.
- Presentation on Thursday morning
- Will be advertising for an Executive Director
- Looking for members
Yaw^ko!

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