San Pasqual Band of Indians Microgrid Project

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Trust and Fee Lands

- Trust Land (1,990 US Acres)
- Fee Land (1,153 US Acres)
- Total US Acres: 3,143

Date Created: 4/20/2019
Source: San Pasqual Band of Mission Indians Environmental Department
Project Title: SPBMI Microgrid
Topic Area: 3.a. Energy Infrastructure Deployment on Tribal Lands – 2018

Key Personnel: John Flores, SPBMI Environmental Director; David Martinez, Public Works Director; Andrew Orosco, SPBMI Planning Director; Desiree Morales-Whitman, SPBMI Utility Manager

Project Summary: The SPBMI Microgrid Project, a hybrid solar + storage + LP system with 184 kW of PV capacity, 150 kW/300 kWh of batteries, and 44 kW of standby generation, is designed to achieve four primary objectives: 1) Ensure the availability of resilient energy for five tribal facilities identified as essential in the San Pasqual Hazard Mitigation Plan and San Pasqual Energy & Resiliency Plan; 2) Provide solar generation sufficient to achieve net-zero energy consumption at the five essential facilities; 3) Reduce the tribe’s lifetime levelized costs of energy (LCOE); and 4) Support tribal energy objectives including reducing greenhouse gas emissions and achieving net-zero energy balance by the year 2021.

Description of Impact:
- Strengthening the tribal administration’s ability to provide critical public services including first response (both fire and police), reservation security, emergency sheltering and evacuation capacity, and administration command and control capabilities.
- Saving approximately $45,190 in electric energy costs per year on average, or $1.13 million over the system’s 25-year useful life.
- Reducing net electric energy imports to the reservation by approximately 278,300 kWh per year, offsetting about 96% of the tribe’s grid electricity consumption for five essential tribal facilities.

San Pasqual Band of Mission Indians
2017 Usage & Cost

During 2017, the five essential facilities consumed 288,481 kWh of electricity supplied by SDG&E.

SDG&E billed the tribe $74,886 for that electricity over a 12-month period – representing an average unit cost of $0.2596 cents/kWh.

The tribe pays a relatively high price ($0.256/kWh) for grid electric service that has been demonstrated vulnerable to outages.

Generation/electricity charges on these bills varied by season and time of use.
<table>
<thead>
<tr>
<th>Facility</th>
<th>Essential Purpose</th>
<th>Essential Electric Loads</th>
<th>Square Footage</th>
<th>Electric Load (kWh/year*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tribal Administration</td>
<td>Red Cross evacuation center; emergency public shelter; tribal management command and control</td>
<td>HVAC, lighting, telecommunications</td>
<td>19,908</td>
<td>111,283</td>
</tr>
<tr>
<td>Housing &amp; Security</td>
<td>First response (police); public safety and security monitoring</td>
<td>Telecom/IT, security camera monitoring, lighting</td>
<td>3,475</td>
<td>76,872</td>
</tr>
<tr>
<td>Fire Department</td>
<td>First response (residential fire station); 911 emergency dispatch</td>
<td>Telecom/IT, lighting, overhead door operation</td>
<td>5,362</td>
<td>38,944</td>
</tr>
<tr>
<td>Education Building</td>
<td>Emergency public shelter</td>
<td>HVAC, food storage, food service, lighting</td>
<td>10,279</td>
<td>44,239</td>
</tr>
<tr>
<td>Preschool</td>
<td>Emergency public shelter</td>
<td>HVAC, lighting</td>
<td>2,874</td>
<td>17,144</td>
</tr>
<tr>
<td><strong>Total - Five Facilities</strong></td>
<td></td>
<td></td>
<td><strong>41,898</strong></td>
<td><strong>288,481</strong></td>
</tr>
</tbody>
</table>

*Load data derived from SDG&E interval metering data for 365 days beginning 1/2/2017.*
SDG&E Power Outages

- San Pasqual Government Buildings (Admin/Tribal Hall, Fire, Housing/Police, Education) experience multiple power outages each year.
- Outages can extend for multiple hours; the longest outage in 2017 affected the five essential tribal facilities for a period of 19 to 20 hours.
- Tribal Hall is a Certified Red Cross Emergency Shelter.
Reasons for Power Outages

- Severe weather
- High winds (Santa Ana winds in the fall)
- Wildfires
- Earthquakes
- Localized physical damage to utility distribution systems
- SDG&E system upgrades (planned outages)
San Pasqual and Wildfire
**Fig. 4.2: Major Outages at Essential Tribal Facilities (2017)**

<table>
<thead>
<tr>
<th>Major* Outage Duration (2017)</th>
<th>Tribal Admin Offices</th>
<th>Housing/Security</th>
<th>Fire Station</th>
<th>Education</th>
<th>Preschool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outage Minutes</td>
<td>2,040</td>
<td>2,040</td>
<td>1,275</td>
<td>1,260</td>
<td>1,260</td>
</tr>
<tr>
<td>Outage Hours</td>
<td>34</td>
<td>34</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Longest Outage - Minutes</td>
<td>1,200</td>
<td>1,200</td>
<td>1,125</td>
<td>1,110</td>
<td>1,110</td>
</tr>
<tr>
<td>Longest Outage - Hours</td>
<td>20</td>
<td>20</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

*Outage duration derived from 15-minute interval metering data for seven SDG&E electric meters serving five buildings. This data excludes frequent outages lasting less than 15 minutes.
Tribal Benefits

- Strengthening the tribal administration’s ability to provide critical public services including first response (both fire and police), reservation security, emergency sheltering and evacuation capacity, and administration command and control capabilities
- Saving approximately $45,190 in electric energy costs per year on average, or $1.13 million over the system’s 25-year useful life.
- Reducing net electric energy imports to the reservation by approximately 278,481 kWh per year
- Producing approximately 6.5 GWh of renewable electricity over the system’s lifetime to offset about 96% of the tribe’s grid electricity consumption for the five facilities served.
Tribal & Environmental Benefits

- Reducing the environmental footprint by approximately 1,954 tons of carbon dioxide (CO2), 275 lbs. of sulfur oxides (SOX), and 1,648 lbs. of nitrogen oxide (NOX) over the system’s lifetime.
- Enabling the safe installation of 4 electric-vehicle (EV) charging stations at the Tribal Administration building parking lot.
- Backup propane gensets to provide standby capacity in the event of an outage at a time when the batteries are depleted from daytime load.
- Upgrading San Pasqual Government electrical infrastructure to 3-phase service.
- First and only tribe in San Diego County with a microgrid.
### Fig. 4.3: SPBMBI Microgrid Resource Portfolio

<table>
<thead>
<tr>
<th>Asset</th>
<th>Nameplate Capacity</th>
<th>Estimated Production</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kW (DC)</td>
<td>kW (AC)</td>
</tr>
<tr>
<td>Carport PV (New)</td>
<td>114.6</td>
<td>97.4</td>
</tr>
<tr>
<td>Rooftop PV (New)</td>
<td>69.9</td>
<td>59.4</td>
</tr>
<tr>
<td><strong>New PV</strong></td>
<td><strong>184.5</strong></td>
<td><strong>156.8</strong></td>
</tr>
<tr>
<td>Rooftop PV (Existing 1)</td>
<td>9.6</td>
<td>8.6</td>
</tr>
<tr>
<td>Rooftop PV (Existing 2)</td>
<td>14.4</td>
<td>12.7</td>
</tr>
<tr>
<td><strong>Existing PV</strong></td>
<td><strong>24.0</strong></td>
<td><strong>21.3</strong></td>
</tr>
<tr>
<td>Battery Energy Storage System</td>
<td>150kW/300kW</td>
<td></td>
</tr>
<tr>
<td>LP-Fueled Gensets</td>
<td>44 kW</td>
<td></td>
</tr>
</tbody>
</table>

*Existing 24 kW (DC) system located on Education building will be integrated into the system, but its output is excluded from system economic and environmental modeling to avoid double-counting its production, which already is offsetting onsite loads.*
Economics for SPBMI Microgrid

- **Total installed cost:** $1,396,636; DOE $698,318; SP $500,000 (cash), $198,318 (in-kind)
- **Life of the proposed system:** 25 years (with 15-year BESS and controller replacement)
- **Payback period:** 20.89 years (12 years for the tribal investment)
- **Sources of financing:** DOE grant matched by tribal cash and in-kind investment. The tribe intends to apply for California Self-Generation Investment Program (SGIP) rebates applicable to in-state storage investments. SGIP rebates are expected to contribute $120,000 to project cash flow over a period of six years
- **Cash-flow analysis:** The tribe’s investment is expected to begin producing a positive internal rate of return (IRR) in the 12th year of operation. The net 25-year IRR for the tribe’s investment is expected to be 7.5 percent, producing a cumulative return to the tribe of approximately $1.13 million.
- **Financing terms:** The tribe intends to invest its own equity in the project. Seeking tax-equity financing for solar and storage assets, as an untaxed entity with sovereign immunity, are difficult and costly to arrange
- **Equipment purchasing:** The tribe anticipates purchasing equipment, materials, and services on a tax-free basis
Questions and Comments

Thank you

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