Business Plan

General project description:
- **Goals:** Create a business case for an energy aggregator using leading edge technologies that includes key stakeholders, provides employment opportunities, and becomes a profitable model development.
- **Strategies:**
  - Identify and engage suitable technology and operational partners for the creation/operation of this system.
  - Develop a financial and business plan that aligns the interests of all parties involved such that everyone is incentivized to make this endeavor successful.
  - Create a cost effective system that utilizes appropriate technology to deliver a reliable and adequate system and serves as a successful proof-of-concept.

### Palamanui Power (PP) - A Green Micro-Utility

- **Renewable Generation Onsite Storage Communications & DSM**
  - The sole electricity provider to the Palamanui development.
  - Manages load to create lowest and most constant load curve. Buys and sells electricity as needed from HELCO.
  - Grid infrastructure ownership to be determined.

- **HELCO**
  - Has partial ownership or JV relationship with PP.
  - Buys and sells electricity from PP as needed.

### Key Components of Palamanui Power (PP)

<table>
<thead>
<tr>
<th>Generation</th>
<th>Storage</th>
<th>Communications</th>
<th>Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment: Solar Photovoltaics, Inverters</td>
<td>Equipment: Battery system</td>
<td>Equipment: Internet &amp; broadband power line network, control center, smart appliances, smart building systems, smart meters</td>
<td>Equipment: Electric cable, sensors, grid interconnection equipment</td>
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<tr>
<td>Model: Solar energy provides the PP generation. Customers pay for what they use, with excess power stored in batteries.</td>
<td>Battery systems can store excess generation. Stored energy can be released to help load match and to conserve storage cost.</td>
<td>Communication systems give total visibility into consumption and device performance. Devices can respond to commands to enable demand response.</td>
<td>Equipment: Solar thermal, deep source heating for commercial space &amp; established residential space</td>
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<td>Possible partners: Tesla &amp; Siemens, Infracore, SunRun</td>
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### Palamanui Power - Impact on Stakeholders

<table>
<thead>
<tr>
<th>Developer</th>
<th>Palamanui Power</th>
<th>Palamanui residents</th>
<th>HELCO</th>
<th>Island residents</th>
<th>DOE and related agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Benefits</td>
<td>• Publicity and marketing</td>
<td>• Bond-like profit stream appeals to similar investors as solar PPAs</td>
<td>• Lower energy bills</td>
<td>• Avoided generation and transmission costs</td>
<td>• Potential for business and job creation working with or for PP</td>
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<td></td>
<td>• Revenue from participation in PP</td>
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<td>• Demonstrates project for ideas that have to date only been in concept phase</td>
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### Conclusions

- High cost of electricity ($0.25+/kWh) in HELCO service area is favorable for distributed renewables and aggressive DSM measures and systems.
- This is not the first attempt at a micro-grid; other trials have validated concept, economic feasibility of phased construction at Palamanui development must be demonstrated.
- All components for Palamanui micro-grid available 'off-the-shelf' or with minor adjustments.
- Potential for creation of local micro-businesses is strong.

- Additional complexity, variability, risk, and cost for developer.
- Learning curve to integrating and operating a system like this.
- HELCO's ability and willingness to work with this type of system is unclear.

- Acceptance of system by residential and commercial buyers/tenants remains uncertain (Yale team assignment).
- Possible undiscovered legal or insurability issues associated with system to be addressed.
- Renewal of the solar investment tax credit for 2030+ is in uncertain.

- Possible undiscovered legal or insurability issues associated with system to be addressed.