Calista Energy Management Assistance Initiative - CEMAI

DOE – Indian Energy Program Review
November 16, 2017
Denver, CO

Calista Corporation Technical Team
Calista – DOE TA Award

Budget and Timeline
Federal funds: $967,498 Cost-share: $109,584 Total: $1,077,082

We are a growing partnership led by Calista Corporation focused on saving energy and money for shareholders, businesses, and residents of the Calista region.

Key Milestones & Deliverables

<table>
<thead>
<tr>
<th>Year</th>
<th>Deliverables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Data collection; formatting database; benchmarking; workshop</td>
</tr>
<tr>
<td>2</td>
<td>Trainings/workshops; village plan templates; technology review</td>
</tr>
<tr>
<td>3</td>
<td>Village action plans; regional plan; roadmap/coordinations</td>
</tr>
</tbody>
</table>

Project Outcomes

- Improved understanding of the cost of operating existing utilities
- Rate-setting tools to increase financial viability
- Key Performance Indicators and record keeping to identify and track progress in maintenance
- Energy-training, and planning
- Enhanced human capacity resulting in improved operational efficiency, lower costs
- Create Job opportunities
Calista Region Description

- 56 Tribal Villages (Yu’pik, Cu’pik, Athabascan)
- Islanded microgrids...(no connected roads) Expensive energy!
- ~57,000 sq mi = size of New York State; 75% federal lands; 3 sub-regions
- Highest poverty and unemployment rates in AK (and among highest in US)
- High Subsistence use
- Most Fluent Speakers in AK
- Severe Coastal and Riverbank Erosion (Climate Change)
Whole Community Solutions

Help us create a 3 year plan!

2017 Program Alignment
Better Homes
Better Utilities
Better Communities

2018
Customized Program
Specialized Training
Support:
Profiles,
Scorecards,
Baselines,
Dashboards,
Workplans

2018-9 Full deployment
Workplan
Activities
Collaboration
Focus: Whole Community & Regional Energy Progress

• Increase Awareness
• Analyze Opportunities
• Customized programs
• Align resources
• Build Capacity

Increase Data & Analysis
Improve financial performance
Program manager
• Household reports
• Community reports/plans
• Regional plans

• Program Collaboration
• Define resources
• Funding/equipment/experts
• Coordinate implementation
• Assist with training
• Assist with business development
Tools and Interfaces

- Community Profile
- Scorecard
- Home Survey
- Utility Inventory
- Utility Log
- Utility Dashboard
- Community Report
Better Homes: Lighting, Appliances, Weatherization

- **Infiltration**: 13%
- **Windows**: 13%
- **Doors**: 3%
- **Ceiling**: 22%
- **Walls**: 17%
- **Floor**: 32%
Your Energy Audit

This report is part of your community’s efforts to improve the availability and efficiency of your energy utilities. As part of that effort, we are producing reports about how your home uses energy. This report will give you some information about how you can improve how your home uses fuel and electricity. It includes sections on the following:

- Insulation
- Heating
- Appliances
- Weatherproofing
- Sealing Windows

Furthermore, in addition to helping you understand opportunities for your home, similar reports will help your village utility understand the needs of the community.
Heat Loss Summary
Average Home

- Infiltration: 13%
- Windows: 13%
- Doors: 3%
- Ceiling: 22%
- Walls: 17%
- Floor: 32%
Better Utilities

Diesels

Distribution
Utility Management

- Trend Analysis
- 2,5,10 year plan
- Engineering
- OMM&R
- Revenue
- Rate Setting
- Financing
Scorecards, Baselines, KPI’s

**Better Utilities**

- **IS**
- **OM**
- **MM**
- **DS**

**Information Support**

**Operational Support: OMM & R plan**

**Management Support: Financial Planning, KPI, Coordination**

**Decision Support: Technology/Markets/Resources**

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### Electricity Consumption

<table>
<thead>
<tr>
<th>Description</th>
<th>Community</th>
<th>Avg.</th>
<th>2/3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical demand growth (7 years).</td>
<td>40%</td>
<td>48%</td>
<td></td>
</tr>
<tr>
<td>What percent of the electricity sales are residential?</td>
<td>65%</td>
<td>49%</td>
<td></td>
</tr>
<tr>
<td>Annual residential load per customer.</td>
<td>3000 kWh</td>
<td>4000 kWh</td>
<td>3/3</td>
</tr>
<tr>
<td>Houses without retrofits.</td>
<td>72%</td>
<td>50%</td>
<td>1/3</td>
</tr>
<tr>
<td>How much more electricity does community use in the winter?</td>
<td>30%</td>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>

**Total:** 13/18

### Electricity Production

<table>
<thead>
<tr>
<th>Description</th>
<th>Community</th>
<th>Avg.</th>
<th>2/3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-fuel costs.</td>
<td>40%</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Fuel/diesel kWh.</td>
<td>3000 kWh</td>
<td>4000 kWh</td>
<td>3/3</td>
</tr>
<tr>
<td>Percent of Electricity from Diesel.</td>
<td>72%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Functioning Generators.</td>
<td>3%</td>
<td>4%</td>
<td>2/3</td>
</tr>
</tbody>
</table>

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**Powerplant Operational Dashboard**

**Online Monitoring Prototype**

- **Plant Log Measures**
  - Measure: Operational
  - Value: Last Log: Today: 12PM
  - Fuel (Diesel) kWh: 3.3 gallons
  - Active Genset: GenSet 1
  - Line Balance: Good
  - Frequency: Good
  - Battery Voltage: Good
  - Battery Density: Good
  - Engine Oil Level: Good
  - Engine Oil Pressure: 184 psi

- **Upcoming Recommended Maintenance**
  - Action: After 400 more hrs, Genset 1 needs Complete Oil Change.
  - Timeframe: 1 Week
  - Action: After 1,600 more hrs, Genset 3 needs Filter Replacement.
  - Timeframe: 2 Month
  - Action: After 24,000 hrs, Genset 1 needs a Complete Rebuild.
  - Timeframe: 1 Year

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Your community will probably need 12% more electricity this year.
Sub-Regional Intertie Opportunities
InterTie Study
## Driving Down Costs for Interties ($/Mile)

### Option: Unbraced H-frame using H-piles

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Qty</th>
<th>Wt. ea.</th>
<th>Material Cost, Seattle</th>
<th>Freight to W. AK</th>
<th>Labor Cost</th>
<th>Total Unit Cost</th>
<th>Extended Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-piles, 10x42x40'</td>
<td>176</td>
<td>1,680 lbs</td>
<td>$1,050</td>
<td>$840</td>
<td>$1,890</td>
<td>$32,640</td>
<td>$168,000</td>
</tr>
<tr>
<td>H-piles, 10x42x40'</td>
<td>176</td>
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<td>$1,050</td>
<td>$840</td>
<td>$1,890</td>
<td>$32,640</td>
<td>$168,000</td>
</tr>
<tr>
<td>Conductor, reels</td>
<td>18.95</td>
<td>3,175 lbs</td>
<td>$5,080</td>
<td>$1,588</td>
<td>$6,668</td>
<td>$126,349</td>
<td>$240,000</td>
</tr>
<tr>
<td>Guy wire, 3/8&quot; EHSS</td>
<td>2,700</td>
<td>0.30 lbs</td>
<td>$0.60</td>
<td>$0.15</td>
<td>$0.75</td>
<td>$2,025</td>
<td>$4,050</td>
</tr>
<tr>
<td>Anchor, 10x42x40' H-pile</td>
<td>28</td>
<td>1,680 lbs</td>
<td>$1,050</td>
<td>$840</td>
<td>$1,890</td>
<td>$32,640</td>
<td>$66,720</td>
</tr>
<tr>
<td>Guy hardware</td>
<td>40</td>
<td>20 lbs</td>
<td>$50</td>
<td>$10</td>
<td>$60</td>
<td>$2,400</td>
<td>$4,800</td>
</tr>
<tr>
<td>Steel Arms, 4&quot;x4&quot;x1/4&quot;x13'</td>
<td>92</td>
<td>160 lbs</td>
<td>$250</td>
<td>$80</td>
<td>$330</td>
<td>$30,360</td>
<td>$60,720</td>
</tr>
<tr>
<td>Insulators, pin</td>
<td>16</td>
<td>1 lbs</td>
<td>$15</td>
<td>$1</td>
<td>$16</td>
<td>$249</td>
<td>$498</td>
</tr>
<tr>
<td>Insulators, comp, susp, w/fittings</td>
<td>116</td>
<td>6 lbs</td>
<td>$40</td>
<td>$3</td>
<td>$43</td>
<td>$4,988</td>
<td>$9,976</td>
</tr>
<tr>
<td>Grounding wire, rod, hardware</td>
<td>88</td>
<td>5 lbs</td>
<td>$10</td>
<td>$3</td>
<td>$13</td>
<td>$1,100</td>
<td>$2,200</td>
</tr>
<tr>
<td>Wire wraps, deadends</td>
<td>88</td>
<td>10 lbs</td>
<td>$60</td>
<td>$5</td>
<td>$65</td>
<td>$5,720</td>
<td>$11,440</td>
</tr>
<tr>
<td>Bolts and hardware</td>
<td>88</td>
<td>20 lbs</td>
<td>$30</td>
<td>$10</td>
<td>$40</td>
<td>$3,520</td>
<td>$7,040</td>
</tr>
</tbody>
</table>

**Total Weight:** 718,690 lbs

**Total Material Cost:** $535,566

**Extended Cost:** $894,911

**Cost/mile:** $53,557

![Diagram of Unbraced H-frame using H-piles](image)
Community Workshop, Bethel – April 2017

• ~ 25 Villages represented, other parts of AK, Canada, federal and state agencies, University of AK, others

• Each participant community created a “readiness scorecard” to direct next steps and fuel savings

• Replicate workshop in sub-regional hubs & individual communities

• Goal: Collect more data to create EE & RE development plans for homes, community & commercial buildings and electric utilities
Partnering & Job Creation

Capacity Building and Training

NEW JOB RECRUITMENT: ENERGY COORDINATOR

Collaborative effort between Nuvista and CEMAI
Will work with community leadership & technical team to design and implement energy projects and system improvement activities:

- Management of community outreach activities, data collection, and reporting
- Organization of workshops and trainings
- Assist in program design
- Stakeholder outreach and public communication
- Project evaluation
- Program administration

Position is Funded by the US DOE CEMAI Grant and Nuvista

RECEIVED NUMEROUS APPLICATIONS – SELECTION IN DECEMBER 2017
Quyana - Thank You!
Working for Future Generations

www.cemai.callstacorp.com