Village Economic Development

NANA Region Energy Projects
NOVEMBER 3, 2016 • Anchorage, Alaska
A Remote Region

- No roads and few electrical interties to connect communities
- 61% more expensive than Anchorage
- High cost goods and fuel
Updated: November 2013
### ALASKA VILLAGE ELECTRIC COOPERAIVE

**Account Number**
123456

**Bill Date**
08/31/16

**Payments Received Through**
08/31/16

**Due Date**

**Service Dates**
From 07/31/16
To 08/31/16

**Days in Cycle**
31

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**Customer Name & Village**
NOATAK

**Service Address**

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<table>
<thead>
<tr>
<th>Meter Serial #</th>
<th>Previous Reading</th>
<th>Current Reading</th>
<th>Rate Code</th>
<th>kWh Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>96640</td>
<td>97786</td>
<td>142</td>
<td>1146</td>
<td></td>
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</tbody>
</table>

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### Billing Description

- **Prior Balance Due:** 1295.45
- **Adjustments:** 0.00

#### Customer Charge
- **Energy:** 210.00
- **Fuel Cost:** 573.34
- **PCE Block 1:** 289.05
- **City Sales Tax:** 26.33

### Charge Type

<table>
<thead>
<tr>
<th>kWh Used</th>
<th>Rate</th>
<th>Charge Amount</th>
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<tbody>
<tr>
<td>700 KWH</td>
<td>0.00</td>
<td>210.00</td>
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<tr>
<td>446 KWH</td>
<td>0.00</td>
<td>446.40</td>
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<td>1146 KWH</td>
<td>0.00</td>
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<tr>
<td>500 KWH</td>
<td>0.00</td>
<td>500.00</td>
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</table>

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**Ending Balance:**

614.82

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**Account Status**

- **Contract Days:** 614.82

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**Last Date to Pay before Disconnections is September 26th, 2016.**

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**Notice:** The utility will be paid under the state of Alaska PCE Program (as 42.45.111) to assist the utility and its customers in reducing the high cost of generation of electric energy. For the most recent monthly reporting period, the fuel efficiency for each AVEC location per kilowatt hours per gallon and the fuel efficiency standard set out in the regulations for the PCE Program for each location is published and sent to every member. This information is also posted on our website www.AVEC.org.
Vision: To promote energy security in the NANA Region

Three Distinct Projects (2008-09)
• Strategic Energy Plan NANA SEP
• NANA Geothermal Assessment Program NANA GAP
• NANA Wind Resource Assessment Program NANA WRAP

• DOE/NREL Funded
• NANA Pacific Technical Services Contractor

Execution Partners
• Kotzebue Electric Association
• Alaska Village Electric Cooperative
• NW Arctic Borough
• Manilaaq
• Alaska Energy Authority

Selawik, AK - Wind Farm, New Bulk Fuel, Recovered Heat

• **SO 1**: Increased collaboration between NANA Region stakeholders on energy policy, program, infrastructure, and increased capacity of tribal entities for the region

• **SO 2**: Increased understanding of energy options available to NANA Region energy stakeholders for improved energy decision making

• **SO 3**: Increased awareness and understanding of NANA Region energy needs on the part of external stakeholders

Northern Lights, Noorvik AK
Energy Plan & Project Development
Methodology & Approach
(from 2008-09 Energy Planning)

- Community Outreach, Resolutions, & Surveying
- Energy Options Analysis
- Energy Resource Data Collection and Forecasting
- Regional Energy Plan
- Energy Summit
- Energy Steering Committee

- Project Development
  - Feasibility Studies
  - Modeling
  - Conceptual Designs
  - Secure Funding
  - Detailed Design
  - Construction
  - Commissioning & Operations
Northwest Arctic Borough Solar

1. All regional water/sewer systems use solar-PV by 2016 and run solely on solar in summer

2. NANA co-sponsored solar energy conferences in Anchorage to educate and develop solar energy concepts
   - Participants included DOE, NREL, solar developers, investors, villages, and other stakeholders
23 kW Solar Array in Noorvik

A 23 kW solar array is being installed in Noorvik by the NWAB.
### Solar PV Performance

#### Solar PV for NAB Waterplants

<table>
<thead>
<tr>
<th>Community</th>
<th>installed size Kw</th>
<th>production MWh</th>
<th>9/5/2016 Current Value $/Kwh</th>
<th>CO2 offset lb</th>
<th>Diesel offset Gallon</th>
<th>Cost $</th>
<th>Cost/watt Kwh installed</th>
<th>Performance Kwh/day</th>
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<tbody>
<tr>
<td>Ambler</td>
<td>8.4</td>
<td>21.69</td>
<td>0.67 $14,532.30</td>
<td>63,794</td>
<td>1606.67</td>
<td>75,000</td>
<td>8.928571</td>
<td>18.39694656</td>
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<td>Kobuk</td>
<td>7.38</td>
<td>16.32</td>
<td>0.73 $11,913.60</td>
<td>48,000</td>
<td>1208.89</td>
<td>75,000</td>
<td>10.1626</td>
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<td>Shungnak</td>
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<td>9.97</td>
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<td>738.52</td>
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<td>16.6166667</td>
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<td>Noorvik</td>
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<td>23.29</td>
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<td>1725.19</td>
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<td>27.56</td>
<td>0.71 $19,567.60</td>
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<td>Buckland</td>
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<td>6.22</td>
<td>0.47 $2,923.40</td>
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<td>460.74</td>
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</table>

**Total** | 120.05            | **180.63**     | **$113,701.90**           | **531,265**   | **13380.00 948,000** | **7.437296**       | **467.3087138**     |
NANA partnered with KEA and tribes to apply for DOE funding; to install solar energy into Deering, Buckland, and Kotzebue

Will be largest solar PV project in Alaska

Public-Private Partnership – Evaluated, loans, grants, and investment tax credits

Community & Business Development

Total Project Cost: $2.0M

Local/Village commitment of VEDC funds in Buckland & Deering
Goals & Objectives

The Primary goals of the solar energy project are to:

1. Lower energy costs for the communities of Kotzebue, Buckland, and Deering
2. Reduce diesel fuel use and increase renewable energy deployment in these communities
3. Develop clean energy job skills and expertise among residents in the three communities
4. Demonstrate the success of high penetration solar-wind-storage-diesel hybrid systems in remote high latitude locations for broad replication (aiming for “diesel-off” for some period of time)
KEA/NANA Renewable Energy Joint Venture (KEA/NANA JV)
- NANA Regional Corporation
- Kotzebue Electric Association
- Kikiktagruk Inupiat Corporation

Other Project Participants:
- Adaptive Microgrids
- Deerstone Consulting
- Electric Power Systems

Project Advisors & Beneficiaries
- Kotzebue IRA
- Buckland IRA
- Deering IRA
- KIC
- Ipnatchiaq Electric Company

Funders:
- DOE
- Financial Institution
### Summary of Funding for Total Installed Cost (Public-Private Partnership)

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant Award – Solar PV DOE</td>
<td>$1,000,000</td>
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<tr>
<td>Senior Debt Loan</td>
<td>$1,009,724</td>
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<tr>
<td><strong>Total Installed Costs</strong></td>
<td><strong>$2,009,724</strong></td>
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</table>
Gaps

- Renewable energy projects need smaller generators and battery packs – battery funding has been secured for all 3 communities

- Need operator training/follow up and run measures for power generation

- Power Cost Equalization could be reformed to not penalize integrating renewable energy (reward diesel savings)

- Existing generators are oversized
Opportunities

• Develop solar project for Deering, Buckland, and Kotzebue; promote public/private partnership and local capacity for funding & replication elsewhere

• Advocate for PCE reform

• Change the culture: Grants vs. loans