This is NANA | NANA Regional

• Regional Native corporation for the NW Arctic region- based in Kotzebue
• 7,200 people living in 11 communities or villages; total 11,000 shareholders
• NW Arctic Borough: governing body for the region.
• Encompasses 38,000 square miles, about the size of Indiana.
• “Tribal Members” (Inupiat Eskimos) who live the subsistence lifestyle
“The economic future of the NANA region is directly tied to restructuring current energy options and looking towards alternative & renewable sources.”

Jeff Nelson, Assistant Director of Lands
Aerial view of new power plant, tank farm, cogeneration, and wind turbines at Selawik, Alaska.
NANA Region Energy Challenges

- 200 miles from the nearest road
- Barge & Air Delivery of all consumables
- Forefront of Global Warming: erosion, permafrost, & limited transportation corridors
- Small Communities
Extraordinary Challenge of Providing Energy in NW Alaska

- Changing Regulatory Environment
- Geography
- Topography
- Cost
- Climate
- NANA
- Energy Security
- Global Energy Prices
- Economies of Scale
- Isolation
- Interconnectedness
- Transportation
- Storage
Vision: To promote energy security in the NANA Region

Three Distinct Projects

- 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
- Manilaq
- Alaska Energy Authority

Selawik, AK
Wind Farm, New Bulk Fuel, Recovered Heat
Partners & Collaborators

In-Kind
• Anemometers - AEA
• Technical Expertise
• Communication & Outreach

Communities
• Corporations
• City Councils
• Village Councils
• Schools
• Institutions

Federal
• Denali Commission
• NREL
• DOE

State
• AEA
• AHFC

Regional
• NW Arctic Borough
• NANA
• Manilaaq
• Red Dog & Nova Gold
• KEA, AVEC

NANA
NANA Energy Security: Strategic Energy Plan

• *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

- Community Outreach, Resolutions, & Surveying
- Energy Options Analysis
- Energy Resource Data Collection and Forecasting
- Drafting of Plan
- Energy Summit
- Finalize Plan - Evolving plan
- Project Development
  - Feasibility Studies
  - Modeling
  - Conceptual Designs
  - Secure Funding
  - Detailed Design
  - Construction
  - Commissioning & Operations
## Rural Energy Planning & Project Development Timelines

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Energy Planning &amp; Energy Options Analysis</td>
<td>6-12 months</td>
</tr>
<tr>
<td>Feasibility Studies (concurrent w/other activities)- Financial and Technical</td>
<td>6-24 months</td>
</tr>
<tr>
<td>Conceptual Designs</td>
<td>3-6 months</td>
</tr>
<tr>
<td>Secure Funding Resources &amp; Negotiate Power Purchase Agreements (if relevant)</td>
<td>3-24 months</td>
</tr>
<tr>
<td>Detailed Design</td>
<td>3-6 months</td>
</tr>
<tr>
<td>Construction (foundation and logistics dependent)</td>
<td>12-36 months</td>
</tr>
<tr>
<td>Commissioning &amp; Operations</td>
<td>1-6 months</td>
</tr>
</tbody>
</table>

**Timeline:** 2-10 years Conceptualization to Commissioning

**Lessons Learned**

*Long term visioning, planning, and continuity assurance.*
Energy Security: NANA Region Energy Options

- Integrated Planning
- Improved Efficiencies
- Cogeneration
- Recovered Heat
- Stranded Natural Gas Deposits
  Red Dog Mine Area
- Economies of Scale
  Bulk Fuel Joint Purchasing
  Transportation Co-mobilization
- Hydro
  Noatak
  Shungnak/Ambler/Kobuk
- Geothermal
  Kotzebue
  Deering/Buckland
  Shungnak/Ambler/Kobuk
- Wind
  Kivalina/Noatak
  Kiana/Deering
  Buckland
  Upper Kobuk
- Biomass
  Shungnak/Ambler/Kobuk
- Diesel Hybrid & Fossil Fuels
- Economies of Scale
Deering Case Study

• **Current Situation**
  - Power Prices = $.5 /kw hr
  - Independent Power Producer - Ipnatchiaq Electric Company
  - Imports approximately 55,000 gallons of diesel fuel for generation
  - Unable to confirm home heating fuel use at this time
  - New Power Plant built by AEA in 2003 & 2004
  - Wind Resource Assessment Program Initiated
  - B/C Ratio for wind development 1.55 (AK Rural Energy Plan)
Energy Options Analysis

End-Use

Geothermal

Energy Efficiency & Conservation

Deering

Wind-Diesel Hybrid
Organizational Mission
NANA improves the quality of life for our people by maximizing economic growth, protecting and enhancing our lands, and promoting healthy communities with decisions, actions, and behaviors inspired by our values and Core Principles.

Inupiaq Values
Knowledge of Language  Knowledge of Family Tree
Sharing  Humility
Respect for Others  Love for Children
Cooperation  Hard Work
Respect for Elders  Respect for Nature
Avoid Conflict  Family Roles
Humor  Spirituality
Domestic Skills  Hunter Success
Responsibility to Tribe
Ask these two questions only one time of each respondent. Circle the number that best reflects the respondent’s opinion.

<table>
<thead>
<tr>
<th>How important is each of these guiding principles in your life?</th>
<th>Not at all important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Extremely important</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Respect for Nature</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>● Hunter Success</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>● Responsibility to Tribe</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>● Assuring sufficient energy for future generations</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>● Promotion of local economic development</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>● Reducing the family energy budget</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>● Reducing cost of energy in my home</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>● Knowledge of the language</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How much trust do you have in these organizations?</th>
<th>No trust at all</th>
<th>Neutral</th>
<th>Very much trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Federal government</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>● State government</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>● Tribal government (IRA)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>● City government</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>● Regional Corporation (NANA)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>● Environmental groups</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>● Industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Ask these questions for each alternative energy source

#1. Energy Source X

<table>
<thead>
<tr>
<th>How much do you know about this energy source?</th>
<th>Nothing 1</th>
<th>2</th>
<th>Some 3</th>
<th>4</th>
<th>A lot 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do you believe that your Elders would feel about this alternative?</td>
<td>Strongly oppose 1</td>
<td>2</td>
<td>Neutral 3</td>
<td>4</td>
<td>Strongly support 5</td>
</tr>
<tr>
<td>How do you believe that other members of your community would feel about this alternative?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How would this energy source impact the environment?</td>
<td>Harm 1</td>
<td>2</td>
<td>No effect 3</td>
<td>4</td>
<td>Improve 5</td>
</tr>
<tr>
<td>How would this energy source impact future economic development?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How would this energy source impact the future of this community?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How would this energy source impact subsistence activities?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How would this energy source impact traditional activities?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Overall, should your community pursue this alternative energy source?</td>
<td>Drop it 1</td>
<td>2</td>
<td>Neutral 3</td>
<td>4</td>
<td>Pursue it 5</td>
</tr>
</tbody>
</table>
Deering Preliminary Recommendations

Recommendations

– Wind Resource Assessment Program.
– Coordinate a Geothermal Power Generation Feasibility Study for Deering.
– End-Use Energy Efficiency Analysis

Other

– Research Additional Home Heating Energy Options
– Secure fossil fuel delivery status
– Small scale hydro-electric
NANA Region Energy Security: Wind Resource Assessment Program Feasibility Study

- **SO 1:** Identify wind monitoring sites and initiate wind data collection.
- **SO 2:** Collect wind data and communicate preliminary data to project stakeholders for one year.
- **SO 3:** Analyze one year of wind data for technical and economic feasibility and prioritize wind power generation sites for development in the NANA region. Identify undeveloped NANA Wind Resource
NANA WRAP Activities

- Wind Energy Regime Qualification/Quantification
- Identify energy needs of regional interests
- Technical and Economic Viability of the Proposed Project
- Assessing a Wind/Hybrid System Impact on the NANA Region
- Environmental, Archaeological, and Historical Assessment
- Leadership and Community Involvement
Geothermal Assessment Program
Feasibility Study

• SO 1: Identify potential geothermal sites in the NANA Region.

• SO 2: Undertake a geological, geochemistry, and geophysical assessment of targeted sites for geothermal power generation potential.

• SO 3: Ascertain geothermal feasibility potential for power generation in the NANA Region.

Chena Hot Springs Geothermal Demonstration Project
Kotzebue Geothermal Resource

- Accessibility: 0 mile
- Distance from load center: Good
- Distance from power line: 0 Miles
- Land status: Private
- Environmental sensitivity: Low
- Degree of development to date: None
- Exploration status: Minimal
- Surface temperature: 0
- Estimated subsurface temperature: 160 degrees
- Number of wells drilled: 2
- Projected use: Power, District Heating

Source: DOE/AEA Pre-Feasibility Analysis-literature review
## Pathway to Regional Energy Security

<table>
<thead>
<tr>
<th>Obstacles</th>
<th>Pathways</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Turf Wars”</td>
<td>Consensus on Energy Security; leverage steering committee.</td>
</tr>
<tr>
<td>Appropriate technology relevant for the Arctic</td>
<td>Technological breakthroughs</td>
</tr>
<tr>
<td>Reliability &amp; integration</td>
<td>Increased collaboration with providers; promotion of the steering committee</td>
</tr>
<tr>
<td>Technical expertise</td>
<td>Leveraging local/state experience; increased research in key areas</td>
</tr>
<tr>
<td>Increased cost planning, design, &amp; construction of facilities</td>
<td>Amalgamated, integrated facilities</td>
</tr>
<tr>
<td>Redundant and emergency generation still needed</td>
<td>Leverage School District and other village facilities for redundancies</td>
</tr>
<tr>
<td>Uncertain Funding Environment</td>
<td>Coordinate proposal; develop alternative business models.</td>
</tr>
</tbody>
</table>
NANA Region Energy Security:
Regional Planning, Wind, Geothermal, and other feasibility studies

• Hedge against rural to urban migration
• Hedge against future emergency events
• Hedge against increasing fuel costs
• Hedge against increasing transportation costs
• Hedge against fuel rationing
• Hedge against increase design/build costs of energy systems
Thank you!

Questions?