THIS IS
NANA
1971 Alaska Native Claim Settlement Act (ANCSA)
- Created 13 Alaska Native Corporations (ANCs)
- Region is 38,000 square large (1/3 of Colorado)
- 11 remote villages
Owners of NANA

- 4,800 shareholders in 1971
- Shareholders live:
  - The region
  - Elsewhere in Alaska
  - Outside of Alaska
- 11,400 shareholders today
“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

“Islanded, Isolated and Small Scale Grids

Use of Diesel-Home heating”
NANA Region Land Status
NANA’s Mission

To be an Inupiaq corporation that enables our people to continue living productively in traditional and modern worlds.
Committed to:

- Human resource management
- Leadership
- Profitability and job opportunities

Inupiaq principles of:

- Honesty and integrity govern our activities
- Commitments made will be fulfilled
- All individuals are treated with dignity and respect
NANA Regional Corporation

- One of the 13 ANCs created by ANSCA
- Lands management and protection
- Cultural preservation
- Based in Kotzebue
This is NANA

A Native corporation owned by the Inupiat people of the Northwest Arctic region of Alaska.
THIS IS
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 Vision: Regionally Independent

- **Vision:** 75% reliant on regionally available energy resources for heating and generation purposes by the year 2025.

- “25 in 5” 25% reduction in fossil fuel use adopted by region’s utility.

- **Transportation:** Decrease the need for transportation fuel imported into the region by 50% by the year 2030.

- Fossil fuels would remain as emergency/back-up fuel only.

- Incremental Approach
Regional Energy Vision

“Pulling together”

- Regional Energy Summit
- Strategic Energy Plan
- Regional Energy Survey
- Energy Options Analysis
- Creation of Sub-Regional Action Teams:
  - Sub-Region 1: Kivalina/Noatak/Red Dog Mine
  - Sub-Region 2: Deering & Buckland
  - Sub-Region 3: Noorvik, Selawik and Kiana
  - Sub-Region 4: Upper Kobuk
  - Kotzebue

“I don’t know which I should worry about more, getting flooded out of my home or if I’m going to be able to heat it.” - Elder Summit Participant
Northwest Alaska Energy Summit

“…The outputs greatly surpassed my expectations from over a year ago when this was first conceptualized. The people I spoke with all had positive reviews and commentary on the summit.” - Summit Presenter

“The summit was excellent …I am hopeful that there will be follow up on moving our region to the next level of energy usage. It has become difficult for our residents to reside in a very expensive place to live.” - Summit Participant
Stakeholders and contributors

Summit Sponsors $80,000 cash contribution

- Alaska Housing Finance Corporation (AHFC)
- Alaska Village Electric Cooperative
- Denali Commission
- Maniilaq Association
- NANA Regional Corporation
- Northwest Arctic Borough
- NOVA Gold
- Shell Exploration
- Teck
- U.S. Department of Agriculture (USDA)
Community Views & Relevant Statistics of Energy Alternatives in the Northwest Arctic
Regional Energy Survey

Why?
• Community Beliefs
• Explore energy solutions. Identify community preferences
• Contribute to the NW Alaska Regional Energy Plan.
• Support grant applications.
• Consistency of data.
• Integrate perceptions about energy options for all NANA communities at the Energy Summit.

Who responded?
• All region Communities
• 134 households surveyed representing over 650 people
• 31 (30%) Elders
<table>
<thead>
<tr>
<th>Village</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambler</td>
<td>1,180,518</td>
<td>1,308,917</td>
<td>1,425,464</td>
<td>1,295,166</td>
<td>1,315,042</td>
<td>1,374,285</td>
</tr>
<tr>
<td>Kiana</td>
<td>1,502,196</td>
<td>1,722,908</td>
<td>1,602,725</td>
<td>1,511,650</td>
<td>1,502,891</td>
<td>1,627,613</td>
</tr>
<tr>
<td>Kivalina</td>
<td>1,174,062</td>
<td>1,196,195</td>
<td>1,213,291</td>
<td>1,188,204</td>
<td>1,265,119</td>
<td>1,275,477</td>
</tr>
<tr>
<td>Noatak</td>
<td>1,471,258</td>
<td>1,470,960</td>
<td>1,526,439</td>
<td>1,488,886</td>
<td>1,487,584</td>
<td>1,486,154</td>
</tr>
<tr>
<td>Noorvik</td>
<td>2,130,094</td>
<td>2,067,229</td>
<td>1,990,683</td>
<td>1,817,235</td>
<td>1,978,674</td>
<td>2,008,285</td>
</tr>
<tr>
<td>Selawik</td>
<td>2,520,511</td>
<td>2,676,680</td>
<td>2,644,409</td>
<td>2,692,996</td>
<td>2,695,019</td>
<td>2,803,273</td>
</tr>
<tr>
<td>Shungnak</td>
<td>1,469,372</td>
<td>1,544,918</td>
<td>1,516,360</td>
<td>1,458,706</td>
<td>1,558,367</td>
<td>1,492,632</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>kWh Generated</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11,448,011</td>
<td>11,987,807</td>
<td>11,919,371</td>
<td>11,452,843</td>
<td>11,802,696</td>
<td>#77777777</td>
<td></td>
</tr>
</tbody>
</table>
Approximate Fossil Fuel Use

- **Transportation**: 10%
- **Generation**: 30%
- **Heating (Hot Water and Space)**: 60%
Total Renewable vs Fossil Fuel Use

Total Power Generation in All NANA Region Communities
FY2007:
37,106,595 kWh

- Diesel: 97%
- Wind: 3%
Energy costs are much higher in Rural Alaska

- Median (middle) data is a better measure than the average.
- Median household energy costs in rural Alaska are over double statewide estimates.
- Rural Alaskans spend over three times as much of their household income on energy as statewide data.

What kind of houses do people live in?

- Average family size is 5.04 (largest is 15).
- Average size was 3 bedrooms.
- Average year built was 1983, oldest was 1930.
- 61% are HUD homes, mostly beginning in late 1970s, surge in 1981.
How do people heat their homes?

Almost half of use wood to heat their homes (during the day during the cold winter).

Over half of all households use more than one heat source.
Energy costs vary by community.

<table>
<thead>
<tr>
<th>Community</th>
<th>Cost of gas per gallon</th>
<th>Cost of stove oil per gallon</th>
<th>Monthly electric bill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Middle</td>
<td>City</td>
</tr>
<tr>
<td>Ambler</td>
<td>$8.18</td>
<td>$8.24</td>
<td>$8.24</td>
</tr>
<tr>
<td>Buckland</td>
<td>$5.71</td>
<td>$5.75</td>
<td>$7.00</td>
</tr>
<tr>
<td>Deering</td>
<td>$5.17</td>
<td>$5.15</td>
<td>$3.86</td>
</tr>
<tr>
<td>Kivalina</td>
<td>$5.29</td>
<td>$5.25</td>
<td>$5.85</td>
</tr>
<tr>
<td>Kobuk</td>
<td>$7.25</td>
<td>$7.25</td>
<td>$7.00</td>
</tr>
<tr>
<td>Kobuk</td>
<td>$9.44</td>
<td>$9.29</td>
<td>$8.13</td>
</tr>
<tr>
<td>Selawik</td>
<td>$5.19</td>
<td>$5.19</td>
<td>$5.19</td>
</tr>
<tr>
<td>Shungnak</td>
<td>$7.99</td>
<td>$7.99</td>
<td>$7.99</td>
</tr>
</tbody>
</table>

- Average and middle (50th percentile) was calculated from survey data.
- “City” reflects the single price in each community.
- Gasoline and electricity costs (survey) are highest in Noatak.
- Stove oil is highest in Buckland.
How much do families spend on energy?

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Average</th>
<th>Middle</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline (per gallon)</td>
<td>$6.68</td>
<td>$5.75</td>
<td>$9.97</td>
</tr>
<tr>
<td>Stove oil (per gallon)</td>
<td>$6.15</td>
<td>$4.85</td>
<td>$9.96</td>
</tr>
<tr>
<td>Stove oil used (gal/winter month)</td>
<td>118</td>
<td>106</td>
<td>600</td>
</tr>
<tr>
<td>Total stove oil cost ($/winter month)</td>
<td>$630.34</td>
<td>$533.50</td>
<td>$4,372.50</td>
</tr>
<tr>
<td>Wood (per month)</td>
<td>$118.57</td>
<td>$60.00</td>
<td>$400.00</td>
</tr>
<tr>
<td>Electricity (per month)</td>
<td>$294.69</td>
<td>$250.00</td>
<td>$900.00</td>
</tr>
</tbody>
</table>

55.4% of households get Energy Assistance
How people improve home energy efficiency

How people reduce energy use.

- Ways of reducing electricity use
  - Turn off or unplug appliances: 71.8%.
  - Use less energy: 10.9%.
  - Get more energy efficient appliances: 55.2%.

- Ways of reducing stove oil use
  - Supplement with wood: 43.1%.
  - Lower home temperature: 27.5%.

More information about home energy efficiency could be valuable.

![Bar chart showing knowledge of energy efficiency among respondents.](chart.png)
What about the cost of transportation?

- 81.3% see the changes in the cost of transportation.
- 81.6% say it has reduced subsistence activities.
- 80.8% say it has reduced travel to other communities.
- 72.4% say it has changed the amount of time spent in camp.
## Long-term Energy Regional Preferences Options Summary

<table>
<thead>
<tr>
<th>Alternative Energy Source</th>
<th>Average Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined heat and power systems</td>
<td>3.73</td>
<td>3</td>
</tr>
<tr>
<td>Wind energy systems</td>
<td>4.16</td>
<td>1</td>
</tr>
<tr>
<td>Hydroelectric energy</td>
<td>2.94</td>
<td>7</td>
</tr>
<tr>
<td>Solar energy</td>
<td>3.78</td>
<td>2</td>
</tr>
<tr>
<td>Geothermal energy</td>
<td>3.18</td>
<td>5</td>
</tr>
<tr>
<td>Interties and tielines</td>
<td>3.02</td>
<td>6</td>
</tr>
<tr>
<td>District energy distribution systems</td>
<td>2.89</td>
<td>8</td>
</tr>
<tr>
<td>Natural gas</td>
<td>3.37</td>
<td>4</td>
</tr>
</tbody>
</table>
# Differences in Community Opinions about Energy Preferences

<table>
<thead>
<tr>
<th>Community</th>
<th>Energy Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First Choice</td>
</tr>
<tr>
<td>Ambler</td>
<td>Wind</td>
</tr>
<tr>
<td>Buckland</td>
<td>Combined heat and power</td>
</tr>
<tr>
<td>Deering</td>
<td>Wind</td>
</tr>
<tr>
<td>Kivalina</td>
<td>Wind</td>
</tr>
<tr>
<td>Kobuk</td>
<td>Interties</td>
</tr>
<tr>
<td>Noatak</td>
<td>Wind</td>
</tr>
<tr>
<td>Selawik</td>
<td>Wind/Natural gas</td>
</tr>
<tr>
<td>Shungnak</td>
<td>Wind</td>
</tr>
</tbody>
</table>

- Respondents may not be aware of existing energy infrastructure or project feasibility.
- Wind energy is the first choice of many communities.
- Communities appear to be aware of locally available energy sources.
Choosing an entity to manage energy initiatives

Confidence in Various Authorities

Confidence Level
(scored 1 = No confidence at all, to 5 = Very much confidence)
Wind Energy in NW AK/NANA Region

Contributors:

- KEA
- AVEC
- AEA- 3 met towers ($30,000 in-kind support)
- Tribal Councils
- V3 Energy
- Northern Power
- NW Arctic Borough
- Teck
- NOVA Gold- Logistical Support with Helicopters- $2-3,000
Existing Wind Power in NANA Region

Need to improve penetration level

- **Kotzebue – Utility, KEA**
  - Class 4 to 5 wind resource
  - Ten AOC 15/50 (65 kW) wind turbines
  - One NW100 (100 kW) wind turbine
  - One Vestas V15 (65 kW) wind turbine
  - Since 1997

- **Selawik – Utility, AVEC**
  - Class 2 to 3 wind resource
  - Four AOC 15/50 (65 kW) wind turbines
  - Since 2001
Predicted Wind Resource in NANA Region Villages (excl. Kotz and Selawik)

- Buckland
  - Excellent (new wind site);
  - Marginal (old wind site)
- Deering – Good to excellent
- Kivalina – Good to excellent
- Noorvik – Fair
- Kiana – Fair
- Ambler/Kobuk/Shungnak Community Marginal to fair
- W/NOVA Gold- Good to excellent
- Noatak – Poor to marginal
Wind-Diesel Hybrid Systems

- Deering- Current Wind Monitoring Program- submitted a pre-construction proposal to AEA
- Buckland- Current wind monitoring program in place
- Kiana/Noorvik /Selawik (connected via tieline)
- Red Dog Mine Port Corridor/ Kivalina- Utility Scale Development (PPP)
- Upper Kobuk Sites-about 6 miles from Kobuk/ (PPP)
- Kotzebue Wind Farm- Additional Investments

Met tower location and potential wind turbine site on old runway in Noorvik.
Regional Wind Resource Assessments

Existing Met Towers-Installed with program resources
- Buckland
- Noorvik
- Deering

Red Dog Mine- Data could benefit communities.

Under Consideration
- Ambler
- Kiana
- Bornite/NOVA Gold- could benefit Upper Kobuk

Red Dog Mine- Installed with Teck’s resources- could benefit Kivalina.
Buckland wind testing
(old site and new site)
Industry Partnerships
Teck and NOVA Gold
Geothermal Resources in NW Alaska
Geothermal &
Organic Rank In Cycle Assessment
. Rough Outline of geologic provinces in southern NANA lands

Selawik & Kotzebue Basins province

Yukon-Koyukuk province

Seward Peninsula province
Geologic map of the Buckland region

- Buckland/Deering Geologic map
  - Red = granitic rocks, which are favorable host rocks for geothermal resources;
  - Strong Possibility that geothermal resources could extend northward as well. Geothermal exploration should focus on the circled area.
Organic Rankine Cycle/Biomass Assessment

- Analysis based on application of the Chena Hot Spring Chena Chiller for Biomass

- Regional Biomass Sufficient for Heating and Generation?
  - Heating-Yes
  - Generation-Uncertain

- Organic Rankine Cycle applicable for Generation?
  - Limited to waste-heat from a process or geothermal
Geothermal Assessment- Next Steps

Collaborate with complementary initiatives on the Seward Peninsula.

Phase 2.
Exploration recommendations:
1. Remote sensing study.
2. Soil geochemical surveys
3. Ground-based geophysical surveys

Phase 3.
1. Advanced exploration recommendations
2. Thermal gradient / exploratory drilling (shallow holes)
3. Technical and economic feasibility studies.
Energy Plan Initiatives

Short, Medium, and Long Term
Energy Regional Policy Planning

- Conservation, energy efficiency, and energy security as a policy.
- Integrated planning.
- Partnerships and Collaboration
- Assure regional involvement in energy assistance programs (LIHEAP, PCE, etc)
- Coordinate purchasing and diesel fuel to the extent practical- Bulk Fuel Cooperatives
- Develop a regional “Rural Energy Center”
Energy Critical Infrastructure
Protection and Development

Regional Bulk & Diesel Fuel Upgrades

- Kotzebue Bulk Fuel Improvements
- Sub-Region-Bulk Fuel Improved Logistics/
- Storage in Kiana & Noorvik to enable surface transportation to Upper Kobuk
- Transportation corridor development- (Noatak to Red Dog Mine Road)
- Bulk Fuel and Rural Power Systems Upgrades
Conservation and Community End-Use Energy Efficiency

“100 percent coverage”

- Households, weatherization, and energy efficiency
- Water and Sewer Systems.
- ANTHC/VSW Outreach
- Promote LEED Standard
- Recovered Heat Systems
- Improved diesel efficiency
  - Using low loss transformers
  - Using recovered heat
  - Renovations needed
  - Kiana, Ambler
  - Kivalina
  - Being done in Selawik
Improved Fuel Storage and Transport

- Look at options for road access to Noatak
  - Could store fuel at Red Dog port and transport by truck

- Options for fuel storage on the Kobuk near Noorvik or Kiana to better serve Ambler and Shungnak/Kobuk
Feasibility Studies, Training, and Improved O&M

- **Training and Workforce Development**
  - Training of qualified operators
  - Youth Mentoring program

- **Operations and Maintenance**

- **Need to better understand our resources through feasibility studies and analysis**
Other Regional Energy Alternatives

- Northwest Arctic Coal-Deadfall Sincline Coal Deposit, Chicago Creek, and others w
- Coal-Bed Methane w/BLM rural energy program
- Natural Gas Exploration
- Mining and Economic Development
  - Public Private Partnership
<table>
<thead>
<tr>
<th>Energy Initiative</th>
<th>Who is responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power generation and distribution</td>
<td>Utility, borough, city and tribal councils</td>
</tr>
<tr>
<td>Bulk fuel storage</td>
<td>Utility, school district, village corporations</td>
</tr>
<tr>
<td>Transportation infrastructure development</td>
<td>Borough, city and tribal councils</td>
</tr>
<tr>
<td>Home energy efficiency</td>
<td>Housing authority, city and tribal councils</td>
</tr>
<tr>
<td>School energy efficiency</td>
<td>School district and borough</td>
</tr>
<tr>
<td>Commercial building energy efficiency</td>
<td>Private sector, city and tribal councils</td>
</tr>
<tr>
<td>Workforce development</td>
<td>University and school district</td>
</tr>
</tbody>
</table>
Regional Hydroelectric

- Run-of-river hydroelectric plants

- Upper Kobuk Valley area (Ambler, Shungnak and Kobuk).

- Upper Kobuk Valley: Jade Creek, Dahl Creek, Cosmos Creek, Shungnak River, and Kobuk River, and the Kogoluktuk River.

- 1.2 mega-watt (MW) to jointly serve to communities of Ambler, Shungnak, Kobuk, and potential mining interests

- Detailed study of hydropower resources in the Upper Kobuk Valley submitted for funding
Biomass

- Heat appears sustainable
- Electrical Power may not be sustainable
- Harvest Economies Suggest a Regional Harvest model
- Develop one harvest and management plan across the region
- Opportunities between NANA, State, and BLM lands
Shunghnak Biomass Opportunities

- Excellent District Heating Opportunities
- Village Land locked in Summer — Winter only wood delivery
- Wood Resource is distant from village
Renewable Energy Possibilities

Solar Power

- 50 kW solar PV for Noatak, Ambler, Shungnak and Selawik
- Goal – can we put in enough PV to displace station service and line losses and thereby increase diesel efficiency?
- Solar thermal hot water heating
Mini-Grids Transmission

- Red Dog Mine Port-Kivalina- 15 miles
- Ambler-Shungnak 25 miles (potential mining interests)
- Selawik-Kiana- Noorvik 50 Miles total between the three communities
- Deering Buckland & the Seward Peninsula

Monitor current research in transmission
Benefits
Energy Options Analysis-
By Sub-Region
“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

“Islanded, Isolated and Small Scale Grids

Use of Diesel-Home heating”
Sub-Region 2: Buckland/Deering

- Wind Resource Development
- Geothermal Exploration
- Recovered Heat.
- Coordinate an End-Use Energy Efficiency Feasibility Study. Recommendations
- Research Additional Home Heating Energy Options
Sub-Region 1: Noatak/Red Dog Mine/Noatak

- Wind Energy Development
  - Noatak Wind Energy in conjunction with proposed road
  - Road to avoid air delivery
- Transmission development
- Recovered Heat
- Weatherization & End-Use Energy Efficiency
- Solar Thermal Heating
- Improved Infrastructure
Sub-Region 3
Kiana/Selawik/Noorvik Energy

- Recovered heat
- End-Use Energy Efficiency
- Wind Diesel Hybrid Local Hydroelectric Options.
- Improve penetration of existing wind-diesel system
- Electrical Inter-tie
- Improved wind penetration- Selawik
Sub-region 4
Kobuk/Shungnak/Ambler/NOVA Gold

- Recovered Heat
- End-use energy efficiency
- Wind-Diesel Hybrid
- Home Heating Fuel diversification
- Bio-mass
- Hydropower
- Wind-Diesel Hybrid (with an intertie)
<table>
<thead>
<tr>
<th>Project Plans &amp; White Papers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solar Thermal</strong></td>
</tr>
<tr>
<td><strong>Wind Diesel</strong></td>
</tr>
<tr>
<td><strong>Upper Kobuk Biomass</strong></td>
</tr>
<tr>
<td><strong>Upper Kobuk Hydroelectric</strong></td>
</tr>
<tr>
<td><strong>50 KW Solar Photovoltaic</strong></td>
</tr>
<tr>
<td><strong>Seward Peninsula Geothermal</strong></td>
</tr>
<tr>
<td><strong>Recovered Heat</strong></td>
</tr>
</tbody>
</table>
Energy Communication Plan

CREATIVE BRIEF
Energy Awareness Campaign
NANA 9914

PURPOSE
Educate about:
- The state of the current energy crisis
- Energy conservation practices
- The importance of taking responsibility and participating
- The purpose of a strategic energy grant
- The plan to face the crisis in the region, short term and long term goals
- NANA’s role as a leader in facing the crisis
- NANA’s partners
- Alternative energy sources in the region
- Energy assistance options
- The importance of new technology

TARGET AUDIENCE
NANA shareholders and region residents

OVERVIEW
NANA is planning a long-term pursuit of funding and seeking partners to help face the crisis.
- There are many actions people can take, today, to conserve energy.
- All villages in the region have potential to implement at least one alternative way of generating energy. (wind - Kivalina, Kotzebue, Selawik, Naplee; biomass - Kotzebue, Ambler, Shungnak, Naplee; hydro - All villages; geothermal - Kotzebue, Buckland; solar - all villages)
- NANA is a leader in facing the energy crisis but they can’t do it alone. Everyone needs to participate.

ADVERTISING OBJECTIVES
- Increase awareness about the importance of achieving energy security
- Increase participation from residents, working together
- Increase awareness about the effort for the region to utilize other energy sources and displacing diesel fuel

ACTION
- Get educated about the energy crisis and what it means to you.
- Take responsibility and participate in efforts to make the region self-reliant by developing alternative energy sources.

COMPONENTS
- Brochure
- Radio PSA’s current events, conservation tips, and technology updates
- Web site current events, conservation tips, and technology updates
- The NANA newsletter conservation tips, success stories, technology updates

MUST HAVE
- NANA Regional Corporation, Inc. logo
- NANA Pacific logo
- Contact information
Lessons Learned

- Energy Security is multifaceted
- Collaboration between communities and across regions
- Prepare for increasing high costs
- Realistic perception of renewable energy-hybrid systems that include fossil fuels
- Displacement vs Replacement
- Diesel fuel will remain a component of the energy supply
Next steps

- Finalize Strategic Energy & Energy Options Plan Report- GIS & Mapping
- Prepare for follow-on projects
- Develop project concepts and white papers
- Continue regional, state, and federal collaborations
- Analyze existing wind data
- Identify Alternative Wind Sites and technologies
- Develop smaller scale wind deployment strategies
Bottom Line: Future Orientation