



NANA Regional Corporation Overview
November 7, 2007

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



This is NANA | Inupiat Principles & Values

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

Sharing

Respect for Others

Cooperation

Respect for Elders

Avoid Conflict

Humor

Domestic Skills

Responsibility to Tribe

Knowledge of Family Tree

Humility

Love for Children

Hard Work

Respect for Nature

Family Roles

Spirituality

Hunter Success



“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



This is NANA | Shareholder Benefits



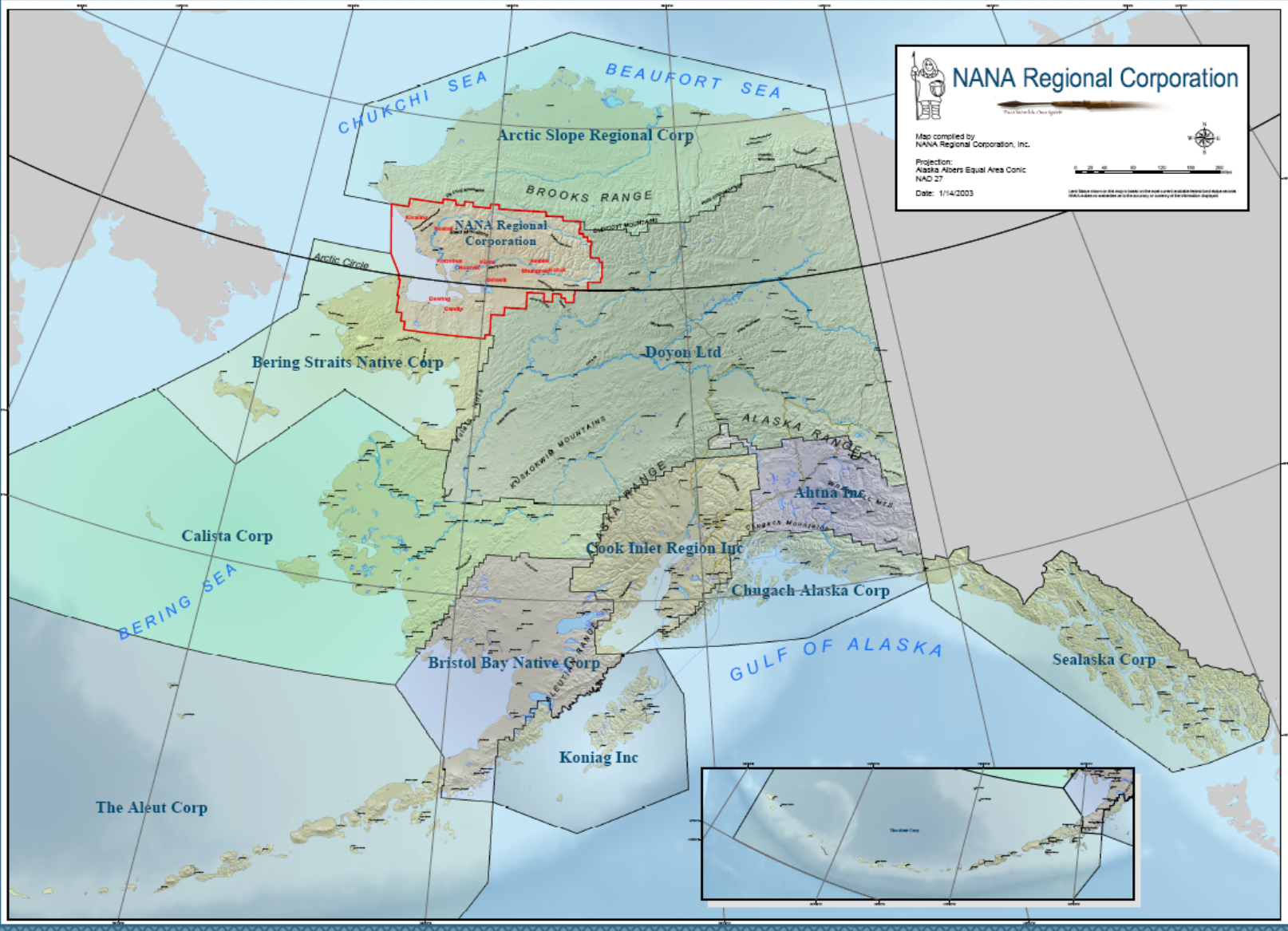
- NANA support a variety of programs to benefit shareholders, including:
 - Energy
 - Cultural programs
 - Regional Elders programs
 - Camp Sivunnigvik
 - Shareholder employee development
 - Scholarships and internships
 - Business and Career fairs
 - Village partnerships
 - Resource specialists
 - Disaster, medical and burial assistance
 - Non-profits benefiting shareholders



Alaska Native Claims Settlement Act

- Congress enacted ANCSA in 1971
- NANA is one of 12 Alaska Native-owned regional corporations
- Land transferred from federal to private ownership and to manage investment
- Alaska Native People would guide development and investment





NANA Regional Corporation

Map compiled by
NANA Regional Corporation, Inc.

Projection:
Alaska Albers Equal Area Conic
NAD 27

Date: 1/14/2003

Scale: 1:1,000,000

Scale: 1:1,000,000

CHUKCHI SEA BEAUFORT SEA

Arctic Slope Regional Corp

NANA Regional Corporation

BROOKS RANGE

Bering Straits Native Corp

Doyon Ltd

Calista Corp

ALASKA RANGE

Ahtna Inc

Cook Inlet Region Inc

Chugach Alaska Corp

BERING SEA

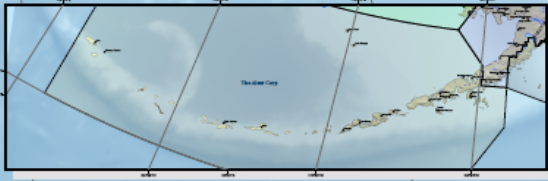
Bristol Bay Native Corp

GULF OF ALASKA

Sealaska Corp

Koniag Inc

The Aleut Corp

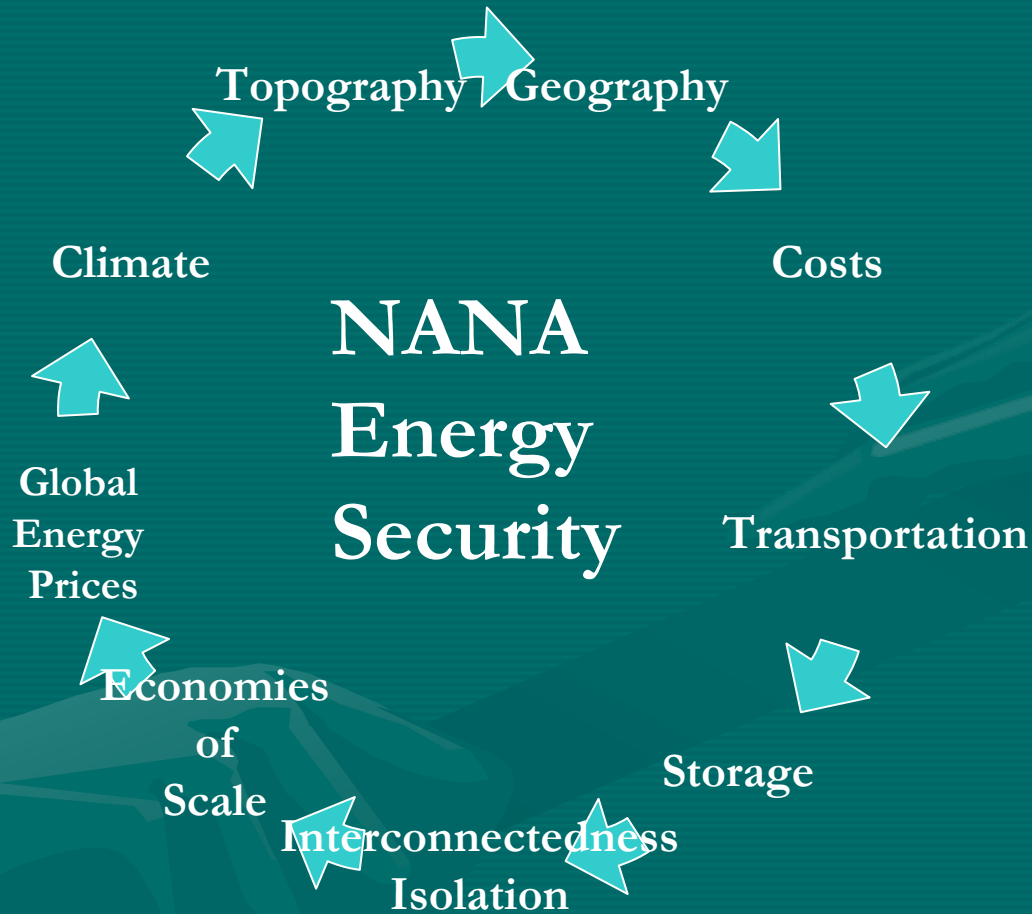


NANA Energy Security Vision: Integrated, Collaborative Efficient, Hybrid Energy Systems

Aerial view of new power plant,
tank farm, cogeneration, and wind
turbines at Selawik, Alaska.



Extraordinary Challenge of Providing Energy in NW Alaska



Alaska Vs. Lower Forty Eight



NANA Region Energy Challenges



- 200 miles from the nearest road
- Barge & Air Delivery of all consumables
- Forefront of Global Warming: erosion, permafrost, & transportation corridors
- Small Communities



2005 Power Cost (actual)

| | |
|---------------------------|-------------|
| Fuel | 15.7 |
| Non Fuel Power Generation | 10.7 |
| Depreciation | 7.3 |
| Administration & General | 3.2 |
| Consumer Accounts | 2.0 |
| Distribution O & M | 1.9 |
| Interest on LTD | 1.7 |
| All Taxes | <u>.5</u> |
| TOTAL | 43.0 (2005) |
| | 45.0 (2006) |

An increase of 7.0 cents/kwh since 2003



Costs to Consumer

| Cost of 700 Res kwh | |
|---------------------|-----------|
| Anchorage | \$83.64 |
| Fairbanks | \$64.40 |
| Juneau | \$71.18 |
| Kodiak | \$117.14 |
| Kotzebue | \$149.03* |
| AVEC Villages | \$235.31* |
| Napakiak | \$290.53* |

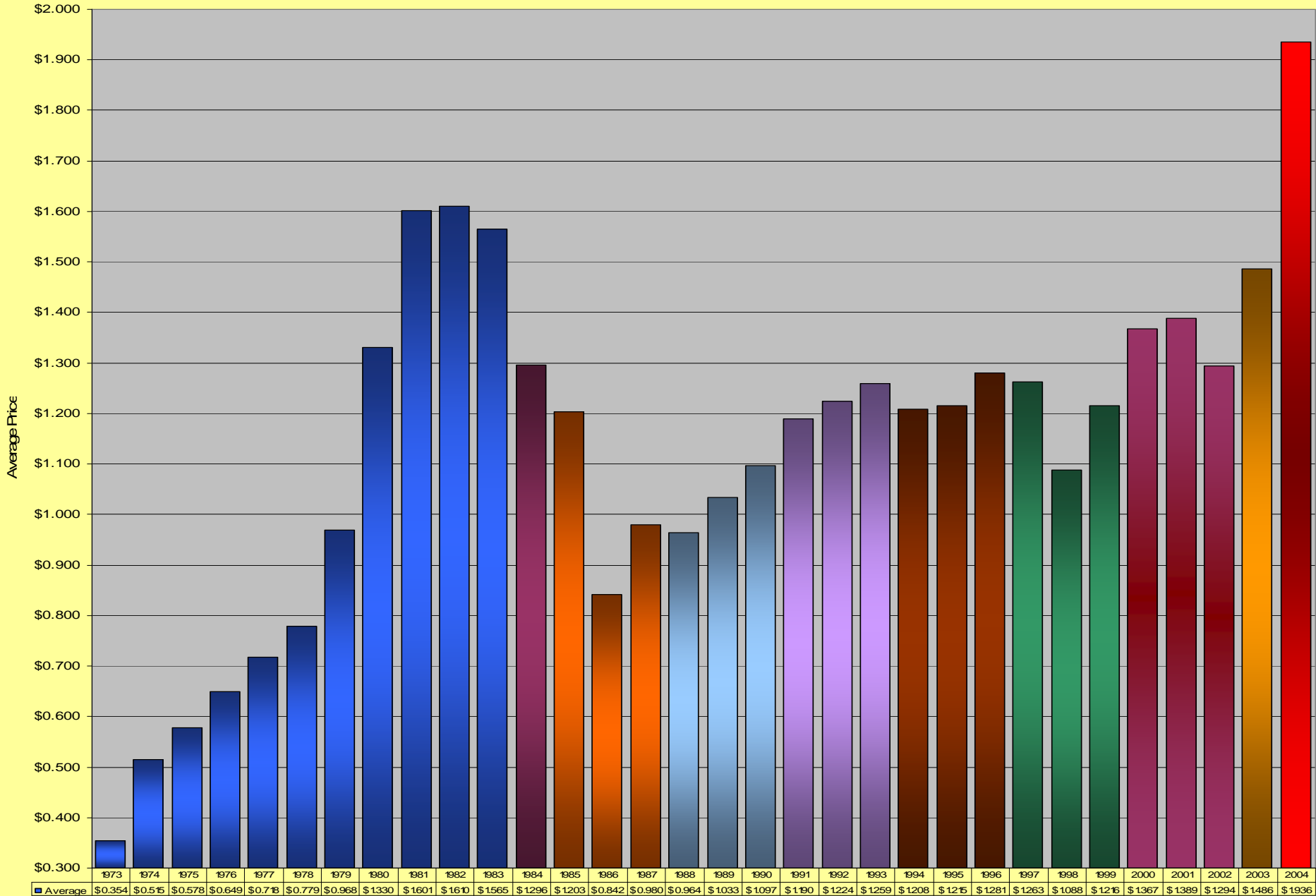
| 2005 PCE Power Cost cost per kw/hr | |
|------------------------------------|----------|
| Chugach Electric (Anch) | \$.1195 |
| Golden Valley (Fbx) | \$.092 |
| AEL&P (Juneau) | \$.1017 |
| Kodiak Electric | \$.1999* |
| AVEC | \$.2857* |
| Napakiak | \$.3808* |

* After PCE



Alaska Village Electric Cooperative, Inc.

1973 - 2004 Fuel Prices



Energy costs for the region are extremely high

- Bulk fuel delivered via airplane due to changing river patterns
- Gas and fuel oil must be flown in and retail prices can exceed \$7.00 a gallon.



Permafrost and Weather



- Icing on equipment and extreme weather conditions
- Equipment cannot settle, tilt or be uplifted
- Foundation concerns

Climatic and Permafrost



Poor roads, water and sewer lines, boardwalks and existing overhead power and phone lines present obstacles and challenges.



Specialty equipment creates mobilization changes



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
 - Manilaaq
 - Alaska Energy Authority

Selavik, AK

Wind Farm, New Bulk Fuel, Recovered Heat



Partners & Collaborators

In-Kind

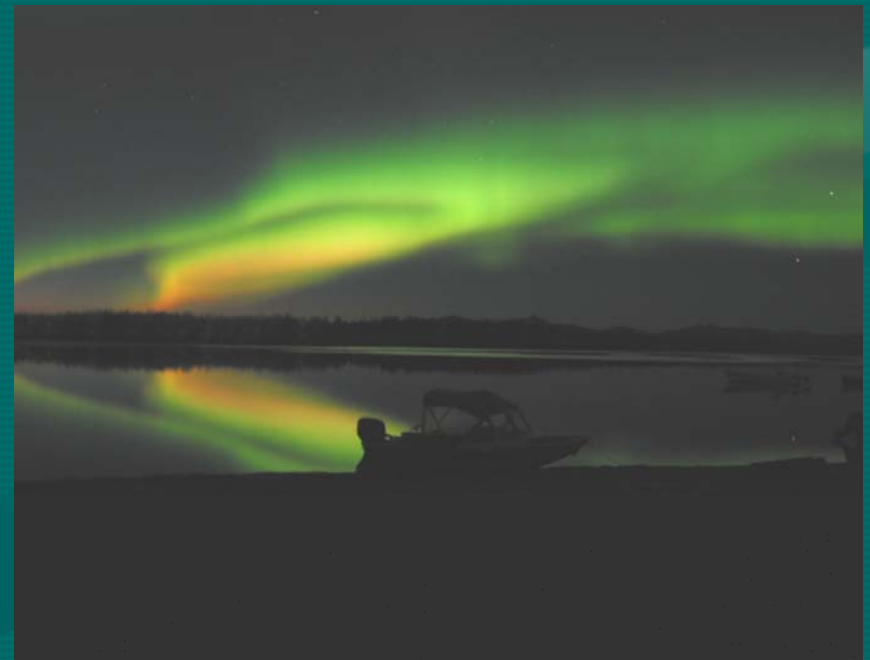
- Anemometers- AEA
- Technical Expertise
- Communication & Outreach

Communities



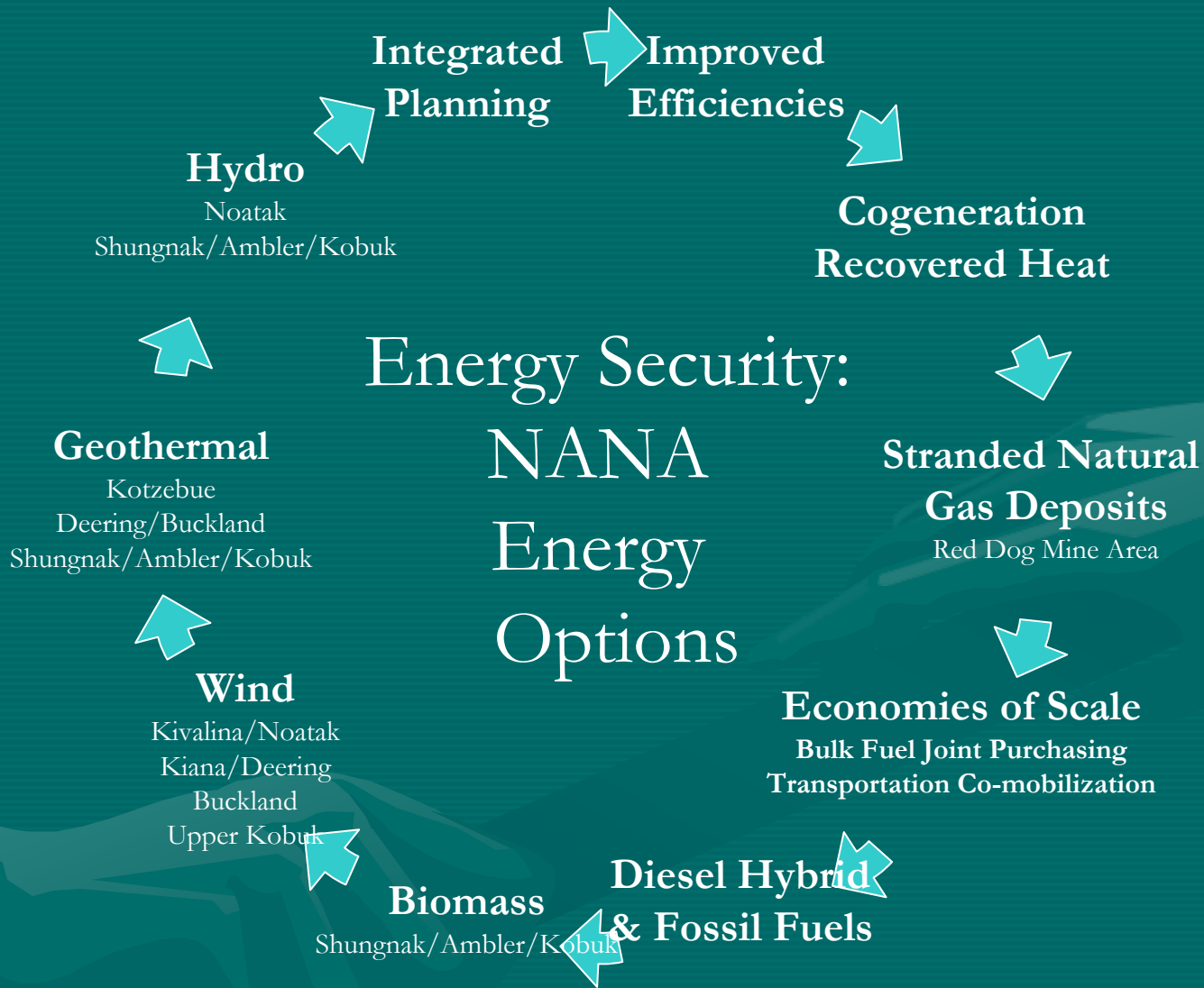
NANA Energy Security: Strategic Energy Plan

- *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





NANA SEP Activities

- Region Energy Steering Committee.
- Involve communities in energy decision making
- Strategic energy vision, vision statement, goals, and objectives.
- NANA Region Energy Summit
- Energy program metrics
- Forecast energy demand in the NANA Region.
- Identify and evaluate the costs and benefits of energy options
- Identify alternative power users
- Develop a funding and financing strategy white paper
- Participate in energy forums
- Disseminate results of the plan and energy options analysis



NANA SEP Technical Assistance Needs

“Leverage Alaska experiences, but look to the marketplace of ideas/experiences”

- Decision making models- energy options analysis
- NANA Energy Summit technical support
- Community Energy Planning
- Economic and Financial Modelling of Energy Options.
- Public Involvement and Educational Materials.

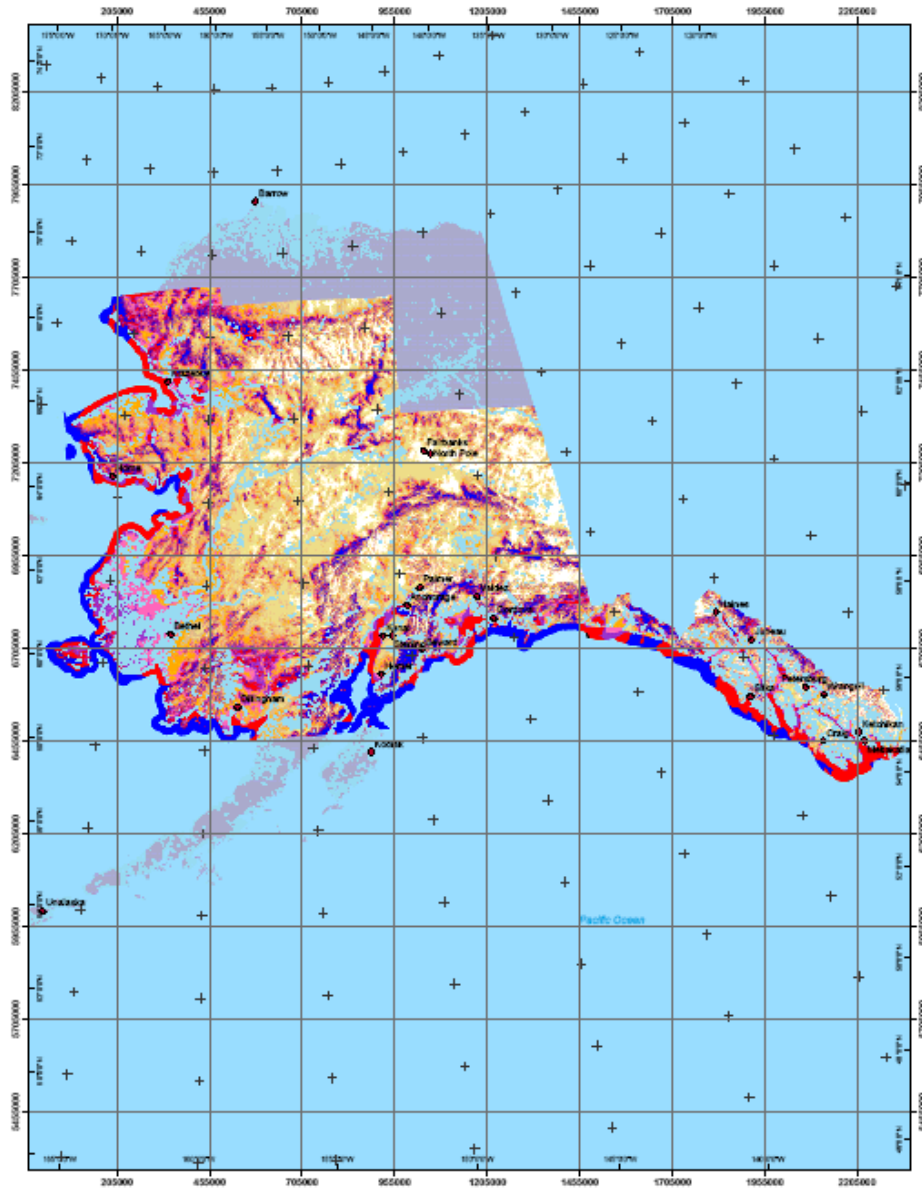


NANA Region Energy Security: Wind Resource Assessment Program Feasibility Study

- *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



Wind Resource of Alaska

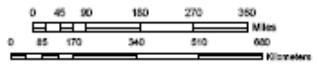


Key to Features

- City
- Road
- Railroad
- River / Stream
- Federal Land
- State / Local Park
- Borough / Census Boundary
- Urban Area
- Waterbody
- State Background
- Canadian Province

| Power Density at 50 m | AWREZ Class | Wind |
|-----------------------|-------------|-----------|
| 1- < 100 | 1 | < 100 |
| 1+ 100 - 200 | 2 | 200 - 300 |
| 2 200 - 300 | 3 | 300 - 400 |
| 3 300 - 400 | 4 | 400 - 500 |
| 4 400 - 500 | 5 | 500 - 600 |
| 5 500 - 600 | 6 | 600 - 800 |
| 6 600 - 800 | 7 | > 800 |

Projection: UTM, Zone 4N, WGS84
 Spatial Resolution of Wind Resource Data: 200m
 This map was created by TrueWind Solutions using the ArcMap system and historical weather data. Although it is believed to represent an accurate overall picture of the wind energy resource, estimates at any location should be confirmed by measurement.



KEA-Wind-Diesel System

An aerial photograph of a coastal area. In the foreground, there is a large body of water, likely a bay or inlet, with a sandy beach. The middle ground shows a cluster of wind turbines on a grassy hillside. A road or path leads from the water towards the turbines. The background is a vast, flat landscape with some scattered water bodies and distant hills under a clear sky.

- Lower electricity costs for consumers
 - Minimize risk of diesel fuel spills
 - Energy independence from state support
- Local economic development, including local jobs

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



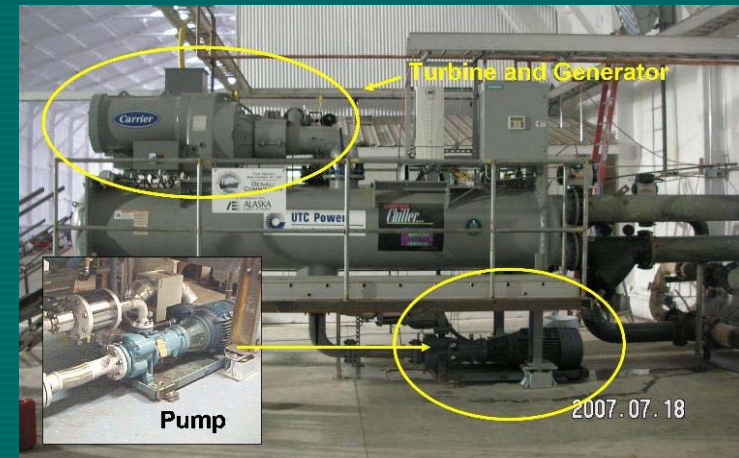
Technical Assistance-WRAP

“Leverage Alaska Experiences in Wind-Diesel Systems and feasibility analysis”

- Technical Assistance in the Analysis of Data.
- Participation at technical committee meetings.
- Economic and Financial Modelling of Energy Options.
- Anemometer Loan Program.
- Public Involvement and Educational Materials.

Geothermal Assessment Program Feasibility Study

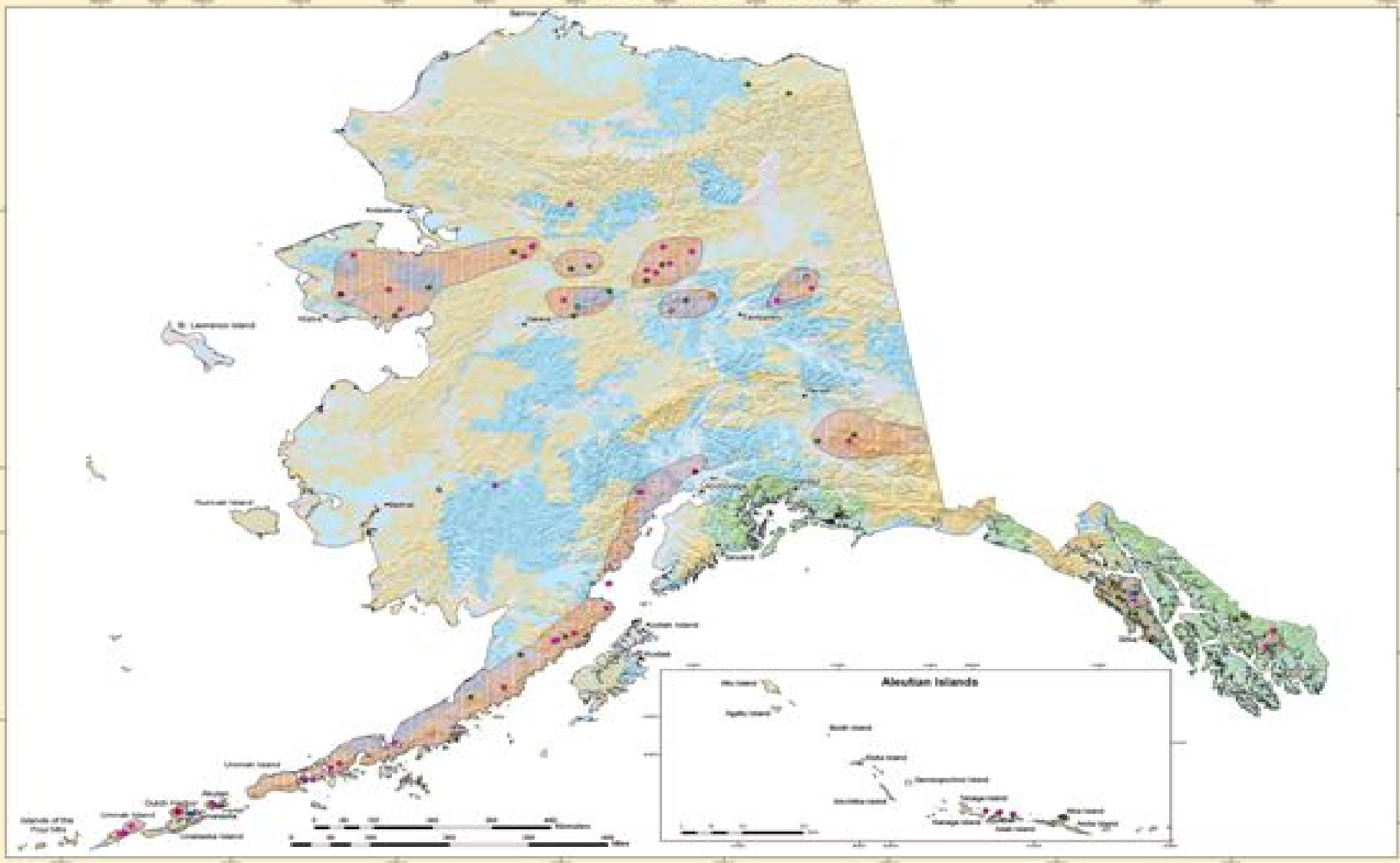
- *SO 1:* Identify potential geothermal sites in the NANA Region.
- *SO 2:* Undertake a geological, geochemistry, and geophysical assessment of targeted sites for geothermal power generation potential.
- *SO 3:* Ascertain geothermal feasibility potential for power generation in the NANA Region.



*Chena Hot Springs Geothermal
Demonstration Project*



Alaska Geothermal Resources



Legend

- Cities/Towns
- Rivers/Streams
- Lakes/Reservoirs

Geothermal Categories

- Geysers
- Geopressure/Reservoir Sites
- Regions of Known or Potential Geothermal Resources
- Wells > 50 Degrees C
- Springs > 50 Degrees C
- Wells > 20 and < 50 Degrees C
- Springs > 20 and < 50 Degrees C

Ownership

- Private Lands
- Bureau of Land Management and Other Federal Lands
- State Lands
- Native American Lands
- U.S. Forest Service Lands

Map prepared by Federal lands and state offices in the Public Health Engineering and Environmental Laboratory
 by
 The U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Geothermal Technology Program
 Geothermal Data Provided by:
 1. Geothermal Data (State Geothermal Database, University of Utah)
 2. National Geothermal Data Center, National University and State
 3. Geothermal Resources of Alaska, Program for Geothermal Technology Transfer (State Department of Energy, 1994)



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



NANA GAP Activities

- Literature Review of the geology
- Geology/Geochemistry Site Assessment and Survey
- Geophysical Assessments
- Power Optimization Modeling.



NANA GAP Technical Assistance

“Promote Alaskan experience, but look to outside for needed technical assistance”

- Development of the scoping document.
- Identifying the technical team
- Technical Assistance in the Analysis of Data.
- Economic and Financial Modelling of Energy Options
- Public Involvement and Educational Materials.



Pathway to NANA Region Energy Security:

| Obstacles | Pathways |
|---|---|
| “Turf Wars” | Consensus on Energy Security ; leverage steering committee. |
| Lack of appropriate technology relevant for the Arctic | Technological breakthroughs, including NW 100, UTC Power Purecycle 200, remote monitoring and control systems |
| Reliability & integration | Increased collaboration with providers; promotion of the steering committee |
| Technical expertise | Leveraging local/state experience; increased research in key areas (foundation design) |
| Increased cost planning, design, & construction of facilities | Amalgamated, integrated facilities |
| Redundant and emergency generation still needed | Leverage School District and other village facilities for redundancies |
| Uncertain Funding Environment | Coordinate proposal; develop alternative business models. |



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?

