NANA

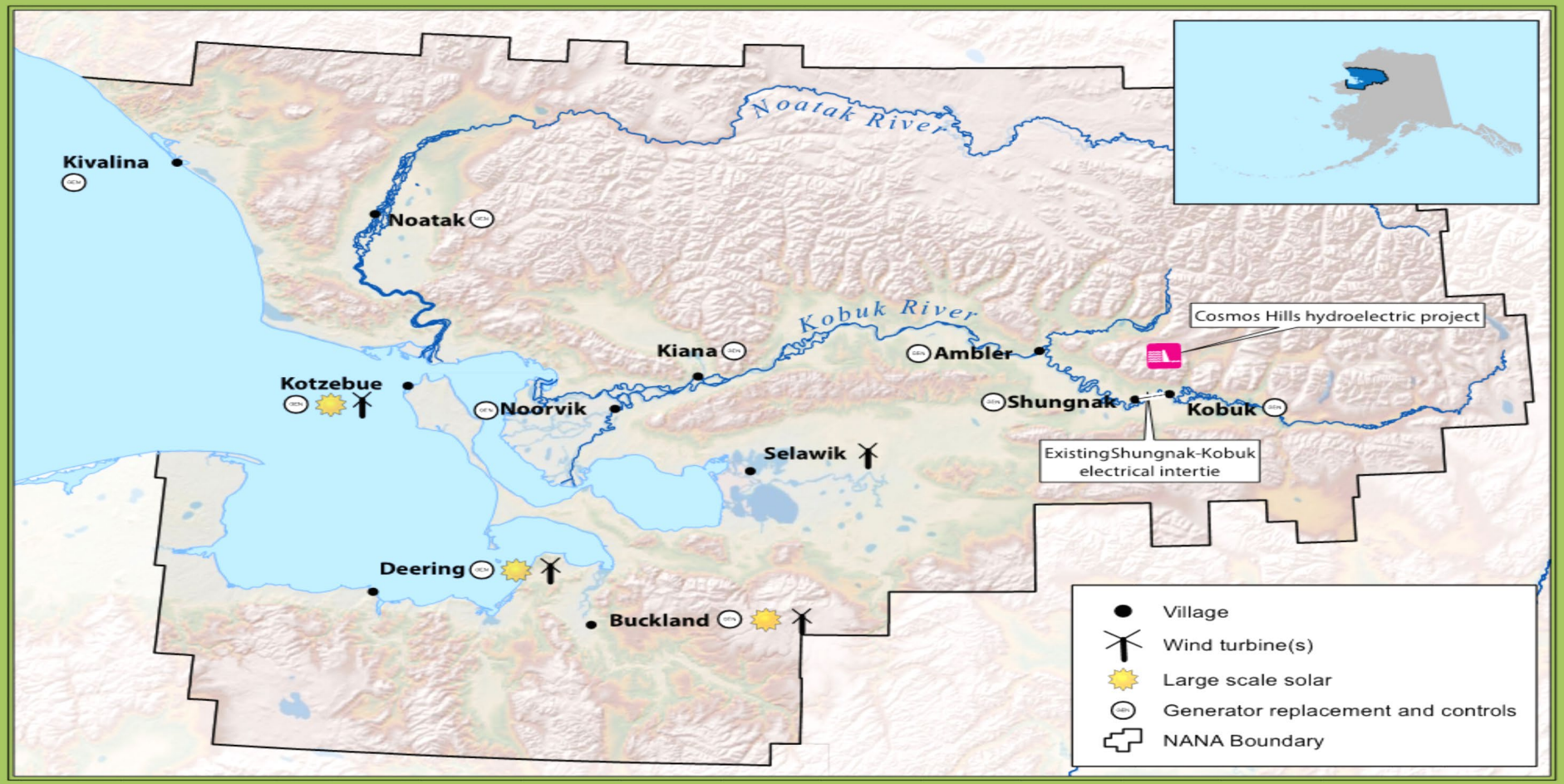


# DOE Intertribal TA Program Review

May 21, 2019 • Washington, DC



# NANA REGION Introduction




Energy Projects in the NANA Region

**NOT FOR NAVIGATION** Date: 7/6/2016



# NANA's Energy Vision

- **The energy vision for the NANA Region is to be 50 percent reliant on alternative energy sources, both renewable and non-renewable.**

- 10 percent decrease of imported diesel fuels by 2020
  - ✓ **We are on-track to meet this goal, in part thanks to DOE and significant community effort**

- 25 percent decrease of imported diesel fuels by 2030

- 50 percent decrease of imported diesel fuels by 2050

| WHY ARE WE DOING THIS??? 2018 ENERGY PRICES IN… | Gas/G | Stove Oil/G | Kwh (1-500) PCE | Kwh (>501) NO PCE |
|---|---|---|---|---|
| Kotzebue | $5.75 | $5.26 | $0.18 | $0.45 |
| Ambler | $9.79 | $9.53 | $0.21 | $0.61 |
| Kobuk | $8.24 | $8.24 | $0.21 | $0.60 |
| Shungnak | $8.42 | $8.42 | $0.21 | $0.60 |
| Kiana | $6.18 | $5.67 | $0.20 | $0.57 |
| Noorvik | $6.06 | $5.64 | $0.20 | $0.57 |
| Selawik | $8.25 | $7.99 | $0.20 | $0.52 |
| Buckland | $6.89 | $6.89 | $0.20 | $0.48 |
| Deering | $5.15 | $4.90 | $0.32 | $0.71 |
| Kivalina | $4.95 | $4.49 | $0.20 | $0.56 |
| Noatak | $10.29 | $10.29 | $0.21 | $0.75 |

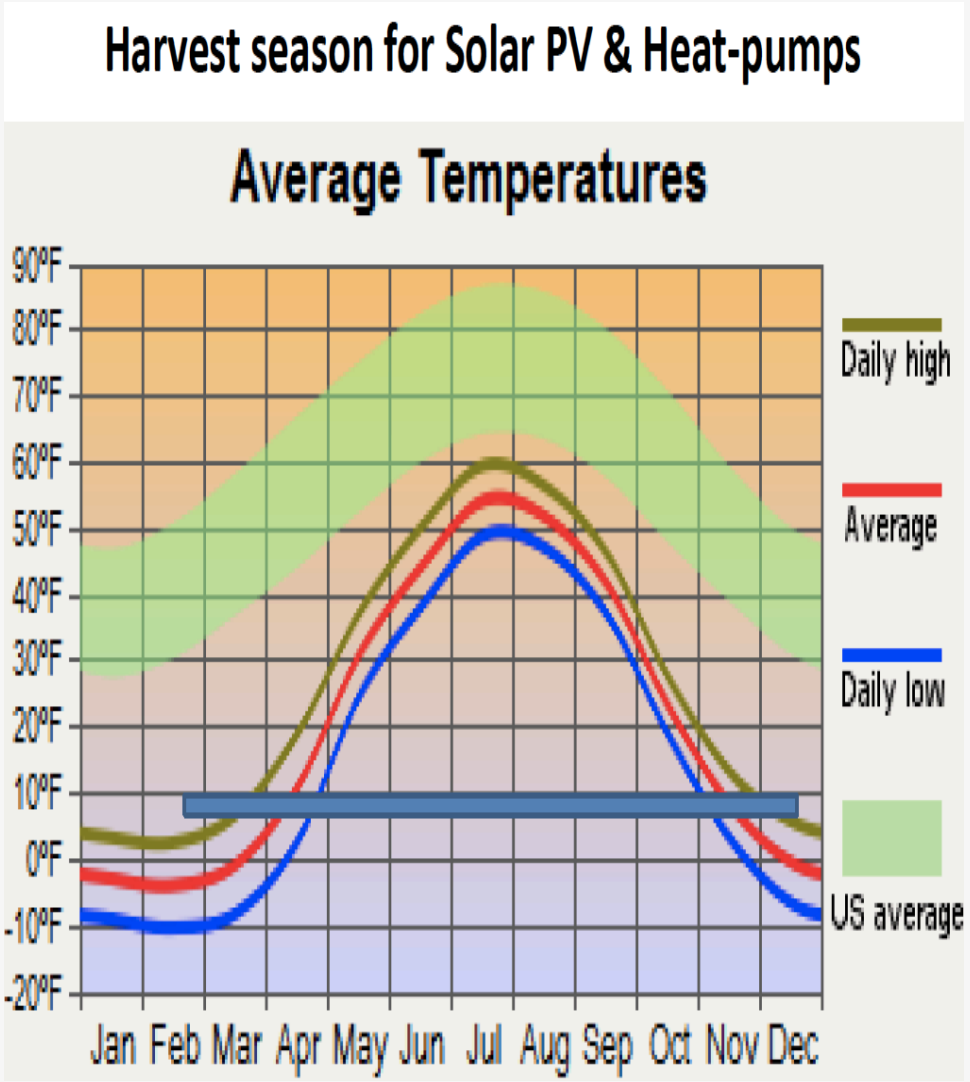
# 2017 Fuel Prices & Village Electric Rates

| NANA village 50 cent increase calculations | | | | | | | |
|---|---|---|---|---|---|---|---|
| Village | Price of Stove Oil | 2017 Usage (in gallons) | Price paid | With 50 cent Increase | Price Difference | Number of Households | Annual Price Per household |
| Ambler | $ 9.50 | 156,310 | $1,484,945 | $1,563,100 | $78,155 | 88 | $888.13 |
| Buckland | $ 6.89 | 203,045 | $1,398,980 | $1,500,503 | $101,523 | 98 | $1,035.94 |
| Deering | $ 4.90 | 91,365 | $447,689 | $493,371 | $45,683 | 44 | $1,038.24 |
| Kiana | $ 5.67 | 228,292 | $1,294,416 | $1,408,562 | $114,146 | 123 | $928.02 |
| Kivalina | $ 4.49 | 163,177 | $732,665 | $814,253 | $81,589 | 85 | $959.86 |
| Noatak | $ 10.29 | 223,018 | $2,294,855 | $2,406,364 | $111,509 | 121 | $921.56 |
| Noorvik | $ 5.64 | 254,113 | $1,433,197 | $1,560,254 | $127,057 | 137 | $927.42 |
| Selawik | $ 7.99 | 340,825 | $2,723,192 | $2,893,604 | $170,413 | 170 | $1,002.43 |
| Shungnak-kobuk | $ 8.42 | 243,156 | $2,047,374 | $2,168,952 | $121,578 | 99 | $1,228.06 |

# Energy- What We've Learned So Far

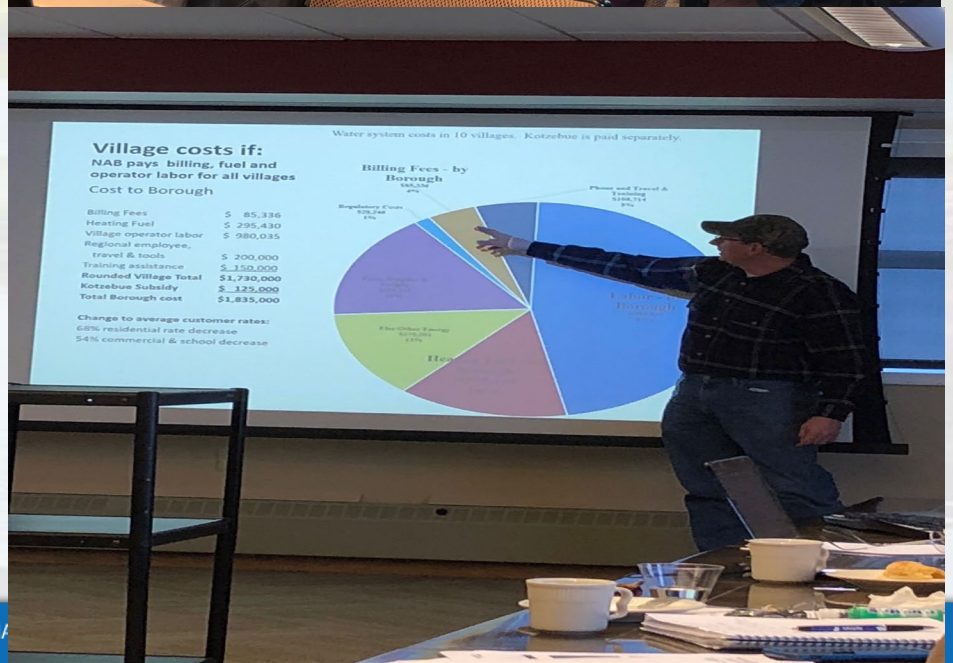
**NANA/NWAB Role in energy for our region**

1. **Project development, including stakeholder coordination**
2. **Grant writer/fund seeker – innovative approaches**
3. **Advocating for change in State and Federal policies**
4. **Infrastructure planner**
5. **Communicating NWALT (NorthWest Arctic Leadership Team) energy priorities to stakeholders**
6. **Update Energy plan**
7. **Research arctic-appropriate technologies (e.g., heat pumps-NWAB, batteries, solar diesels-off)**
8. **Regional Energy Authority/Joint Action Agency**



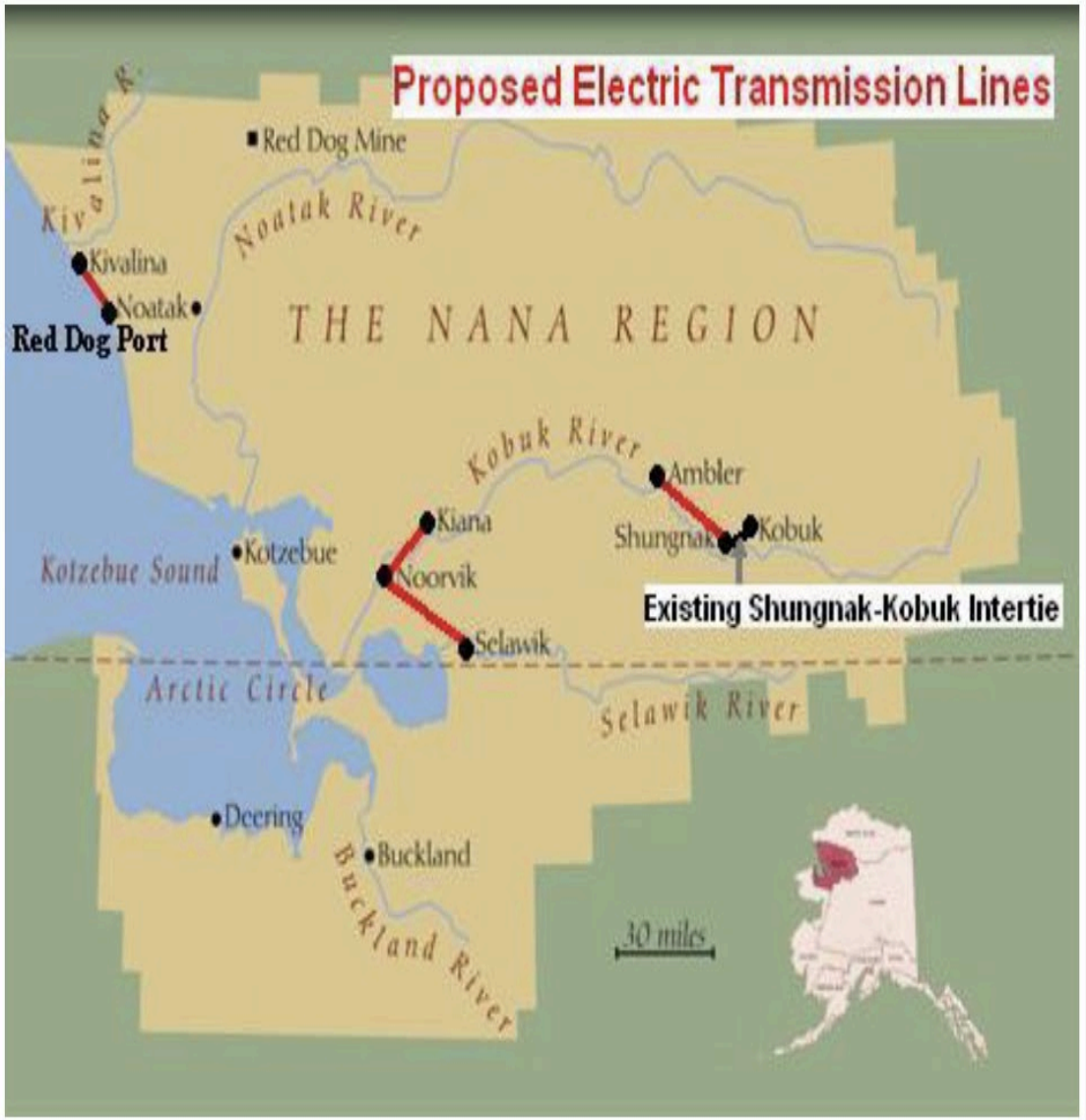
# DOE Inter-Tribal Technical Assistance Grant

- Department of Energy has awarded NANA $495,460 to create an Inter-Tribal Network in the Northwest Arctic
- 3-year effort (began in October 2016), now revised to 5 years
- Local capacity building and economic development
- Regional Coordination for all 11 communities
- Other AK Regionals also received grant (with potential for cross regional collaboration), including in Bering Strait & Calista regions attendance at ESC meetings in Kotzebue



# Inter Tribal TA Project Objectives

- Two Energy Steering Committee (ESC) meetings per year (Fall & Spring); ~ 40 attendees/meeting
- A day of technical training/workforce development added to each ESC meeting. Joint Action agency, batteries, heat pumps, bulk fuel.
- Energy and business planning for individual tribes and the overall region
- Technology reviews for unique arctic applications
- Promote economies of scale in energy & power projects for the NANA Region
- Conduct topical research, including the development of a Joint Action Agency. BIA TEDC grant awarded



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# APPLIED ARCTIC TECHNOLOGY

## Alaska Mini-Split Heat Pump Calculator

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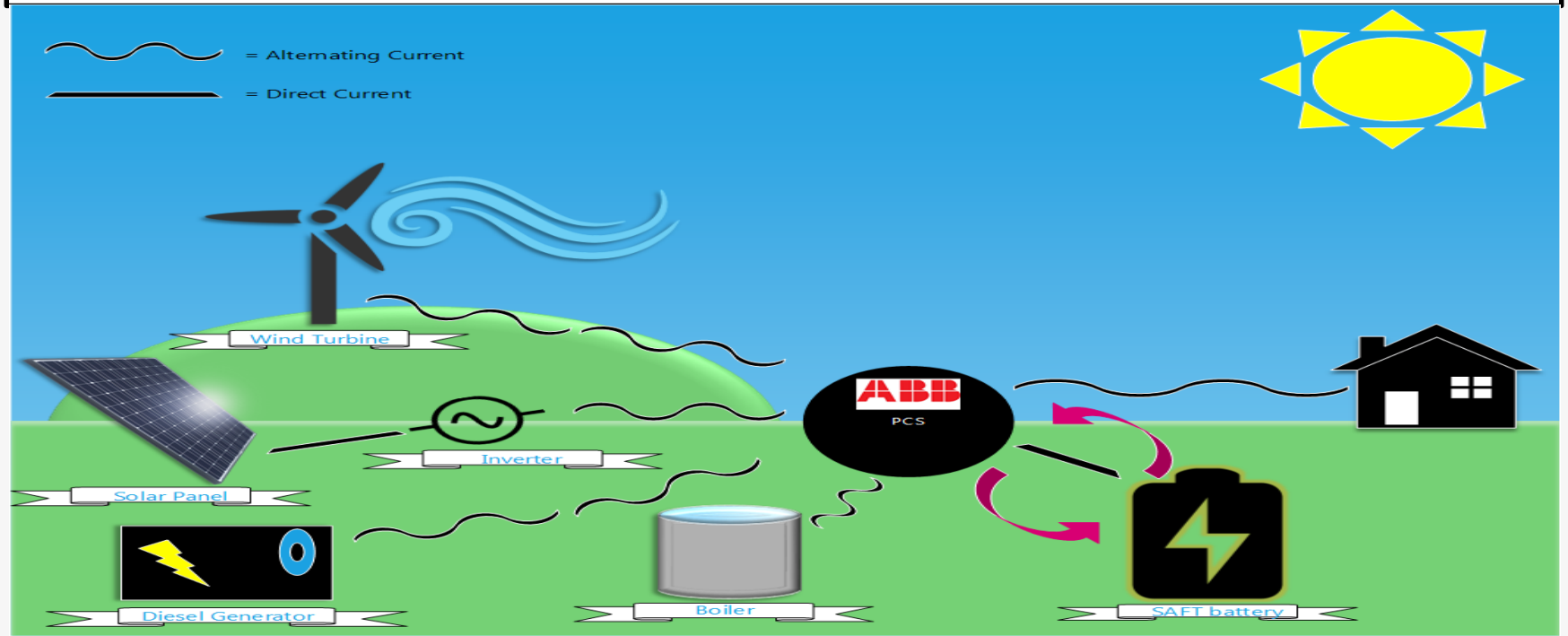
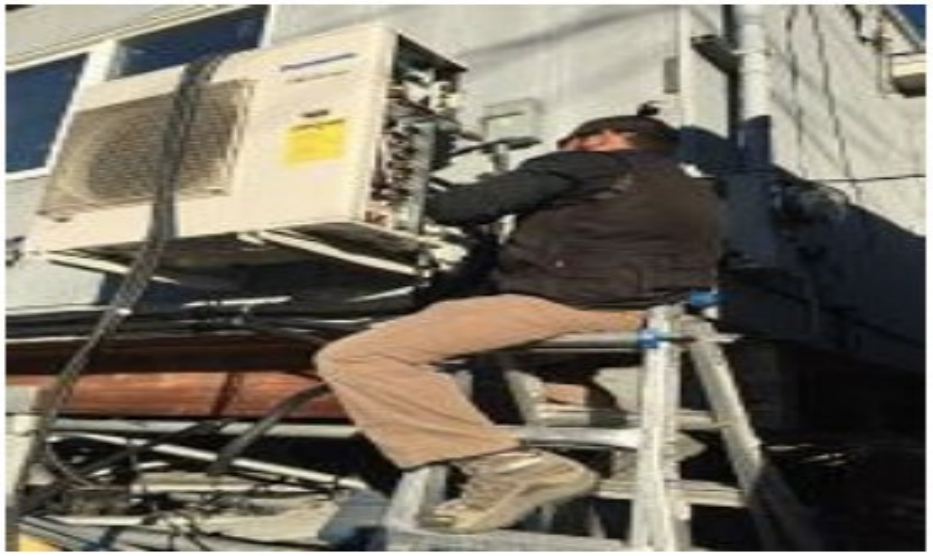


# ESC Priorities → Action Plan

- Critical path to Village Economic Development: Roads and Interties
- Business Case for High Penetration Renewable Energy (must include heat)
- Lower/stabilize costs! (Regional cooperation, new technologies, efficiencies, business structures, financing and grants, economies of scale)
- Powerhouse Upgrades to Integrate Renewables
- Workforce Development - Utility management, Powerhouse operators/mechanics
- Renewable Energy training – wind technicians, solar technicians, energy storage battery maintenance, heat pumps



# Accomplishments

- Community Meetings:
  - Shungnak
  - Selawik
  - Noatak
  - Deering
  - Buckland
  - Kotzebue
  - Ambler
  - Kiana
- Solar on Water plants in every village
- Multi-agency collaboration
- Secured funding/supported diesel powerhouse and distribution system upgrade – Deering, Shungnak
- Project development with NWArctic Borough on Joint Action Agency formation – Future Sustainability for Inter-Tribal effort, BIA TEDC funding ($95,000) secured and Phase 2 applied for
- Heat Pump Calculator & Economic Study (collaborated with other entities)
- Supported Buckland solar installation & Shungnak Solar application; Deering and Kotzebue solar installation support this summer (June – September)
- 6 ESC meetings held, over 200 people in attendance
- Additional funding secured (~$4 million) for targeted projects
- Ambler Biomass Support – $443,476 received from USDA HECG
- Heat Pump Calculator & Study Complete – www.heatpump.cf
- Developing diesel-off technology & renewables integration in Deering, Buckland, Kotzebue, Shungnak
- Over 12 public presentations + Battery and Inverter/Power Conversion hardware technology (ESNA & ABB) conferences for staff capacity development

# Department of Energy Solar Grant

- Department of Energy has awarded NANA $1M to install community solar arrays in Deering, Buckland, and Kotzebue; Requires $1 M cost share ($200K Deering & Buckland, $600K Kotzebue)
- Buckland installation complete; Deering to be installed Summer/Fall 2019; Kotzebue to be installed Q1-Q2 2020
- Kotzebue Electric Association has secured $600,000 from VIF to finance the required cost share for the project – RFP issued, selection by end of May 2019
- NANA & KEA to form Joint Venture to establish ownership of solar equipment during grant period; expected completion June/July 2019
- Both Deering & Buckland using Village Economic Development Committee (VEDC) $ for their cost share, plus additional contribution from NANA

# Targeted TA Project Support: Buckland Solar

# ~50 kW Solar PV

# Department of Energy Solar Grant – Deering & Buckland

- BoxPower solar array installed – September/October 2018
- Deering solar on hold until powerhouse upgrades occur (new diesel engine, controls)
- Solar Energy International PV 101 training held in Kotzebue in June 2018;  18 -20 participants

# Innovations & Lessons Learned – Buckland Solar

- Foundation Design – Box x Box + Corner Locks (Avoid Concrete if possible)
- Tilt Angle of 45 degrees = more output
- Each box > 15 kW, but could be 20 kW in low wind
- Low wind locations = less costly
- Local Crew Works!
- Trade-off between size of array and construction requirements – Still need to evaluate costs and performance
- Will be integrated with batteries, wind, grid-forming inverter, electric boilers in powerhouse and waterplant
- Installed @ ~ $4.45/Watt; incurred several one-time costs that will be “free” for future projects
- Aim to replicate: Kotzebue, Shungnak, ???


# USDA High Energy Cost Grant

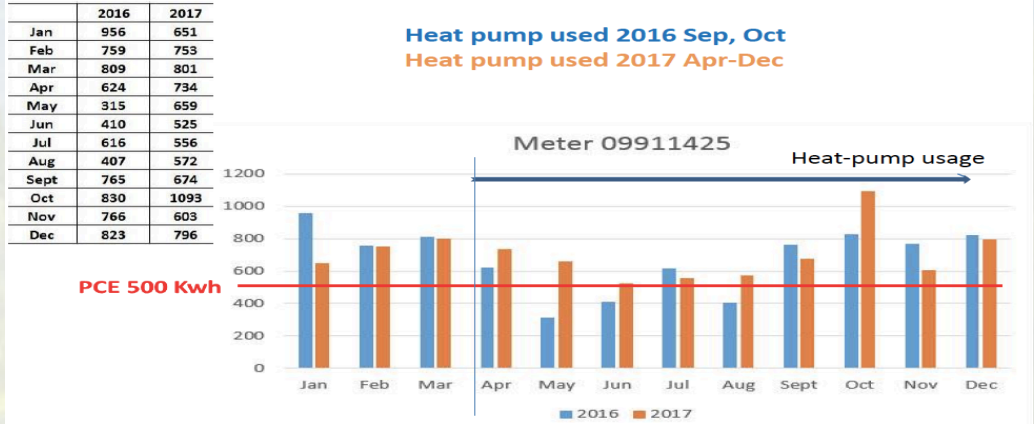
- NANA selected for High Energy Cost Grant – $1.6M to install energy storage batteries and controls in Deering and Buckland
- USDA completed environmental review
- ABB Control system and SAFT batteries ordered; Buckland delivered, Deering on July 2019 barge
- Expected Completion: June/July 2019 for Buckland, October/November 2019 for Deering
- Working with IES, KEA, DeerStone, NWAB for system integration

# Bureau of Indian Affairs – Tribal Energy Development Capacity Grant

- NANA awarded $95,000 to advance regional energy solutions and local capacity building (July 2018)
- Baker Tilly – technical assistance provider
- Detailed energy and financial analysis for individual tribes and the overall region
- Provide business plan and strategy for more enhanced regional cooperation and cost reduction – evaluate NWAB & ANTHC partnership on water/sewer; JAA formation
- Applied for Round 2 of funding, May 2019

## Shungnak Household Electric usage

| | 2016 | 2017 |
|---|---|---|
| Jan | 956 | 651 |
| Feb | 759 | 753 |
| Mar | 809 | 801 |
| Apr | 624 | 734 |
| May | 315 | 659 |
| Jun | 410 | 525 |
| Jul | 616 | 556 |
| Aug | 407 | 572 |
| Sept | 765 | 674 |
| Oct | 830 | 1093 |
| Nov | 766 | 603 |
| Dec | 823 | 796 |




# Energy – What we've learned

- **Critical Path / needs**

1. **Interties between villages**

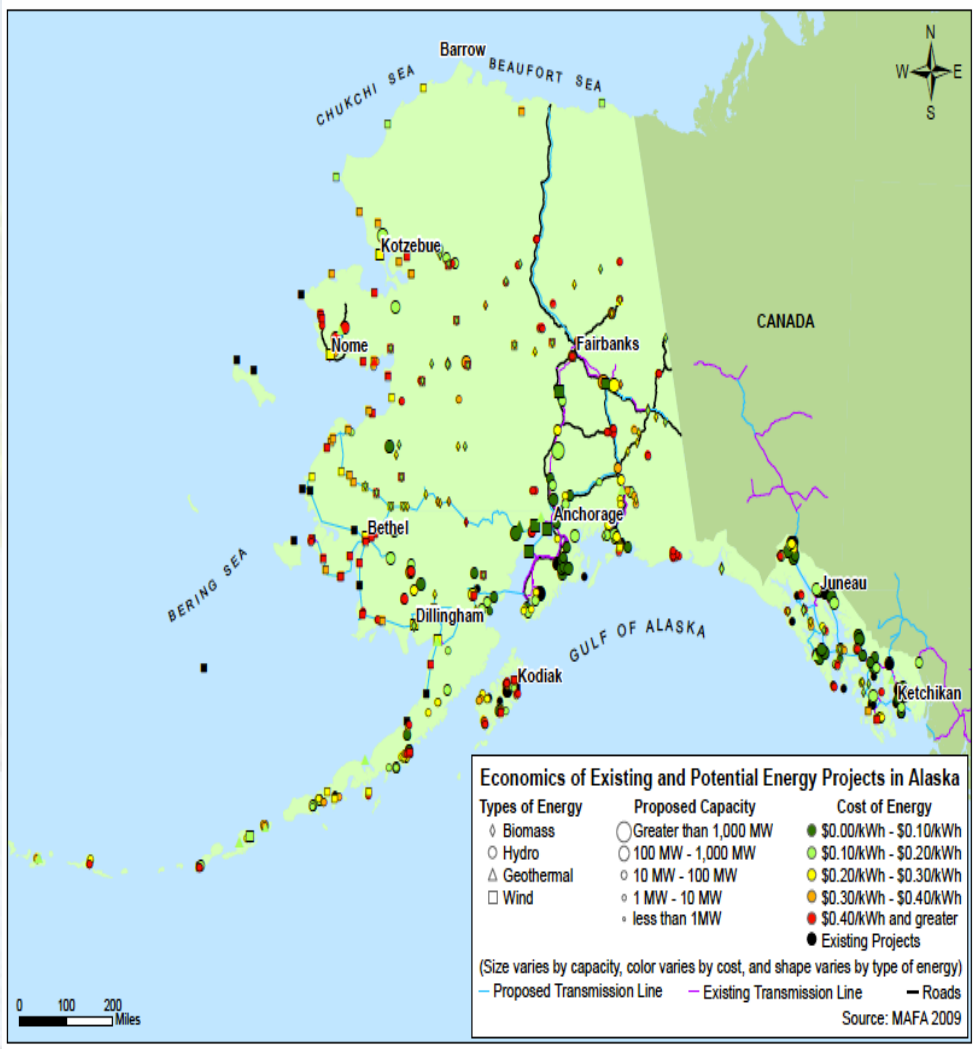
2. **Roads**

3. **Power Cost Equalization Reform – Current formula decreases state subsidy if diesel consumption decreases**

    - **This current model discourages energy efficiency & renewable energy development; JAA as solution?**

# Recommendations

- Critical path to Village Economic Development: Roads and Interties
- Powerhouse Upgrades to Integrate Renewable Energy
- Workforce Development - Utility management, Powerhouse operators/mechanics
- Renewable Energy training – wind technicians, solar technicians, energy storage battery maintenance, heat pumps



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# Taikuu!