

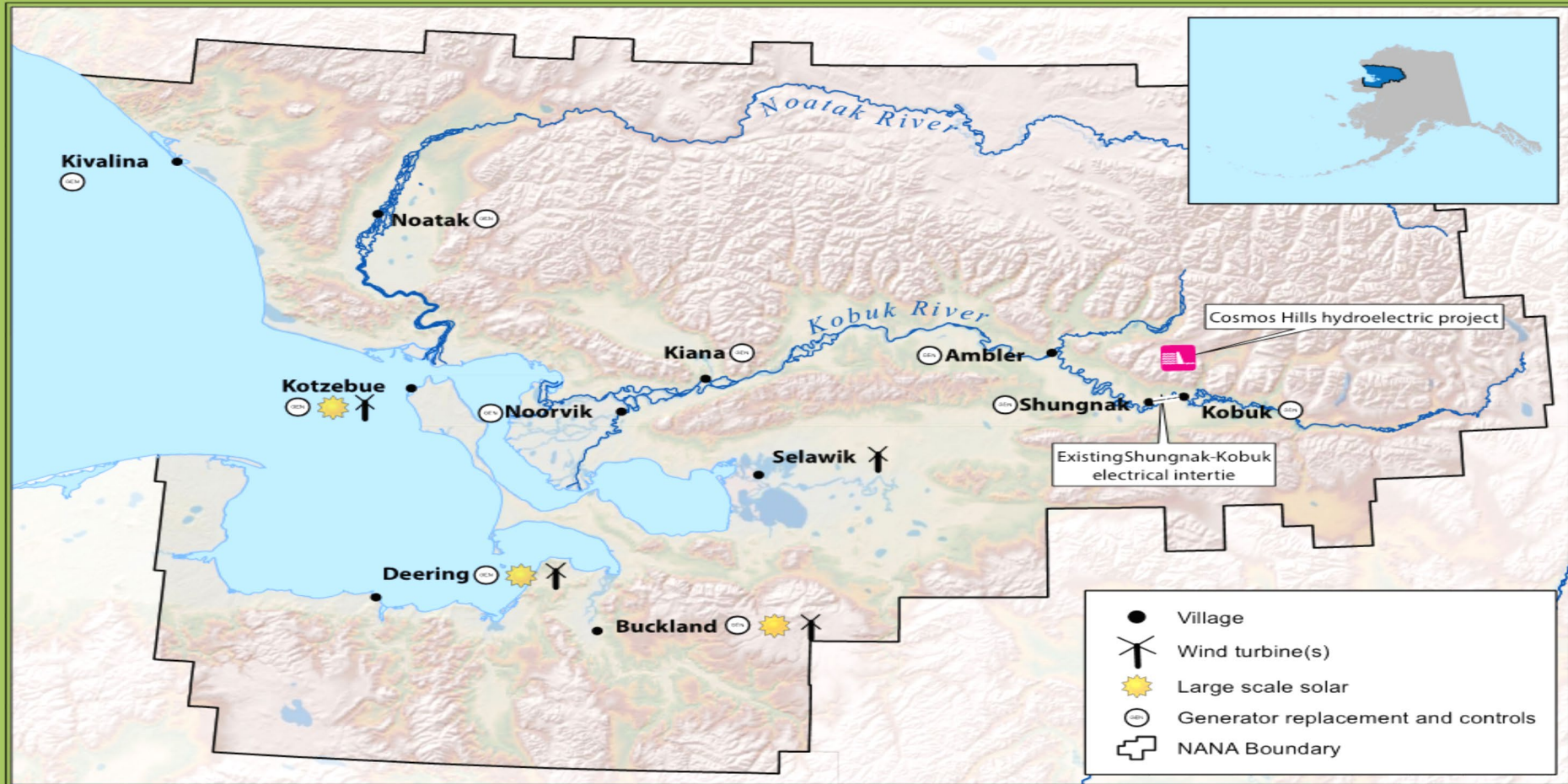


DOE Program Review – Community Scale Solar

November 21, 2019 Denver, Colorado



NANA REGION Introduction



Energy Projects in the NANA Region

NOT FOR NAVIGATION Date: 7/6/2016

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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

<u>WHY ARE WE DOING THIS???</u> 2019 ENERGY PRICES IN...	Gas/G	Stove Oil/G	Kwh (1-500) PCE	Kwh (>501) NO PCE
Kotzebue	\$5.88	\$5.92	\$0.18	\$0.45
Ambler	\$10.04	\$10.04	\$0.21	\$0.61
Kobuk	\$9.27	\$9.27	\$0.21	\$0.60
Shungnak	\$8.50	\$8.50	\$0.21	\$0.60
Kiana	\$5.15	\$5.67	\$0.20	\$0.57
Noorvik	\$6.06	\$5.64	\$0.20	\$0.57
Selawik	\$5.30	\$6.36	\$0.20	\$0.52
Buckland	\$6.15	\$6.15	\$0.20	\$0.48
Deering	\$3.35	\$3.35	\$0.32	\$0.71
Kivalina	\$5.10	\$4.53	\$0.20	\$0.56
Noatak	\$9.26	\$9.26	\$0.21	\$0.75

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, \$610K Kotzebue)
- Kotzebue Electric Association to finance the \$610K cost share for the project (NWAB VIF)
- NANA & KEA to form Joint Venture to show ownership of solar equipment during grant period, JV agreement signed.
- Both Deering & Buckland using Village Economic Development Committee (VEDC) \$ for their cost share



Department of Energy Solar Grant

- Buckland Community Solar array is operational, but still needs performance monitoring & communication integration



- Expected Completion Date of Dec 2019
- First BoxPower installation in Alaska
- Modified foundation & racking based on site-specific needs
- Community training and major in-kind contributions

Department of Energy Solar Grant

- Deering Solar Array Installation complete
- Supersacks, gravel, & duckbill foundation/anchoring
- Single 50 kW inverter
- Maximum local hire via Ipnatchiaq Electric, Tribe, City
- Radio communication back to power plant for full system control



Innovations & Lessons Learned

- Tilt Angle of 45 degrees = more output
- Each box > 15 kW, but could be 20 kW
- Low wind locations = less costly
- Local Crew Works!
- Trade-off between size of array and construction requirements – Each situation unique, requires analysis
- Will be integrated with batteries, wind, grid-forming inverter, electric boilers in powerhouse and waterplant
- Hosted Solar Energy International Training for region in June 2018 – created interest and competence
- Aim to replicate: Kotzebue, Shungnak, Kobuk, Noatak, ???



Kotzebue Solar

- Contractor selected
- System design in process
- Will replace legacy wind turbines that are no longer operational, but will use some existing infrastructure to reduce costs
- Will be largest solar array in rural Alaska
- Will interconnect with existing wind, battery, electric boilers, and now electric vehicle charging above the Arctic Circle



Replication in Process!

- Communities of Shungnak & Kobuk interconnected via 10-mile distribution line
- In process of receiving \$1.3 million from USDA High Energy Cost Grant for 150 kW solar and ~650 kWh battery for Shungnak & Kobuk
- Intend to create Independent Power Producer and sell power to AVEC
- Partnership between Tribes and Cities of Shungnak, Kobuk, NANA, Northwest Arctic Borough



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
- Necessary to make solar effective
- **ABB Control system and SAFT batteries operational in Buckland & Deering**
- Working with IES, ABB, Saft, KEA, DeerStone, NWAB for system integration
- Allows for high penetration renewables (wind & solar) to turn diesels off when enough renewable energy available
- Also controls electric boiler for additional diesel displacement



USDA High Energy Cost Grant – Breaking Trail

- First (**and second!**) utility scale wind-solar-battery-diesel hybrid system in rural AK
- Diesels-off in Buckland on July 24, 2019 & in Deering on October 11, 2019
- Expect Significant Fuel Savings
- Developing Institutional and Financial Structures to Monetize Fuel Savings
- Still Need to Address heating diesel engines and powerhouse under long-duration diesels-off (good problem to have!)
- Enables high penetration & high quality renewable generation, like wind and solar energy, without destabilizing the system



Upcoming Energy Projects

- **USDA High Energy Cost Grant (HECG) – Install community solar array and energy storage batteries in Shungnak and solar in Kobuk**
- **BIA Tribal Energy Development Capacity – Continue formation of Joint Action Agency**
- **Intend to submit DOE grant application for solar and energy storage batteries for Noatak**
- **Support for all other villages in region**



A close-up photograph of several stalks of golden-brown grasses, likely a type of wild rice or similar grain, set against a dark, blurred background. The grasses are illuminated by warm, golden light, highlighting their intricate, feathery seed heads. The word "Taikuu" is overlaid in the upper right quadrant in a clean, white, sans-serif font.

Taikuu