Projects & Opportunities Matrix

KEY:	PROJECT COMPLETE	IN PROGRESS	VIABLE		NOT VIABLE														
Community	**Priority Project #1**	**Priority Project #2**	**Priority Project #3**		**Wind**	**Utility Solar**	**Water Plant Solar**	**Battery Storage**	**Hydroelectric**	**Community-Scale Biomass**	**Geothermal**	**Intertie**	**IPP**	**Generator Upgrades**	**Automated Switchgear**	**Recovered Heat**	**Residential Biomass**	**Energy Efficiency**	**Opportunities**
Ambler	Develop a plan to upgrade bulk fuel storage; Engage all stakeholders in operational plan; Identify funding to complete upgrade	Upgrade biomass harvest management plan; Use wood resource assessment for resource availability; Engage all stakeholders to balance needs	Design and permit utility-scale solar PV and battery storage; Funding pending from AEA REF 14 application		Good wind resource near Ambler, project is more viable project with intertie to Shungnak in place, if intertied - Shungnak wind is better than Ambler	Need to complete design and permitting; Application submitted for funding: AEA REF 14	Installed: 8.4 kW	Need to complete design and permitting; Application submitted for funding: AEA REF 14	Cosmos Hills feasibility study complete: Best option - Kogoluktuk River: 690 kW, 5,410 MWh/year, run of the river, seasonal variation, 7 mi from Kobuk, financial viability depends on construction of Ambler - Shungnak intertie; Need feasibility study to estimate heat load for Ambler - Shungnak - Kobuk	Funded by USDA HECG: Heat washeteria and City offices; Final commissioning Q2 2022, displace 3,516 gal diesel annually; Need to upgrade harvest management plan	Not Viable	Ambler - Shungnak - Kobuk: Initial study complete; Need to complete feasibility study; Intertie enhanced by Cosmos hydro/Shungnak wind; Intertie may be financially viable without additional renewables if Ambler power plant is upgraded due to high cost of fuel in Shungnak; Denali Commission interested in partnering on MVDC + fiber	Opportunity with construction of power generation project	Upgrade of Gen #1 completed by AVEC	Upgrade needed	Opportunity to expand to serve fire hall and search and rescue buildings	Biomass is a significant residential heat source; As part of heat pump project residential biomass use interviews were conducted to fully characterize village heat load	Residential solar-powered heat pumps installed: DC4812VRF Solar/DC mini split, 12,000-38,000 BTU	Develop a plan to upgrade bulk fuel storage; Explore regional opportunities for fuel cooperative with Kobuk and Ambler
Buckland	Develop a long-term maintenance and operations plan for the power plant, renewables, and microgrid control system with corresponding financial plan to reduce the variation in the cost of electricity for residents; Support the City to accomplish this	Conduct energy efficiency audits for the community buildings; Implement recommended energy efficiency upgrades including residential and streetlight lighting upgrades	Design, permit, and construct additional solar PV or wind turbines and battery storage; Identify funding		Installed: 200 kW, space for additional turbine, need study to determine if additional 100 kW is feasible	Installed: 45.99 kW; Desire to increase size of array; Utility needs guidance on next steps; evaluate siting issues; study to identify how much to increase - include increments	Installed: 10.53 kW	Installed: 277 kW/218 kWh; electric boiler in power plant and WTP use excess renewable energy	Not Viable	Not Viable	Resource identified in 2016 energy plan: Granite Mountain Hot Springs, 40 miles south; Financial viability is a challenge	Not Viable	Need tribe to sign resolution in support of IPP; Need to draft agreement; model from Shungnak IPP, clearly identify NANA's role, conduct financial assessment to include/exclude wind; Review agreement in person in Buckland	DERA EPA Grant Awarded 2020: Gen #2 & #3: Generators installed; Final commissioning Q1 2022	Complete: Upgraded as part of solar + battery project	Opportunity to improve controls, insulation, and set points	Limited biomass resource; driftwood available for residential heating; Need to conduct residential biomass use interviews to fully characterize village heat load	Optimize WTP operational set points; Upgrade residential lighting to LEDs; Upgrade remaining streetlights to LEDs; Conduct energy efficiency audits	Verify communication to electric boilers and optimize dispatching, Need to resolve issues with generators to run system in automatic
Deering	Increase the number of hours of diesels-off operation; Enhance the reliability of generators; Implement robust heating system for power plant during diesels-off operation	Conduct energy efficiency audits for the community buildings; Implement recommended energy efficiency upgrades including residential lighting upgrades	Conduct residential water service line energy efficiency upgrades; Implement solution to minimize use of heat trace; Consider adding circulating pumps to each home		Installed: 100 kW; Need options analysis to determine if additional 100 kW turbine is best option for additional renewables	Installed: 48.5 kW; Desire to increase size of array; Need options analysis to determine if additional solar PV is best option for additional renewables	Installed: 11.13 kW	Installed: 277 kW/109 kWh	Not Viable	Not Viable	Resource identified in 2016 energy plan: Lava Creek, 50 miles south; Financial viability is a challenge	Not Viable	Tribe signed resolution in support of IPP; Need to draft agreement; model from Shungnak IPP, clearly identify NANA's role, conduct financial assessment to include/exclude wind; Review agreement in person in Deering	DERA EPA 2021 Grant Awarded: Gen #1 & #3; VIF: Gen #2 installation complete, needs troubleshooting	Complete: Upgraded as part of solar + battery project	Additional troubleshooting/maintenance may be needed	Limited biomass resource; driftwood available for residential heating; Need to conduct residential biomass use interviews to fully characterize village heat load	Upgrade residential heat trace to residential circ pump; Upgrade residential lighting to LEDs; Conduct energy efficiency audits	Need to resolve issues with generators to run system in automatic
Kiana	Design and permit utility-scale solar PV and battery storage; Funding pending from AEA REF 14 application	Upgrade all residential lighting to LEDs; Survey homes to determine lighting needs; Apply for VIF support	Conduct feasibility study, design, and construct waste heat expansion to new fire hall and/or other buildings; Locate new fire hall accordingly		Need to complete feasibility study for Westlake Ridge location (5 miles), wind study indicates Westlake Ridge is Class 2; Collect wind data: Install 50 m MET tower in Spring 2022, provided by AVEC, Need to complete options analysis for Kiana - Noorvik/Update wind-intertie feasibility study	Need to complete design and permitting; Application submitted for funding: AEA REF 14	Installed: 10.53 kW	Need to complete design and permitting; Application submitted for funding: AEA REF 14	Feasibility study: Creek near Kiana, run of the river, low flow; Reconsider if new technology develops	Feasibility study completed 2016: economically viable; Community interest in revisiting biomass project, access to wood resource has improved with new road	Not Viable	Kiana - Noorvik: Need to complete options analysis for Kiana - Noorvik/Update wind-intertie feasibility study & add solar + battery storage	Opportunity with construction of power generation project	Upgrade of generator with marine manifold completed by AVEC	Upgrade needed	Expansion completed in 2021	Biomass is a significant residential heat source; Need to conduct residential biomass use interviews to fully characterize village heat load	Upgrade lighting for school and clinic; Upgrade residential lighting to LEDs	Waste heat to new fire hall: consider when selecting location for fire hall
Kivalina	Continue to move forward with village relocation planning and execution; Evaluate opportunities for energy efficiency throughout relocation process	Complete feasibility study for wind energy integration with existing power system and finalization of wind turbine siting; Pursue reallocation of VIF funds to wind to heat (dependent on village relocation)	Complete options analysis for electrification opportunities for new village site (heat pumps, LED lighting, etc.); Coordinate with housing authority to pursue relevant technologies		Wind data analysis complete; Excellent wind resource; Need to complete feasibility study; Siting depends on final village relocation site; Plan to reallocate VIF funds from waste heat to wind to heat; Need City/IRA Resolution signed to approve	Need to complete feasibility study; wait for community to determine final village relocation site	Installed: 10.53 kW	Need to complete feasibility study; wait for community to determine final village relocation site	Not Viable	Not Viable	Not Viable	Intertie to Red Dog port	Opportunity with construction of power generation project	Upgrade of Gen #2 in progress, final commissioning Q1 2022	Upgrade needed; Village plans to continue to use existing power plant during and after village relocation	Feasibility study conducted to expand to serve new WTP, Washeteria, Community Hall, City Building: Not financially viable; 25 year simple payback; Plan to reallocate VIF funds from waste heat to wind to heat	Limited biomass resource; driftwood available for residential heating; Need to conduct residential biomass use interviews to fully characterize village heat load	Complete options analysis for electrification opportunities for new village site (heat pumps, LED lighting, etc.); Coordinate with housing authority to pursue relevant technologies	Village relocation is ongoing; Water system for school will be from desalination plant - energy intensive
Kobuk	Install heat pumps in all residences; Scope cost of procurement and installation; Apply for VIF support	Conduct options analysis for additional solar PV/battery storage to reduce cost of home heating; distributed solar vs. community array, siting	Upgrade biomass harvest management plan for utility-scale biomass; Engage all stakeholders in discussion and resolution		Viable only with intertie to Ambler	Installed: With Shungnak 223.5 kW, Still defining operational protocols and system set points	Installed: 7.38 kw	Installed: With Shungnak 384 kWh, Still defining operational protocols and system set points	Cosmos Hills feasibility study complete: Best option - Kogoluktuk River: 690 kW, 5,410 MWh/year, run of the river, seasonal variation, 7 mi from Kobuk, financial viability depends on construction of Ambler - Shungnak intertie; Need feasibility study to estimate heat load for Ambler - Shungnak - Kobuk	Installed - Cordwood fired boiler, Serve WTP, Predicted consumption of 40 cords/year, displace approximately 4,400 gal diesel annually; Need to upgrade harvest management plan	Not Viable	Shungnak - Kobuk: Completed 1994; State-owned, 10 mile distribution line, $0.05 per kWh surcharge to Kobuk; State requested letters of interest to buy intertie	Complete	Upgrade generator building weatherization and heating for enhanced system resiliency	N/A	N/A	Biomass is a significant residential heat source; As part of heat pump project residential biomass use interviews were conducted to fully characterize village heat load	Install heat pumps in all residences; Upgrade residential lighting to LEDs	Tie-line is currently for sale - in need of substantial maintenance soon; Explore regional opportunities for fuel cooperative with Kobuk and Ambler
Kotzebue	Additional wind turbines, solar PV, battery storage; design funding pending	Upgrade all residential lighting to LEDs; Survey homes to determine lighting needs; Apply for VIF support	Enhance engagement regional stakeholders in Kotzebue: City, Tribe, Maniilaq, KIC		Installed - 1.8 MW (An additional 915 kW is installed, but non-functional); Design in progress for 2 additional 1 MW each turbines, VIF funded, need funding for construction	Installed: 576 kW, bifacial, average 1794 kWh/day; Application submitted for funding for construction of additional 600 kW: AEA REF 14	Installed: 21.06 kW	Installed: 950 kWh/1,225 kW; 450 kW electric boiler at Maniilaq uses excess renewable energy; 108 kW electric boiler at NPS - needs legal agreement finalized to operate; Design funding awarded for additional 4 MWh: AEA REF 13	Hydro resource across channel: Noatak River, strong current; Need feasibility study; KEA expressed interest; Opportunity for tidal power (seasonal)	Feasibility study completed 2012; Financially feasible; Burn combustibles from waste stream, Equivalent waste of 120,000 gal diesel is available annually; Tie to backhaul program/increase scale; Need to identify funding source; KEA expressed support if City takes lead; potential to incorporate ORC generator from power plant	Not Viable	N/A	Opportunity for recent solar project; KEA expressed willingness to implement if successful elsewhere in the region	New 1,440 kW EMD generator has restricted number of hours operated due to air permit restrictions--results in operation of larger, dirtier generator and wind curtailment (approx. 25%)	Upgrades needed; using analog load share line, old Woodward controls, need controls upgrades for diesels-off operation	Opportunity to expand wind-to-heat to serve WTP	Biomass is a significant residential heat source; Need to conduct residential biomass use interviews to fully characterize village heat load	KEA has interest in expanding wind-to-heat to dispatch power to residential electric heaters when there is excess wind	Local interest and investment in electric vehicles: KEA owns and operates Nissan Leaf and ordered electric Ford 150; Long-term interest from KEA in development of Cape Blossom Port, expansion of land for additional 3-4 MW of wind
Noatak	Engage community in solar PV and battery storage project; Establish IPP; Provide training for solar and battery maintenance technician/AVEC liaison	Develop a plan for construction of fuel line from new airport and long-term solution for power plant relocation; Engage all stakeholders; Implement plan; Identify funding	Upgrade all residential lighting to LEDs; Survey homes to determine lighting needs; Apply for VIF support		AEA airport data wind resource study predicts Class 1 wind resource; Need to install MET tower and conduct additional wind resource assessment to characterize alternate locations, potentially hills 5 mi west	DOE Tribal Grant Awarded 2021: Design 2022, Construction 2023, 275 kW	Installed: 11.27 kW	DOE Tribal Grant Awarded 2021: Design 2022, Construction 2023, 500 kW/384 kWh	Not Viable	Pre-feasibility study completed 2016; Need to complete full study of biomass resource due to relatively sparse resource; Need to confirm community interest	Not Viable	N/A	Opportunity for current solar project	Not currently planned for by AVEC	Complete: Upgraded as part of solar + battery project	Scheduled for system maintenance/troubleshooting as part of 2022 RAVG/DC funding; Need agreement signed by Noatak	Biomass is a significant residential heat source; Need to conduct residential biomass use interviews to fully characterize village heat load	Upgrade residential lighting to LEDs	AVEC is concerned about fuel supply when airport is relocated
Noorvik	Design and permit utility-scale solar PV and battery storage; Funding pending from AEA REF 14 application	Upgrade all residential lighting to LEDs; Survey homes to determine lighting needs; Apply for VIF support	Complete feasibility study to evaluate all wind energy options including intertie to Kiana		Good wind resource, Quarry Rd. site is Class 4 by power density, Class 2 by wind speed, 5 mi from Noorvik along proposed Kiana intertie route; Need to complete options analysis for Kiana - Noorvik/Update wind-intertie feasibility study	Installed: 23 kW, complete 2016, predicted to generate 23 MWh/year; Need to complete design and permitting for expansion; Application submitted for funding: AEA REF 14	Installed: 12 kW	Need to complete design and permitting; Application submitted for funding: AEA REF 14	Not Viable	Pre-feasibility study completed 2016; Financially viable projects for teacher housing or City Hall depending on fuel prices; Need to complete full study of biomass resource, Need to confirm community interest	Not Viable	Kiana - Noorvik: Need to complete options analysis for Kiana - Noorvik/Update wind-intertie feasibility study & add solar + battery storage	Opportunity with construction of power generation project	Gen #2 replacement installation planned for Q2 2022	Upgrade needed; AVEC pursuing funding (~$1M - $1.4M)	Expansion completed in 2021	Biomass is a significant residential heat source; Need to conduct residential biomass use interviews to fully characterize village heat load	Upgrade residential lighting to LEDs	Local interest in enhancing resiliency of residential heating systems by diversifying heating infrastructure and fuel types
Selawik	Design and permit utility-scale solar PV and battery storage; Funding pending from AEA REF 14 application	Conduct residential water service line energy efficiency upgrades; Implement solution to minimize use of heat trace; Consider adding circulating pumps to each home	Conduct energy efficiency audits for the community buildings; Implement recommended energy efficiency upgrades including residential lighting upgrades		Installed; AOCS x4, non-functional; incorrect turbine choice; airport FAA restrictions limit siting; Need to install MET tower and conduct wind resource assessment to evaluate other wind sites	Need to complete design and permitting; Application submitted for funding: AEA REF 14	Installed: 9.72 kW	Need to complete design and permitting; Application submitted for funding: AEA REF 14	Not Viable	Not Viable	Not Viable	Selawik - Kiana - Noorvik; Need feasibility study/Options analysis for wind on Hotham Peak	Opportunity with construction of power generation project	Not currently planned for by AVEC	Plan to replace Woodward EGCP2 controls with ComAp; Additional upgraded controls needed (~$100k); Need funding source	Opportunity for additional maintenance and troubleshooting	Limited biomass resource; driftwood available for residential heating; Need to conduct residential biomass use interviews to fully characterize village heat load	Upgrade residential heat trace to residential circ pump; Upgrade residential lighting to LEDs	Pervasive freezing issues with water/sewer. Need functional alternative to heat tape to reduce community energy costs.
Shungnak	Conduct feasibility study to evaluate wind turbine opportunity in Shungnak; Install MET tower to characterize wind resource; Identify funding	Upgrade all residential lighting to LEDs; Survey homes to determine lighting needs; Apply for VIF support	Conduct residential water service line energy efficiency upgrades; Implement solution to minimize use of heat trace; Consider adding circulating pumps to each home		Class 2 wind resource, 2.5 mi NE of Shungnak; Need to install MET tower and conduct additional wind resource assessment to characterize alternate locations	Installed: With Kobuk 223.5 kW, Still defining operational protocols and system set points	Installed: 7.5 kW	Installed: With Kobuk 384 kWh, Still defining operational protocols and system set points	Cosmos Hills feasibility study complete: Best option - Kogoluktuk River: 690 kW, 5,410 MWh/year, run of the river, seasonal variation, 7 mi from Kobuk, financial viability depends on construction of Ambler - Shungnak intertie; Need feasibility study to estimate heat load for Ambler - Shungnak - Kobuk	Biomass project would compete for biomass resource with Kobuk & Ambler; There is community interest for a biomass boiler serving the community center	Not Viable	Shungnak - Kobuk: Completed 1994; State-owned, 10 mile distribution line, $0.05 per kWh surcharge to Kobuk; State requested letters of interest to buy intertie	Complete	Complete: All generators upgraded	Complete: Upgraded as part of solar + battery project	REF-funded to expand to serve clinic, cookhouse, VPSO and others; Construction in 2022	Biomass is a significant residential heat source; Need to conduct residential biomass use interviews to fully characterize village heat load	Upgrade residential heat trace to residential circ pump; Upgrade residential lighting to LEDs	Explore regional opportunities for fuel cooperative with Kobuk and Ambler
REGIONAL TOTALS	Pursue home heating energy efficiency upgrades at a regional level; Maintenance of existing systems; Replacement of aging infrastructure; Installation of heat pumps	Develop regional energy hub in Kotzebue to offer trainings and shared resources; Hire lineman, mechanics, and other licensed technical tradespeople to support entire region	Partner with Northwest Inupiat Housing Authority (NIHA) to prioritize energy efficiency in new construction and retrofits		2.1 MW	0.917 MW + 0.275 MW in construction	0.12 MW	1.672 MWh + 0.384 MWh in construction		4,400 gal/yr diesel displaced + 3,516 gal/yr diesel displaced in construction		Shungnak - Kobuk	1 IPP formed + 2 IPPs in progress	Many generators upgraded	Many switchgears upgraded	Waste heat installed in all villages			

UPDATED: 4/10/22