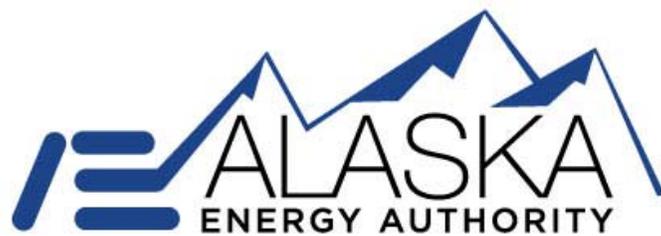


**Application Summaries**  
**Alaska Renewable Energy Fund**  
**Round IX**

January 28, 2016





# Renewable Energy Fund: Round 9 Application Summaries



## Unalaska Water Treatment Plant Inline Micro Turbines

App #1201

Standard Application

**Project Type:** Hydro

**Energy Region:** Aleutians

**Applicant:** City of Unalaska

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Feasibility, Design

### Project Description

Feasibility, design, and construction of a 64 kW power recovery hydro serving the community of Unalaska utilizing 6.4 cfs and 184 ft of head to approximately generate 280 MWh of energy and displacing 280 MWh of diesel energy (18 k gallons of fuel, <1% of existing diesel generation) annually at an estimated total project cost of 1.3 million with a projected online date of 2019. Proposed project features include a power recovery turbine in the existing 4000 foot long 24 inch diameter City water supply transmission main. This project will install inline micro-turbines in the new Pyramid Water Treatment Plant to generate power for its use as well as provide power to the Electric Utility's grid. The new Water Treatment Plant was designed and constructed with a configuration that would allow for micro-turbines to be installed at a future date. This project is estimated to provide at least 64 KW of in-house power using the water that passes through the Water Treatment Plant for treatment or system flushing; 30 KW may be needed for the Water Treatment Plant's electrical usage. An annual average of 280,000 kWh of power production is anticipated. A 1997 DOE report indicated that up to 260 KW could be available from the source (Icy Creek Reservoir) with additional water diversions, so there may be potential for future low-cost power development.

### DNR/DMLW Feasibility Comments

The Rural Energy grant should have no impacts to state land. The micro water turbines will be place within the current city owned water treatment facility. If the grant is carried out as described in the application, the City of Unalaska would not need any DNR authorizations.

### Financing Opportunities/Limitations

If the City is awarded the grant, the source of matching funds for all phases of the project would be the proprietary enterprise funds. These funds could be secured for this project in the FY2017 budget period or secured for FY2016 with Council approval through a budget amendment. The need for a loan to other financing options is not anticipated at this time. The City received an ADEC Municipal Matching Grant and an Alaska Drinking Water Fund Loan for the Water Treatment Plant project. ADEC's funding division indicated that if there are any funds remaining after the final completion of the new Water Treatment Facility, some limited use of the funds could be used for the proposed micro turbine project. The new Water Treatment Facility is still in construction phase and final payments have not been made, so it's uncertain how much of these funds will be available.

# Renewable Energy Fund: Round 9 Application Summaries



## Unalaska Water Treatment Plant Inline Micro Turbines

App #1201

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	17.61	Stage 2 Tech & Econ Score (100)	58.00
2. Matching Resources (15)	11.00	Benefit/Cost Ratio	1.24
3. Stage 2 Feasibility (20)	6.00		
4. Project Readiness (5)	3.33	<b>Project Rank</b>	
5. Benefits (15)	6.50	Statewide (of 38 Standard applications)	20
6. Local Support (5)	2.00	Regional (of all applications)	5
7. Sustainability (5)	4.00	Stage 3 Ranking Score (100)	50.44
<b>Total Stage 3 Score (100)</b>	<b>50.44</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$1,340,000	\$1,340,000	Cost of Electricity	\$0.39/kWh
REF9 Grant Funds	\$1,100,000	\$144,000	Price of Fuel	\$4.16/Gal
Matching Funds	\$240,000	\$36,000	Household Energy Cost	\$7,677

### AEA Review Comments & Recommendation

### Partial Funding

Unalaska proposes to modify its water supply system to incorporate a power recovery turbine in lieu of a pressure reducing valve. AEA received similar proposals from 2 other REF applicants this year. Unalaska's application was the most advanced with a study dedicated to such a proposal.

The preliminary economics for these types of projects looks positive but there are technical challenges that must be addressed. A turbine's hydraulic behavior is significantly different than a pressure reducing valve. Understanding how the turbine will interact with the combined water supply and power generation system (particularly under load rejection) is a difficult task and will require specialized analysis.

AEA recommends partially funding the feasibility and final design phases of this project to better understand operation of power recovery turbine and PRV under varying flow conditions and events such as load rejection. The study should include evaluation of traditional hydroelectric alternatives utilizing the same resource. AEA also recommends Unalaska evaluate other potential hydroelectric resources in the region.

# Renewable Energy Fund: Round 9 Application Summaries



## Upper Hidden Basin Diversion - Geotechnical Investigation

App #1202

Standard Application

**Project Type:** Hydro, Storage

**Energy Region:** Kodiak

**Applicant:** Kodiak Electric Association, Inc.

**Proposed Phase(s):** Feasibility

**Applicant Type:** Utility

**Recommended Phase(s):** Feasibility

### Project Description

Feasibility (geotech investigation) for a 0 kW addition to the existing Terror Lake storage hydro consisting of two diversions on Hidden Basin drainage serving the community of Kodiak utilizing 950 cfs and rated 1436 ft of head and 118 k acre feet of storage to approximately generate 33,000 MWh of energy and displacing 0 MWh of diesel energy (based on 2015 demand, fully utilized in 2025) annually at an estimated total project cost of \$80 million with a projected online date of 2021. Proposed project features include a two low height diversion structures, 0.6 miles of open channel or 60 inch diameter piped conveyance, 1.2 miles of 12 ft diameter horseshoe tunnel, and 4 miles of access road. The Upper Hidden Basin Diversion (UHBD) will supplement the available hydro resource supply of KEAs existing Terror Lake Hydroelectric Facility (FERC Project No. 2743) by an additional 30,000 acre-feet of water. The UHBD will increase hydropower generation by an additional 33 million kilowatt-hours (kWh) annually. Diversion components would be a basic, non-mechanical design intended for un-manned water conveyance. Structural components of the UHBD consist of two concrete-face rockfill dams, a buried conveyance pipe, tunnel and access road. Surface water from the diversion dam on the eastern tributary of the West Fork of Hidden Basin Creek (D-East) will flow to the diversion dam on the western tributary of the West Fork of Hidden Basin Creek (D-West). The combined flow of water from both diversions will then flow by gravity through a tunnel through a mountain ridge to the Terror Lake reservoir. Assuming no spill at the Terror Lake reservoir, the inflow of water from the diversions generate additional hydropower from the existing Terror Lake powerhouse and will feed directly into KEAs existing electrical grid without any operational or capacity-related changes. The UHBD is the most technically-viable, cost-effective, and minimally invasive option for adding renewable energy to Kodiaks electrical grid for the benefit of the Kodiak community.

### DNR/DMLW Feasibility Comments

Existing SAPA Terror Lake Hydro project previously approved under SCRO lease ADL 204024, is seeking to add diversion works from Hidden Basin creek into Terror Lake. SCRO has an active permit to KEA under LAS 29042 for stream gauges. A portion of the proposed tunnel, and the entirety of the diversion dam and access road are proposed for construction on State-owned lands and would require SCRO authorization if built. Additional authorization from the DMLW Water Section may also be later required.

### Financing Opportunities/Limitations

N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Upper Hidden Basin Diversion - Geotechnical Investigation

App #1202

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	16.17	Stage 2 Tech & Econ Score (100)	79.00
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	4.24
3. Stage 2 Feasibility (20)	13.00		
4. Project Readiness (5)	1.83	<b>Project Rank</b>	
5. Benefits (15)	11.37	Statewide (of 38 Standard applications)	10
6. Local Support (5)	5.00	Regional (of all applications)	2
7. Sustainability (5)	2.00	Stage 3 Ranking Score (100)	64.38
<b>Total Stage 3 Score (100)</b>	<b>64.38</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$79,992,000	\$79,247,000	Cost of Electricity	\$0.14/kWh
REF9 Grant Funds	\$750,000	\$750,000	Price of Fuel	\$3.45/Gal
Matching Funds	\$750,000	\$750,000	Household Energy Cost	\$7,047

### AEA Review Comments & Recommendation

### Full Funding

This project is expected to significantly increase the average annual hydroelectric energy generation at the existing Terror Lake Hydroelectric Project at a relatively low cost because the project addition is for construction of access and diversion works only (the existing generation infrastructure remains unchanged). The geotechnical investigation is required to advance the project through the FERC permitting and the final design phase of project development. Kodiak Electric currently meets all of their electrical demand with existing renewable energy resources. Demand growth is expected to reach the point where the additional energy from this proposed project addition would be fully utilized in about 10 years. The basis for recommending award is primarily the significant benefits if demand growth occurs. It is noted that if load growth does not materialize the project increases the cost of power. Other options for meeting minor demand would be to invest in energy efficiency measures.

A condition of award is to provide AEA for review an updated feasibility study addressing need for power, alternatives (including energy efficiency), demand projections by type/industry (including electric heat and transportation conversion), fuel costs, hydrology, diversion operation reliability, and other factors necessary to evaluate the project economics. As a condition of award the scope of work shall include a project management plan, evidence of permit acquisition, health and safety plans, work plan covering execution on site (with contingencies) and data collection and reporting, hazard analysis and spill prevention plans, environmental compliance and onsite safety/health monitoring, quality control and assurance plan, and weekly reporting during onsite activity. The above requirements shall flow down to consultants and contractors as well.

# Renewable Energy Fund: Round 9 Application Summaries



## Craig Water Treatment Plant Micro-Hydro

App #1203

Standard Application

**Project Type:** Hydro

**Energy Region:** Southeast

**Applicant:** City of Craig

**Proposed Phase(s):** Feasibility, Design

**Applicant Type:** Local Government

**Recommended Phase(s):** Feasibility, Design

### Project Description

Feasibility and design of a 45 kW power recovery hydro serving the City of Craigs water treatment plant utilizing an estimated 1.8 cfs and 500 ft of head to approximately generate 287 MWh of energy and displacing 5 k gallons of diesel heating fuel annually at an estimated total project cost of 0.4 million with a projected online date of 2019. Proposed project features include a power recovery turbine in the existing 6.4 mile long 12 inch diameter City water supply transmission main. Provide design, engineering and permitting to install and operate a micro-hydro power generator in line of the raw water supply line from the Craig municipal water source (North Fork Lake) to the Craig water treatment plant and Prince of Wales Hatchery Association Chinook Salmon hatchery to provide electrical power for the water treatment plant and hatchery.

### DNR/DMLW Feasibility Comments

The City of Craig will need to apply for a Permit to Appropriate Water for this project and may need to apply for a Temporary Water Use Authorization if the project moves forward to the permitting stage and prior to the construction phase, respectively. The DMLW Water Resources Section recommends the applicant consult with our Southeast Office to determine specific water use authorization requirements. May also require a shorelands public lease.

### Financing Opportunities/Limitations

This proposed project does not include the construction phase. While bonds and loans are feasible for this project these funding sources would likely result in significant rate increases for consumers.

# Renewable Energy Fund: Round 9 Application Summaries



## Craig Water Treatment Plant Micro-Hydro

App #1203

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 1.07
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$297,510	\$386,000	Cost of Electricity	\$0.25/kWh
REF9 Grant Funds	\$80,000	\$0	Price of Fuel	\$3.40/Gal
Matching Funds	\$10,000	\$0	Household Energy Cost	\$7,351

### AEA Review Comments & Recommendation

**Not Recommended**

The Prince of Wales Island is an isolated grid with existing and planned hydroelectric resources. The construction of the Hiilangaay (Reynolds) Hydro is expected to be complete in the next few years. The total hydroelectric generation capacity on Prince of Wales Island will exceed the demand for many years in the future negating the need for the energy from this project. While this project's energy could be used for building heating, the energy production is low, AEA estimates it would cost approximately the same as heating fuels (benefit/cost ratio 1.07), and the projects complexities increase risk to the water system operations. Due to these reasons, this project is not recommended for funding.

Additional concerns with this project include the long pipeline, potentially damaging transient pressures, and maintaining water system operation. If the applicant pursues the project with other funds, AEA recommends conducting a feasibility study first with particular focus on the operational modeling including transient pressure analysis from the combined water/power generation system operation.

This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF regulation 3 AAC 107.645(b), and per Section 4 of the Request for Applications #16012.

# Renewable Energy Fund: Round 9 Application Summaries



## Clearwater Creek Hydropower Project: Phase II

App #1204

Standard Application

**Project Type:** Hydro

**Energy Region:** Yukon-Koyukuk Upper Tanana

**Applicant:** Alaska Power Company

**Proposed Phase(s):** Feasibility

**Applicant Type:** Utility

**Recommended Phase(s):** Feasibility

### Project Description

Feasibility for a 1000 kW new run of river hydro on Clearwater Creek serving the community of Tok, Tanacross, Tetlin, utilizing 35 cfs and 500 ft of head to approximately generate 3400 MWh of energy and displacing 1700 MWh of diesel energy (118 k gallons of fuel, 18% of existing diesel generation) annually at an estimated total project cost of 15.4 million with a projected online date of 2021. Proposed project features include a low height diversion structure, 20,000 feet of penstock, a single turgo turbine, 2 miles of access road, and 9 miles of transmission line. Alaska Power Company (APC), a subsidiary of Alaska Power & Telephone (AP&T), requests \$386,000 in AEA Renewable Energy Fund Round IX grant funding support for Phase II Feasibility / Conceptual Design activities for the Clearwater Creek hydropower project. APC proposes a match of \$100,000 in private funds supplied by AP&T / APC. The proposed project is located approximately 15 miles southwest of the community of Tok on the Tok-Cutoff Highway (Glenn Highway).

### DNR/DMLW Feasibility Comments

project involves state land. phase II involves placement of stream gauges, which may require DMLW permits. If future phases of the project are undertaken, infrastructure will require DMLW authorizations. Access is described as going through a state campground - consultation with Division of Parks early in process will be necessary.

### Financing Opportunities/Limitations

N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Clearwater Creek Hydropower Project: Phase II

App #1204

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100) 37.00
2. Matching Resources (15)		Benefit/Cost Ratio 0.74
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$15,891,000	\$15,400,000	Cost of Electricity	\$0.37/kWh
REF9 Grant Funds	\$386,000	\$0	Price of Fuel	\$3.70/Gal
Matching Funds	\$100,000	\$0	Household Energy Cost	\$7,963

### AEA Review Comments & Recommendation

### Did Not Pass Stage 2

The primary concerns for this project relate to the need for power and the timing and quantity of hydroelectric resources including the Yerrick Creek project. At this stage quantifying the resource potential and understanding the Yerrick Creek resource better through stream flow measurements is recommended before undertaking environmental resource studies on Clearwater Creek.

AEA performed an analysis of the combined Yerrick Creek and Clearwater Creek projects with dispatch priority given to Yerrick and load growth considered. The results indicated that about 1.7 GWh (in 2021) could be utilized to offset diesel generation because of the limits of demand.

Overall, the project may be viable but improved reconnaissance analysis should be included in future applications with technical and conceptual development followed by focused environmental studies.

AEA scored this project assuming a recommendation for partial funding for stream gauging (tasks 2 and 3, \$69k total cost), however the project did not pass minimum stage 2 score of 40 points. The primary reason for not passing stage 2 is the low benefit cost ratio of 0.74.

This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.

# Renewable Energy Fund: Round 9 Application Summaries



## Neck Lake Hydropower Project: Phases II-III

App #1205

Standard Application

**Project Type:** Hydro

**Energy Region:** Southeast

**Applicant:** Alaska Power Company

**Proposed Phase(s):** Feasibility, Design

**Applicant Type:** Utility

**Recommended Phase(s):** Feasibility, Design

### Project Description

Feasibility and design of a 124 kW new run of river hydro on Neck Lake serving the community of Whale Pass utilizing 34 cfs and 60 ft of head to approximately generate 1086 MWh of energy and displacing 300 MWh of diesel energy (24k gallons of fuel, 98% of existing diesel generation) annually at an estimated total project cost of 3.0 million with a projected online date of 2022. Proposed project features include a low height foot high diversion structure, 400 feet of 30 inch diameter penstock, multiple pumps or other type of low head turbines, 400 ft of access road, and 4 miles of transmission line upgrades. Alaska Power Company (APC), a subsidiary of Alaska Power & Telephone (AP&T), requests \$395,200 in funding for feasibility, design, and permitting activities for the Neck Lake hydropower project. APC will provide \$98,800 cash match to AEA funding. The 124 kW Neck Lake Hydroelectric Project will be located below the outlet of Neck Lake, approximately 1.5 miles southwest of the community of Whale Pass on Prince of Wales Island, Alaska. The Project will supply as much as 450,000 kilowatt hours of energy per year to the community of Whale Pass, offsetting diesel generation, which is currently the sole source of electricity for residents. The relatively high and modulated flows from the lake combined with the steep drop at the lower end of the outlet stream provide an attractive opportunity for a small run-of river hydroelectric project. The hydroelectric facilities will be designed to avoid interference with the existing salmon rearing and collection facilities operated at Neck Lake by the Southern Southeast Regional Aquaculture Association (SSRAA). A letter of support from the SSRAA is enclosed. APC conducted a reconnaissance study of the site in 2009 and determined that there is sufficient potential to almost always provide enough generation meeting 100% of current and future Whale Pass loads. This Project will provide clean, renewable electricity, as well as rate stabilization and lower rates for APCs Whale Pass customers. In 2014 and 2015, AP&T conducted financial and economic analysis which confirmed the economic and financial viability of this project.

### DNR/DMLW Feasibility Comments

Alaska Power Company (Alaska Power & Telephone Company) will need to apply for a Permit to Appropriate Water for this project and may need to apply for a Temporary Water Use Authorization if the project moves forward to the permitting stage and prior to the construction phase, respectively. The DMLW Water Resources Section recommends the applicant consult with our Southeast Office to determine specific water use authorization requirements. May also require a shorelands public lease.

### Financing Opportunities/Limitations

This application does include Phase III, which has final design within it. APC is capable of funding the project with a combination of private debt and equity; however, a combination of grant funds and a low interest rate are also required to make the project financially feasible.

# Renewable Energy Fund: Round 9 Application Summaries



## Neck Lake Hydropower Project: Phases II-III

App #1205

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	22.09	Stage 2 Tech & Econ Score (100)	63.17
2. Matching Resources (15)	11.00	Benefit/Cost Ratio	1.21
3. Stage 2 Feasibility (20)	7.72		
4. Project Readiness (5)	2.50	<b>Project Rank</b>	
5. Benefits (15)	6.38	Statewide (of 38 Standard applications)	15
6. Local Support (5)	3.00	Regional (of all applications)	5
7. Sustainability (5)	3.00	Stage 3 Ranking Score (100)	55.69
Total Stage 3 Score (100)	55.69		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$3,019,975	\$3,016,475	Cost of Electricity	\$0.61/kWh
REF9 Grant Funds	\$395,200	\$395,200	Price of Fuel	\$3.50/Gal
Matching Funds	\$98,800	\$98,800	Household Energy Cost	\$9,630

### AEA Review Comments & Recommendation

### Full Funding

AP&T's reconnaissance study indicates this project may be economical despite the very low population and energy demand in Whale Pass. The application indicates that demand is expected to increase because several residents in Whale Pass lack connection to the local utility.

AEA recommends feasibility analysis to include assessment of project size and economics for offsetting heat demand and the growth potential for the community followed by design and permitting if warranted.

# Renewable Energy Fund: Round 9 Application Summaries



## False Pass Hydrokinetic Feasibility Study

App #1206

Standard Application

**Project Type:** Hydrokinetic

**Energy Region:** Aleutians

**Applicant:** City of False Pass

**Proposed Phase(s):** Feasibility

**Applicant Type:** Local Government

**Recommended Phase(s):** Feasibility

### Project Description

The City of False Pass requests Alaska Energy Authority (AEA) funding in the amount of \$440,319 through the Renewable Energy Fund Round IX program (RFA 16012) to complete Phase II Feasibility Analysis and Conceptual Design for the False Pass Tidal Energy Project proposed for the Isanotski Strait. The City of False Pass, like most communities of the Aleutian Islands, has very high energy costs and depends completely on diesel fuel to meet their electricity and heating needs. While diesel fuel is currently the most practical option for such communities, it also creates economic, energy security and environmental problems it has a disproportionately high carbon dioxide (CO<sub>2</sub>) output compared to other power generation systems at both local and global levels. The City of False Pass, fortunately, is situated near a significant hydrokinetic (tidal) resource at the Isanotski Strait that offers a potential to significantly reduce, or eliminate the use of diesel fuel. Circulation modeling conducted by University of Alaska Anchorage shows False Pass as a premier tidal energy resource, having the strongest tidal energy resource measured in Alaska. The City seeks to lower its very high cost of energy by utilizing this resource and proposes the False Pass Tidal Energy Project. The completed Project will be the first commercial installation of a tidal hydrokinetic power system in the state of Alaska and is a key part of our quest for sustainability. In addition, the Project will benefit local industry by selling excess energy to the expanded Bering Pacific Seafood plant. This Phase II proposal follows the successful completion of the AEA-funded Phase I Reconnaissance research, which proved a significant tidal energy resource in the Isanotski Strait. This Project proposes to build on this work, thereby accelerating development of the False Pass Tidal Energy Project. The Project Team has previously worked together and is comprised of the City of False Pass; Aleutian Pribilof Islands Community Development Association (APICDA); University of Alaska Anchorage (UAA); Benthic GeoScience, Inc.; and ORPC Alaska, LLC (ORPC).

### DNR/DMLW Feasibility Comments

Feasibility study and conceptual design of potential hydrokinetic energy involves State submerged lands. This project involves mooring placement of ORPC TidGen devices and associated cables, which may require DMLW authorizations.

### Financing Opportunities/Limitations

N/A

# Renewable Energy Fund: Round 9 Application Summaries



## False Pass Hydrokinetic Feasibility Study

App #1206

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 0.13
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$502,819	\$6,300,000	Cost of Electricity	\$0.42/kWh
REF9 Grant Funds	\$440,319	\$0	Price of Fuel	\$4.39/Gal
Matching Funds	\$62,500	\$0	Household Energy Cost	\$8,145

### AEA Review Comments & Recommendation

**Not Recommended**

AEA is currently considering a change to an existing Renewable Energy Fund grant to ORPC allowing a requested location move of the round 4 REF award for Cook Inlet TidGen Project to False Pass for feasibility, conceptual design, final design, permitting and construction of a TidGen tidal hydrokinetic device. The scope of work for the existing grant overlaps with this REF round 9 requested funding for the feasibility phase, and is therefore not recommended.

A round 9 application was also received and recommended by AEA to conduct a hydroelectric feasibility study and conceptual design for a run-of-river hydroelectric for Unga Man Creek, which has the potential to meet most of the electric needs of False Pass. The REF process allows for simultaneous funding of feasibility studies for competing projects, but will ultimately not fund two construction-phase projects that serve the same need (RFA 16012, Section 4, Stage 3, Criteria 8). AEA recommends allowing for controlled development of both the hydro and hydrokinetic projects through the feasibility stage to determine which project or combination of projects is most cost effective and provides the greatest public benefit for the community. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.

# Renewable Energy Fund: Round 9 Application Summaries



## Yerrick Creek Hydropower Project: Construction

App #1207

Standard Application

**Project Type:** Hydro

**Energy Region:** Yukon-Koyukuk Upper Tanana

**Applicant:** Upper Tanana Energy, LLC. UTE

**Proposed Phase(s):** Construction

**Applicant Type:** IPP

**Recommended Phase(s):** Construction

### Project Description

The proposed project includes construction of a 1500 kW new run of river hydro on Yerrick Creek serving the communities of Tok, Tanacross, Tetlin, and Dot Creek utilizing 60 cfs and 460 ft of head to generate approximately 3,450 MWh of energy and displace 3450 MWh of diesel energy (240 k gallons of fuel, 37% of existing diesel generation) annually at an estimated total project cost of \$21 million with a projected start date of 2019. Proposed project features include a 10 foot high diversion structure, 15,000 feet of 36-42 inch diameter penstock, turbines, 3 miles of access road, and 5 miles of transmission line. The applicant estimates that the project will provide 4.9 GWH of energy. Tok and surrounding communities in the upper Tanana region (Tok, Tanacross, Tetlin, Dot Creek) are currently dependent upon 100% diesel-fired generation of electricity. Construction of project features (transmission) has already begun through the support of USDA funds. Applicants are requesting \$4 million through the AEA REF IX program. It is estimated that this level of funding support by the State of Alaska, in conjunction with \$500,000 in new USDA Renewable Energy for America Program (REAP) funds awarded to the project in September of 2015, will result in a project which produces clean energy at less than the cost of diesel fuel, which will allow for project approvals by the regulatory commission of Alaska (RCA). Tanacross Inc., the Native Village of Tanacross, and Alaska Power & Telephone (AP&T) signed a Memorandum of Understanding expressing willingness to work cooperatively on the Yerrick Creek project in August of 2014. The three entities established a new venture named Upper Tanana Energy (UTE) to develop, own, and operate the project as an independent power producer (IPP). As a project partner, AP&T has drafted and will finalize and execute PPA terms and other commercial agreements after project financing is secured. Yerrick Creek is located on private and State lands and has received a non-jurisdictional determination from the Federal Energy Regulatory Commission (FERC), making it possible to develop this low-impact hydropower project in a timely fashion without undergoing lengthy federal permitting processes through FERC. In 2015, UTE installed several stilling wells on Yerrick Creek at the request of ADF&G to record subsurface flow and for stream gaging. In addition, 5.3 miles of new transmission line was installed from Tok toward the project. An additional 5 miles of upgraded transmission line will still need to be funded.

### DNR/DMLW Feasibility Comments

Some of the infrastructure will be on state land and require DMLW easements or leases and material site designation. In spring 2015, APT was issued a permit for hydro data collection. On October 8th 2015, APT submitted updated development plans to compliment previously submitted easement and material sale applications. These applications had been closed out in 2013 due to lack of response by the applicant. updated plans will need review and full Best Interest Finding adjudication prior to to be applicant's proposed construction start date in start date inreviewed and applications fully adjudicated, as applicant proposes construction to begin in summer 2016.

### Financing Opportunities/Limitations

UTE and its partners are capable of funding the project with a combination of private debt and equity; however, a combination of grant funds and a low interest rate are also required to make the project financially feasible.

# Renewable Energy Fund: Round 9 Application Summaries



## Yerrick Creek Hydropower Project: Construction

App #1207

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	18.27	Stage 2 Tech & Econ Score (100)	57.17
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	1.23
3. Stage 2 Feasibility (20)	5.72		
4. Project Readiness (5)	1.67	<b>Project Rank</b>	
5. Benefits (15)	7.13	Statewide (of 38 Standard applications)	14
6. Local Support (5)	5.00	Regional (of all applications)	1
7. Sustainability (5)	3.33	Stage 3 Ranking Score (100)	56.12
Total Stage 3 Score (100)	56.12		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$20,675,000	\$20,744,264	Cost of Electricity	\$0.37/kWh
REF9 Grant Funds	\$4,000,000	\$3,925,000	Price of Fuel	\$3.70/Gal
Matching Funds	\$15,000,000	\$14,718,750	Household Energy Cost	\$7,963

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

UTE applied for grant funding in round 8 and was recommended for funding after reconsideration. AEAs concern in round 8 primarily related to an incomplete design and limited hydrology data. AEA still has the same concerns with the round 9 application but is recommending the project for award due in large part to the expectation that outstanding deficiencies will be addressed in the near future (AEA performed a detailed evaluation using more conservative hydrology information and found that the project is still economically viable).

In the last year UTE was awarded a USDA grant that will provide the matching funds allowing them to use the outstanding round 7 award and APT has advanced the project further by extending transmission lines from Tok to Tanacross and conducting additional hydrology work with the installation of stage recorders at 3 locations on Yerrick Creek.

As a condition of award, UTE is still required to address the deficiencies noted in round 8 and it is expected the round 7 award will be utilized for this purpose. The outstanding deficiencies include providing complete design drawings (the current drawings are not complete) including addressing the intake geotechnical conditions, hydraulic design, and winter operation and also performing additional stream and hydrology analysis to verify the economic feasibility of the project and optimize hydraulic capacity and turbine selection.

UTEs application is recommended for full funding conditioned on UTE completing the work above and providing a complete design and permit package generally conforming with AEAs best practices and including a one line electrical drawing of existing and proposed electric system, property boundary drawing for existing and proposed with a proposed boundary description and generally conforming with FERC Exhibit G requirements, project engineering drawings generally conforming with industry standards and FERC Exhibit F requirements, and a design report with calculations and other information pertinent to the project design generally in conformance with industry standards and FERC requirements.

Election District: C-6 Eielson/Denali/Upper Yukon/Border

# Renewable Energy Fund: Round 9 Application Summaries



## Ketchikan High School Biomass Boiler Construction

App #1208

Heat Application

**Project Type:** Biomass

**Energy Region:** Southeast

**Applicant:** Ketchikan Gateway Borough

**Proposed Phase(s):** Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Construction

### Project Description

Ketchikan Gateway Borough seeks to modify install a containerized, 2,460-MBH biomass-fired boiler at the Ketchikan High School. The woody biomass fired boiler will be installed to replace heating oil boilers, which will become more costly to maintain. The project will include construction of the biomass system, including storage bin, collection bin, motors, fans, controls, circulation pumps, accumulator tanks and valves.

### DNR/DMLW Feasibility Comments

No impacts to state land.

### DNR/DOF Feasibility Comments

This project was reviewed for the Round 8 application period. This project is for construction of pellet/biomass fired boilers for the Ketchikan High School. Although the square footage serviced remains the same, the wood requirement has been revised downward from 1,049 tons of pellets annually to 708 tons per year. Currently the Federal Government, Forest Service and City of Ketchikan have pellet boilers in service so a reliable supply chain should be well established in this area.

### Financing Opportunities/Limitations

The Ketchikan Gateway Borough has the ability to seek bond funding for this project, subject to the acceptance of the Assembly and School Board and a successful vote by the public during the general election or a special election. Historically, a project of this nature likely would have qualified for bond funding reimbursed at a rate of up to 70% by the State of Alaska Department of Education and Early Development: the State of Alaska's fiscal condition limits the ability for the Ketchikan Gateway Borough d/b/a KGBSD to secure this funding. Nonetheless, the Ketchikan Gateway Borough is committed to aggressively seeking other financing options where available.

# Renewable Energy Fund: Round 9 Application Summaries



## Ketchikan High School Biomass Boiler Construction

App #1208

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	14.21	Stage 2 Tech & Econ Score (100)	82.67
2. Matching Resources (15)	0.00	Benefit/Cost Ratio	1.33
3. Stage 2 Feasibility (20)	14.22		
4. Project Readiness (5)	4.00	<b>Project Rank</b>	
5. Benefits (15)	8.50	Statewide (of 14 Heat applications)	11
6. Local Support (5)	3.00	Regional (of all applications)	7
7. Sustainability (5)	4.33	Stage 3 Ranking Score (100)	48.27
Total Stage 3 Score (100)	48.27		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$1,409,458	\$1,365,890	Cost of Electricity	\$0.10/kWh
REF9 Grant Funds	\$1,251,000	\$1,251,000	Price of Fuel	\$3.28/Gal
Matching Funds	\$00	\$00	Household Energy Cost	\$6,194

### AEA Review Comments & Recommendation

### Full Funding

The Ketchikan Gateway Borough requests funding for the construction of a pellet fueled biomass heating system for the Ketchikan High School. The project is estimated to displace 89,146 gallons of fuel/year. The Ketchikan Gateway Borough received funding through the US Forest Service to complete the design of this system. They have demonstrated their capability with the installation, operation, and maintenance of pellet systems through their library installation. = The Borough is completing the construction of a pellet boiler for the airport complex, with funding through the Renewable Energy Fund – Round 7. = Ketchikan is an example of the effective use of pellet heating to stem the conversions to resistance heating that are occurring due to the low cost of hydroelectric generation.

Recommend full funding for construction with the requirements that AEA must review and accept the final engineering design and the final business/operational plan.

## Renewable Energy Fund: Round 9 Application Summaries



### Ketchikan Schools Recreation Central Heating Plant

App #1209

Heat Application

**Project Type:** Biomass

**Energy Region:** Southeast

**Applicant:** Ketchikan Gateway Borough

**Proposed Phase(s):** Feasibility, Design

**Applicant Type:** Local Government

**Recommended Phase(s):** Feasibility

#### Project Description

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The proposed project is a feasibility study and design of a central biomass boiler plant to serve the Schools/Recreation complex consisting of Schoenbar Middle School, Valley Park School, the Gateway Recreation Center/Aquatic Center, and the Ketchikan Gateway Borough School District Maintenance Facility. The total project area is roughly 207,000 square feet of building space.

#### DNR/DMLW Feasibility Comments

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No impacts to state land.

#### DNR/DOF Feasibility Comments

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This project was reviewed for the Round 8 application period. This project is similar to the above project 1208 because it is a conversion to pellet boilers from fuel oil. This project is for feasibility and design of a larger scale system that will supply heat to a variety of Gateway Borough owned buildings from a central installation. It is estimated that 2,203 tons of pellets would be required annually at a price of about \$300.00 per ton. Currently the Federal Government, Forest Service and City of Ketchikan have pellet boilers in service so delivered prices as well as a reliable supply chain should be well established in this area.

#### Financing Opportunities/Limitations

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N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Ketchikan Schools Recreation Central Heating Plant

App #1209

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	14.21	Stage 2 Tech & Econ Score (100)	62.00
2. Matching Resources (15)	0.00	Benefit/Cost Ratio	0.00
3. Stage 2 Feasibility (20)	7.33		
4. Project Readiness (5)	5.00	<b>Project Rank</b>	
5. Benefits (15)	1.75	Statewide (of 14 Heat applications)	13
6. Local Support (5)	3.00	Regional (of all applications)	9
7. Sustainability (5)	4.33	Stage 3 Ranking Score (100)	35.63
<b>Total Stage 3 Score (100)</b>	<b>35.63</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$220,000	\$2,600,000	Cost of Electricity	\$0.10/kWh
REF9 Grant Funds	\$220,000	\$40,000	Price of Fuel	\$3.28/Gal
Matching Funds	\$00	\$00	Household Energy Cost	\$6,194

### AEA Review Comments & Recommendation

### Partial Funding

The Ketchikan Gateway Borough requests funding for the feasibility and design of a pellet fueled biomass heating system for five buildings: Schoenbar Middle School, Valley Park School, the Gateway Recreation/Aquatic Centers (two buildings) and the School District Maintenance Facility. The project is estimated to displace up to 95% of their current annual heating fuels - 75,000 gallons of fuel oil and 4,542,000 kWh.

The Ketchikan Gateway Borough received funding through the US Forest Service to complete the design of the Ketchikan High School and have requested construction funding. They have demonstrated their capability with the installation, operation, and maintenance of pellet systems through their library installation. The Borough is completing the construction of a pellet boiler for the airport complex with funding through the Renewable Energy Fund – Round 7. Ketchikan is an example of the effective use of pellet heating to stem the conversions to resistance heating that are occurring due to the low cost of hydroelectric generation.

Although the economics of this project are challenging, there are opportunities in the feasibility phase to identify an economically viable option. The project scores low in the REF economics evaluation because there is no value assigned to displacing hydro power so 95 percent of displacement at the aquatic center is not counted in the calculation of economics score.

Recommend partial funding of \$40,000 for a feasibility study.

## Renewable Energy Fund: Round 9 Application Summaries



### Chugach Electric Association Evaluation of a Community Solar Project

App #1210

Standard Application

**Project Type:** Solar

**Energy Region:** Railbelt

**Applicant:** Chugach Electric Association, Inc.

**Proposed Phase(s):** Feasibility

**Applicant Type:** Utility

**Recommended Phase(s):** Feasibility

#### Project Description

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The proposed project is to for a feasibility study, conceptual design and cost estimate to evaluate the potential for a small scale solar energy project in Anchorage. If feasible, Chugach has land available for an array of solar panels; the location proximate to Chugach's system will allow for easy interconnection.

#### DNR/DMLW Feasibility Comments

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The Rural Energy grant should have no impacts to state land. It is for solar photovoltaic panels to be placed on the Chugach Electric Campus at 5601 Electron Drive which they own. If the grant is carried out as described in the application, the Chugach Electric would not need any DNR authorizations.

#### Financing Opportunities/Limitations

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N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Chugach Electric Association Evaluation of a Community Solar Project

App #1210

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	8.61	Stage 2 Tech & Econ Score (100)	59.67
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	0.36
3. Stage 2 Feasibility (20)	6.56		
4. Project Readiness (5)	4.33	<b>Project Rank</b>	
5. Benefits (15)	0.38	Statewide (of 38 Standard applications)	22
6. Local Support (5)	5.00	Regional (of all applications)	2
7. Sustainability (5)	5.00	Stage 3 Ranking Score (100)	44.87
Total Stage 3 Score (100)	44.87		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$200,000	\$1,814,049	Cost of Electricity	\$0.16/kWh
REF9 Grant Funds	\$100,000	\$50,000	Price of Fuel	\$1.19/Gal
Matching Funds	\$100,000	\$50,000	Household Energy Cost	\$3,751

### AEA Review Comments & Recommendation

### Partial Funding

Chugach Electric's application for a 500kW solar garden project is recommended for funding at 50% of the requested level. The applicant requested a \$100,000 grant to match \$100,000 in a cash contribution from Chugach Electric. However, AEA has determined that the applicant should be able to complete the proposed feasibility study, conceptual design and cost estimate for \$100,000. If the grant is awarded, the scope will reference the phase 2 Feasibility Analysis and Conceptual Design Requirements described in Section 2.2.4 of the Round 9 Request For Applications.



## Sitka Wastewater Treatment Plant Effluent Heat Pump

App #1211

Heat Application

**Project Type:** HeatRecovery, HeatPump

**Energy Region:** Southeast

**Applicant:** City and Borough of Sitka

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design, Construction

### Project Description

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The proposed project would design and construct a heat pump system to replace the existing fuel oil boilers at the Sitka Wastewater Treatment Plant (WWTP). The system would utilize treated effluent as the heat source, and the heat pump would be powered by renewable energy from Sitka's hydroelectric power generation. One fuel-oil boiler would be retained to generate heat on the coldest winter days and to provide redundancy. The system would displace approximately 95 percent of the heating oil usage at the WWTP.

### DNR/DMLW Feasibility Comments

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No impacts to state land.

### Financing Opportunities/Limitations

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If CBS wanted to conduct non-AEA-eligible HVAC improvements at the WWTP, or if AEA funding proved to be insufficient, we have access to an ADEC loan for \$2,832,500. See Attachment 6.

# Renewable Energy Fund: Round 9 Application Summaries



## Sitka Wastewater Treatment Plant Effluent Heat Pump

App #1211

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	16.04	Stage 2 Tech & Econ Score (100)	72.50
2. Matching Resources (15)	11.00	Benefit/Cost Ratio	1.13
3. Stage 2 Feasibility (20)	10.83		
4. Project Readiness (5)	4.50	<b>Project Rank</b>	
5. Benefits (15)	5.50	Statewide (of 14 Heat applications)	6
6. Local Support (5)	4.00	Regional (of all applications)	4
7. Sustainability (5)	4.50	Stage 3 Ranking Score (100)	56.37
<b>Total Stage 3 Score (100)</b>	<b>56.37</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$795,421	\$826,067	Cost of Electricity	\$0.16/kWh
REF9 Grant Funds	\$667,000	\$667,000	Price of Fuel	\$3.51/Gal
Matching Funds	\$113,000	\$113,000	Household Energy Cost	\$6,991

### AEA Review Comments & Recommendation

### Full Funding

The proposal to use wastewater effluent as a source for a heat pump system is a compelling use of an otherwise unused heat source, and could serve as a model for similar systems in other parts of the state. The high temperature and availability of effluent would result in a higher heat pump coefficient of performance (COP) than seen in other heat pump installations in the state. This project has been recommended for funding in the past two years.

Full funding recommended.



## Cosmos Hills Hydroelectric Design & Permitting

App #1212

Standard Application

**Project Type:** Hydro

**Energy Region:** Northwest Arctic

**Applicant:** NANA Regional Corporation

**Proposed Phase(s):** Design

**Applicant Type:** IPP

**Recommended Phase(s):** Design

### Project Description

Design and permitting of a 700 kW run of river hydro on the Kogoluktuk River serving the communities of Ambler, Shungnak, and Kobuk utilizing 170 cfs and 64 ft of head to generate approximately 5,410 MWh of energy and displace 2,900 MWh of diesel energy (212,000 gallons of fuel, 95% of existing diesel generation) annually at an estimated total project cost of \$51 million with a projected start date of 2021. Proposed project features include a 10 foot high diversion structure, 4300 feet of 72 inch diameter insulated above grade penstock, a single kaplan turbine, 7 miles of access road, and 6 miles of transmission line to Kobuk and 25 mile of transmission intertie connecting Shungnak to Ambler. After evaluation of the potential hydropower sources in the Cosmos Hills, as documented in the Feasibility Study and Conceptual Design Report, project stakeholders have chosen to move forward with design and permitting for a hydroelectric project on the Kogoluktuk River to provide renewable electric generation year round. The Kogoluktuk River has an upstream basin catchment area of approximately 424 square miles. In addition to the displaced diesel electric energy the project has significant excess energy that could be used to offset heating fuels.

### DNR/DMLW Feasibility Comments

Should this project move forward, beyond feasibility, a formal navigability determination should be requested to determine the status of the Kogoluktuk River. In a letter dated 8/20/2010 to AVEC, it was noted the navigability status of the river is currently unknown. If the river is navigable, state authorizations will be required.

### Financing Opportunities/Limitations

It is not feasible to pursue loan, bond, or other financing vehicles at this time in order to support this current phase. The NRC team is only requesting partial engineering funding from AEA. With that said, there remains the possibility of private sector financing, rural utility services loans, and other project financing vehicles that will be actively explored.

# Renewable Energy Fund: Round 9 Application Summaries



## Cosmos Hills Hydroelectric Design & Permitting

App #1212

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	35	Stage 2 Tech & Econ Score (100)	40.50
2. Matching Resources (15)	9.00	Benefit/Cost Ratio	1.08
3. Stage 2 Feasibility (20)	0.17		
4. Project Readiness (5)	2.17	<b>Project Rank</b>	
5. Benefits (15)	5.13	Statewide (of 38 Standard applications)	12
6. Local Support (5)	5.00	Regional (of all applications)	2
7. Sustainability (5)	3.00	Stage 3 Ranking Score (100)	59.46
<b>Total Stage 3 Score (100)</b>	<b>59.46</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$37,041,535	\$50,797,871	Cost of Electricity	\$0.75/kWh
REF9 Grant Funds	\$341,335	\$341,335	Price of Fuel	\$7.77/Gal
Matching Funds	\$37,200	\$37,200	Household Energy Cost	\$15,410

### AEA Review Comments & Recommendation

### Full Funding

This proposed hydro project may provide significant benefits but at a very high cost. Additional review of the feasibility study and conceptual design, with additional focus on the Kogoluktuk development, should be performed as part of the next step in development.

The project is recommended for full funding with the condition NANA and its subsidiaries hire an industry recognized consultant with relevant hydroelectric project experience to perform the development work.

# Renewable Energy Fund: Round 9 Application Summaries



## Amble Washeteria and City Office Biomass Heating System

App #1213

Heat Application

**Project Type:** Biomass

**Energy Region:** Northwest Arctic

**Applicant:** City of Amble

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design, Construction

### Project Description

In 2013-2014, the Northwest Arctic Borough, through funding provided by the AEA Renewable Energy Fund, contracted with Tetra Tech, Inc. and Dowl HKM to complete a biomass feasibility study and initial engineering design for the Upper Kobuk villages of Amble, Shungnak and Kobuk. The study focused on identifying woody biomass feedstock availability, availability of local woodcutters, site surveys of viable project locations, heating demand, conceptual design for each proposed project, and a review of permitting requirements. This study concluded that Amble's City Office/Washeteria building offered the best opportunity in the region to integrate biomass heating into an existing community facility. The proposed project will build from this initial work to complete the design and construction of a biomass heating system to serve the City Office/Washeteria in Amble. Specifically, this project will install a prefabricated, containerized cordwood boiler and wood storage area adjacent to the City Office/Washeteria. Biomass heating will be integrated into the end user building using circulating glycol heat transfer loops from the containerized biomass boiler. The estimated heating oil reduction resulting from this biomass project is 3,516 gallons per year.

### DNR/DMLW Feasibility Comments

no DMLW authorizations required for facilities, based on application statement that facilities targeted in this application will be sited entirely on City property. Application notes that biomass resource study of surrounding lands was conducted to address availability of resource, but application does not specify if any of the biomass resource area is cited on state land, Native Corp land, etc. If biomass is located on state lands, state resource sales would be needed.

### DNR/DOF Feasibility Comments

This project is for design and construction of a biomass heating system to heat the City Hall and washeteria it was previously reviewed for the Round 8 application period. A manually fed cordwood boiler would be installed in a prefabricated building. It is estimated that 30 cords annually would be needed at a price of \$210.00/cord. This amount and price is unchanged from the Round 8 submittal. Resource availability has been previously examined by the Tanana Chiefs Conference Forestry Program. A detailed inventory report was written that provides a preliminary assessment of the biomass energy resources within a 25-mile radius of Amble. A significant volume was available indicating that the 30 cords can be harvested relatively close to the village. A detailed harvest plan will be written as part of this proposal. This harvest plan should answer resource sustainability and harvest location concerns.

### Financing Opportunities/Limitations

The community has not expressed interest in applying for financing for this project at this time.

# Renewable Energy Fund: Round 9 Application Summaries



## Amblor Washeteria and City Office Biomass Heating System

App #1213

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	26.03	Stage 2 Tech & Econ Score (100)	49.17
2. Matching Resources (15)	9.00	Benefit/Cost Ratio	1.06
3. Stage 2 Feasibility (20)	3.06		
4. Project Readiness (5)	2.50	<b>Project Rank</b>	
5. Benefits (15)	5.00	Statewide (of 14 Heat applications)	9
6. Local Support (5)	5.00	Regional (of all applications)	3
7. Sustainability (5)	1.17	Stage 3 Ranking Score (100)	51.75
<b>Total Stage 3 Score (100)</b>	<b>51.75</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$484,691	\$484,691	Cost of Electricity	\$0.72/kWh
REF9 Grant Funds	\$429,892	\$429,892	Price of Fuel	\$5.00/Gal
Matching Funds	\$54,799	\$54,799	Household Energy Cost	\$11,345

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

ANTHC and the City of Amblor propose the final design and construction of a cordwood fueled biomass heating system to serve the Washeteria and City Office building in Amblor. The proposed biomass heating system would be manually fed and housed in a prefabricated building. The system is anticipated to displace 3,516 gallons of heating fuel per year. The request is a continuation of a Round 2 grant, "Upper Kobuk River Biomass".

The economics of this project are marginal but there is opportunity to reduce the overall cost of the project. The design phase should focus on a lowering the cost of installation. The community must also develop an acceptable operations and maintenance plan for this project, including contingencies for staffing and wood supply.

Recommend full funding with the special provision that no construction funding be released until the final design and business/operating plan is approved.

## Renewable Energy Fund: Round 9 Application Summaries



### Eek Water System Heat Recovery

App #1214

Heat Application

**Project Type:** HeatRecovery

**Energy Region:** Lower Yukon Kuskokwim

**Applicant:** City of Eek

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design

#### Project Description

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The proposed project is for final design of a recovered heat system from the existing Alaska Village Electric Cooperative (AVEC) power plant to heat the City of Eek's water system via a circulating distribution water loop. The estimated heating fuel savings from this heat recovery system is 4,000 gallons per year.

#### DNR/DMLW Feasibility Comments

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The Rural Energy grant should have no impacts to state land

#### Financing Opportunities/Limitations

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The community is not interested in applying for financing for this project at this time.

# Renewable Energy Fund: Round 9 Application Summaries



## Eek Water System Heat Recovery

App #1214

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	28.85	Stage 2 Tech & Econ Score (100)	59.50
2. Matching Resources (15)	6.00	Benefit/Cost Ratio	1.01
3. Stage 2 Feasibility (20)	6.50		
4. Project Readiness (5)	3.50	<b>Project Rank</b>	
5. Benefits (15)	4.13	Statewide (of 14 Heat applications)	5
6. Local Support (5)	5.00	Regional (of all applications)	3
7. Sustainability (5)	5.00	Stage 3 Ranking Score (100)	58.97
<b>Total Stage 3 Score (100)</b>	<b>58.97</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$319,394	\$311,394	Cost of Electricity	\$0.65/kWh
REF9 Grant Funds	\$308,311	\$50,000	Price of Fuel	\$6.53/Gal
Matching Funds	\$3,083	\$500	Household Energy Cost	\$12,572

### AEA Review Comments & Recommendation

### Partial Funding

The proposed heat recovery system has the potential to offset a significant amount of heating oil. As proposed, however, the project demonstrates marginal economic value. AEA believes that cost saving measures can be identified during the final design phase that can significantly improve the project economics.

AEA recommends funding only the design phase to allow for improved construction cost estimates prior to funding the construction phase. Requested design cost of \$68,262 (21% of total project cost) is higher than expected based on the complexity of the project. Partial funding of \$50,000 is recommended for final design phase only.

# Renewable Energy Fund: Round 9 Application Summaries



## Huslia Water System and Clinic Biomass Boiler Project

App #1215

Heat Application

**Project Type:** Biomass

**Energy Region:** Yukon-Koyukuk Upper Tanana

**Applicant:** City of Huslia

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design

### Project Description

In 2013, AEA provided REF for initial planning and conceptual design of a biomass heating system to serve community buildings in Huslia. Huslia partnered with ANTHC to engineer a conceptual design and to develop a draft biomass operations plan. In addition, ANTHC contracted with Tanana Chiefs Conference to complete an Assessment of Woody Biomass Resources for Huslia, which provides local wood resource harvesting guidance. The proposed project will build on this initial work to complete the design and construction of a biomass heating system to serve the Health Clinic and Washeteria/Water Treatment Plant in Huslia. The proposed project will install a prefabricated, containerized cordwood boiler and cordwood storage area adjacent to the Clinic and Washeteria. Biomass heating will be integrated using circulating glycol heat transfer loops from the containerized biomass boiler. The estimated heating oil reduction resulting from this biomass project is 8,474 gallons per year.

### DNR/DMLW Feasibility Comments

Infrastructure is not on state land, and most biomass resource proposed for use is not state-owned; however, reports cited in application note potential for some state-owned biomass resource. If state timber resources are planned for harvest, state timber sales will be required.

### DNR/DOF Feasibility Comments

This project was reviewed for the Round 8 application period. No changes for wood requirement have been made in the current application (approximately 77 cords per year) or delivered price (\$300/cord). This project is for design and construction of a biomass heating system to heat the Health Clinic and Washeteria/Water Treatment Plan. A manually fed cordwood boiler would be installed in a prefabricated building. Resource availability has been previously examined by the Tanana Chiefs Conference Forestry Program. A detailed inventory report was written that provides a preliminary assessment of the biomass energy resources within a 25-mile radius of Huslia. A significant volume was available indicating that the 77 cords can be harvested relatively close to the village. A detailed harvest plan will be written as part of this proposal. This harvest plan should answer resource sustainability and harvest location concerns.

### Financing Opportunities/Limitations

The community has not expressed interest in applying for financing for this project at this time.

# Renewable Energy Fund: Round 9 Application Summaries



## Huslia Water System and Clinic Biomass Boiler Project

App #1215

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	31.65	Stage 2 Tech & Econ Score (100)	44.67
2. Matching Resources (15)	6.00	Benefit/Cost Ratio	0.72
3. Stage 2 Feasibility (20)	1.56		
4. Project Readiness (5)	3.00	<b>Project Rank</b>	
5. Benefits (15)	1.75	Statewide (of 14 Heat applications)	8
6. Local Support (5)	5.00	Regional (of all applications)	3
7. Sustainability (5)	3.83	Stage 3 Ranking Score (100)	52.79
<b>Total Stage 3 Score (100)</b>	<b>52.79</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$526,108	\$496,526	Cost of Electricity	\$0.61/kWh
REF9 Grant Funds	\$491,610	\$53,116	Price of Fuel	\$6.50/Gal
Matching Funds	\$4,916	\$531	Household Energy Cost	\$13,795

### AEA Review Comments & Recommendation

### Partial Funding

ANTHC and the City of Huslia proposed the Final Design and Construction of a manually fed cordwood heating system to serve the Health Clinic and Washeteria/Water Treatment Plant in Huslia, Alaska. The project is estimated to save the Clinic and Water Treatment Plant 8,474 gallons of heating oil per year.

The economics of this project are challenging, but there has been significant community involvement in the initial planning of the fuel supply. The community champion has attended biomass workshops and is knowledgeable of the proposed system.

Recommend partial funding of \$53,116 to complete the design phase only and work to improve the economics of the project.

# Renewable Energy Fund: Round 9 Application Summaries



## Shungnak Wind-Diesel Conceptual Design

App #1216

Standard Application

**Project Type:** Wind

**Energy Region:** Northwest Arctic

**Applicant:** Native Village of Shungnak

**Proposed Phase(s):** Feasibility

**Applicant Type:** Local Government

**Recommended Phase(s):** Feasibility

### Project Description

Using the conclusions from a completed Wind Resource Data Collection Report, the Native Village of Shungnak will, with assistance from Alaska Energy Authority (AEA), initiate and complete the conceptual design process and establish an environmental baseline to successfully install a winddiesel system in the community. This includes automated controls and the equipment necessary to regulate, control and deliver reliable wind energy to the residents of the community. The project will also establish an environmental baseline and a list of permits for the projected wind turbine, in addition to associated equipment installations needed to upgrade the existing power generation and distribution system to a wind turbine-diesel engine configuration. The Native Village of Shungnak will hire and contract with WHPacific to complete the design project as well as provide management oversight of subcontracted engineering/design firms. Assuming the project progresses to construction, the consultant will also complete the Final Design and needed construction solicitation packages by collaborating with the NANA Regional Corporation, Shungnak Power Plant operator, and the Native Village of Shungnak.

### DNR/DMLW Feasibility Comments

No DMLW authorizations required based on application statement that that proposed wind tower locations are on NANA Corporation land. Application does note that the project contractor will be tasked with in- depth land ownership and authorization requirement research -if future project revisions result in state land being involved, DMLW authorizations may be required.

### Financing Opportunities/Limitations

N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Shungnak Wind-Diesel Conceptual Design

App #1216

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	35	Stage 2 Tech & Econ Score (100)	50.00
2. Matching Resources (15)	11.00	Benefit/Cost Ratio	1.04
3. Stage 2 Feasibility (20)	3.33		
4. Project Readiness (5)	4.00	<b>Project Rank</b>	
5. Benefits (15)	3.75	Statewide (of 38 Standard applications)	7
6. Local Support (5)	5.00	Regional (of all applications)	1
7. Sustainability (5)	3.67	Stage 3 Ranking Score (100)	65.75
<b>Total Stage 3 Score (100)</b>	<b>65.75</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$5,485,000	\$5,598,500	Cost of Electricity	\$0.76/kWh
REF9 Grant Funds	\$135,000	\$135,000	Price of Fuel	\$9.36/Gal
Matching Funds	\$39,000	\$39,000	Household Energy Cost	\$17,752

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

AEA believes that it is too early in the conceptual design process to lock in the EWT-52m/500kW wind turbine option, as presented by the applicant. Without an intertie to Ambler, the combined load for Shungnak and Kobuk are not large enough to support more than 400kW of wind power without designing very complex controls. The Shungnak power plant is not currently scheduled for upgrades that would facilitate variable wind energy. The most significant factor influencing the developability of this project is the recent low river levels and resultant unpredictable barge deliveries that have not happened in the past few years. The project would need to incorporate turbines, materials and construction equipment that could be mobilized through alternate methods - likely by air cargo. This might eliminate larger turbines that offer better economies of scale and would add costs that are well above existing benchmarks. In addition to the standard deliverables in AEA's wind Guidelines for Conceptual Design Reports (CDR), the applicant should address the logistical challenges that are unique to this location in the CDR. The CDR should also focus heavily on the existing diesel generation and intertie system constraints. While AEA will want to take a cautious approach to this project, the funding is to examine the feasibility of a potential wind project in a community with very high energy costs. Per the May 2015 REFAC meeting and the Round 9 request for applications, the REF program is seeking to fund a greater percentage of early project development to help communities determine if projects are feasible and economically beneficial.

AEA recommends full funding for phase 2 conceptual design phase with special provisions that the conceptual design adequately address all the factors listed above to determine the feasibility of the project prior to advancing to future phases (final design and construction). If a grant is issued, AEA will set milestones for the grantee to achieve--in order--prior to advancing to next milestones to ensure productive use of state funding should any of the challenges prove unfeasible. In the event that a go/no-go point stops the project, remaining funds will be returned to the Renewable Energy Fund, per program regulations.

Election District: T-40 Arctic

## Renewable Energy Fund: Round 9 Application Summaries



### Klawock School Biomass Fuel Boiler Project

App #1217

Heat Application

**Project Type:** Biomass

**Energy Region:** Southeast

**Applicant:** Klawock City School District

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design

#### Project Description

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This project will install a wood fired (proposed dried chips) boiler to heat the two school buildings. The wood boiler will connect to the existing heating system and dramatically reduce diesel fuel consumption. The gymnasium boiler will be decommissioned and the existing main building boilers will be used only during peak heating needs and as a backup system.

#### DNR/DMLW Feasibility Comments

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No impacts to state land.

#### DNR/DOF Feasibility Comments

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This project, for design and construction, will install a wood fired chip boiler to heat two main school buildings. The source of the chips would come from Viking Lumber located about ½ miles from the Klawock School location. It is expected that 188 tons/year of dry fuel would be required to heat the main building and gymnasium at a cost of \$22,560 (\$120.00/ton). The required amount of biomass is well within the realm of sustainability as the Tongass National Forest is stated to have an annual resource availability of 60-70 million board feet. The State of Alaska also provides timber sales which are purchased by Viking Lumber.

#### Financing Opportunities/Limitations

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Klawock is a community that struggles with financial issues. Seventy five percent of the students qualify for free and reduced lunches and illustrates the hardships in our community. Klawock School is faced with reduced budgets and to take on more financial burden (loans), it would negatively impact the programs we provide to our students.

# Renewable Energy Fund: Round 9 Application Summaries



## Klawock School Biomass Fuel Boiler Project

App #1217

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	17.18	Stage 2 Tech & Econ Score (100)	59.67
2. Matching Resources (15)	6.00	Benefit/Cost Ratio	1.38
3. Stage 2 Feasibility (20)	6.56		
4. Project Readiness (5)	1.83	<b>Project Rank</b>	
5. Benefits (15)	8.63	Statewide (of 14 Heat applications)	12
6. Local Support (5)	5.00	Regional (of all applications)	8
7. Sustainability (5)	2.67	Stage 3 Ranking Score (100)	47.86
<b>Total Stage 3 Score (100)</b>	<b>47.86</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$858,556	\$858,556	Cost of Electricity	\$0.25/kWh
REF9 Grant Funds	\$833,556	\$111,986	Price of Fuel	\$3.48/Gal
Matching Funds	\$25,000	\$13,438	Household Energy Cost	\$7,488

### AEA Review Comments & Recommendation

### Partial Funding

The Klawock City School District proposes the design and construction of a chip fueled boiler to heat two school buildings in the City of Klawock. Wood chips would be provided by the local lumber mill in Klawock that currently provides chips to the City of Craig biomass heating system. This project could replace approximately 16,200 gallons of heating fuel a year with a local fuel source.

While the economics of this project are good, the engineering will be challenging due to the site constraints. The project could benefit from a more in-depth analysis of the project and fuel storage siting, equipment layout, and equipment specifications.

Recommend partial funding of \$111,986 for the development of final design and a business/operating plan.

# Renewable Energy Fund: Round 9 Application Summaries



## Saxman Low-Rent Multifamily Air Source Heat Pump

App #1218

Heat Application

**Project Type:** HeatPump

**Energy Region:** Southeast

**Applicant:** Tlingit-Haida Regional Housing Authority (THRHA)

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Government Entity

**Recommended Phase(s):** Design, Construction

### Project Description

The Tlingit Haida Regional Housing Authority (THRHA) plans to renovate, modernize, and expand the existing Saxman Multifamily Low Rent building. THRHA requested funding for the inclusion of an air-to-water heat pump system in the renovation. This system would include a new low temperature hydronic heating system and domestic hot water tank to allow the heat pump to provide the building space heating and domestic hot water demands. If funded, this would replace the existing oil boilers and high temperature hydronic heating system. The THRHA recently completed a weatherization and interior insulation project for this building, and will be incorporating additional efficiency measures into the upcoming renovation. If the heat pump project is funded, the THRHA will install a new mechanical room in the existing walk-in crawlspace and the existing mechanical room would be converted to an ADA accessible bathroom. The heat pump project would offset the use of 100% of the oil use at the facility. The heat pump is estimated to cover 95% of the overall heating and domestic hot water demand with a seasonal efficiency of 233%. The remaining 5% (peak and during pump maintenance) of demand would be provided with electric resistance heaters. It is anticipated that the overall energy use index for the facility will drop by over 46%, from 94,000 Btu/sqft/yr to 51,000 Btu/sqft/yr through the implementation of the heat pump and low temperature hydronic system. The project will provide an estimated \$5,200 in annual energy savings for the facility at current low oil prices.

### DNR/DMLW Feasibility Comments

No impacts to state land.

### Financing Opportunities/Limitations

THRHA is an organization dedicated to providing low income housing opportunities for Southeastern Alaskans, and as such has the goal of breaking even on its annual operations, and giving as much back as possible to the residents who benefit from its services. Because of this operational mode, THRHA does not generally take on debt service for capital projects. Because of the nature of the organization, THRHA does not see where it has the ability to borrow to take on additional upfront costs for energy projects.

# Renewable Energy Fund: Round 9 Application Summaries



## Saxman Low-Rent Multifamily Air Source Heat Pump

App #1218

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	14.21	Stage 2 Tech & Econ Score (100)	60.83
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	0.93
3. Stage 2 Feasibility (20)	6.94		
4. Project Readiness (5)	4.50	<b>Project Rank</b>	
5. Benefits (15)	1.13	Statewide (of 14 Heat applications)	10
6. Local Support (5)	5.00	Regional (of all applications)	6
7. Sustainability (5)	4.17	Stage 3 Ranking Score (100)	50.95
<b>Total Stage 3 Score (100)</b>	<b>50.95</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$509,231	\$438,341	Cost of Electricity	\$0.74/kWh
REF9 Grant Funds	\$296,038	\$296,038	Price of Fuel	\$7.45/Gal
Matching Funds	\$213,193	\$213,193	Household Energy Cost	\$6,194

### AEA Review Comments & Recommendation

### Full Funding

Tlingit Haida Regional Housing Authority (THRHA), applying as a Housing Authority, requests funding in the amount of \$296,038 for the design and construction of an air-source heat pump system to offset the use of heating oil at the Saxman Low-Rent Multifamily complex for the communities of Saxman and Ketchikan. The proposed project cost is \$509,231 with THRHA supplying \$164,053 in cash match and \$62,410 in efficiency upgrade match. The applicant invested \$28,890 into the efficiency upgrade match over the past five years and completed a feasibility study that will provide the foundation for the proposed project.

Full funding is recommended.

A 65% design must be accepted by AEA prior to release of funds for items requiring long lead times. A 95% design must be accepted by AEA prior to release of funds for construction. All deliverables must be accepted by AEA prior to the release of the final 10% of funds.

# Renewable Energy Fund: Round 9 Application Summaries



## False Pass Hydroelectric Feasibility Study and Conceptual Design

App #1219

Standard Application

**Project Type:** Hydro

**Energy Region:** Aleutians

**Applicant:** City of False Pass

**Proposed Phase(s):** Feasibility

**Applicant Type:** Local Government

**Recommended Phase(s):** Feasibility

### Project Description

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Feasibility study for a 125 kW new run of river hydro on Unga Man Creek serving the community of False Pass utilizing 12 cfs and 200 ft of head to approximately generate 936 MWh of energy and displacing 540 MWh of diesel energy (43 k gallons of fuel, 85% of existing diesel generation) annually at an estimated total project cost of 4.4 million with a projected online date of 2021. Proposed project features include a low height diversion structure, 4300 feet of 20 inch diameter penstock, a single turbine, 4300 feet of access road, and associated transmission line. The City of False Pass requests funding from the Alaska Energy Authority (AEA) in the amount of \$187,000 through the Renewable Energy Grant Program for a Hydroelectric Feasibility Study and Conceptual Design of Unga Man Creek. Reconnaissance work funded by the City and performed in August 2015 suggests that Unga Man Creek may hold adequate hydro potential. This proposal will build upon recent efforts in order to confirm the viability of hydro power to reduce the community's dependence on diesel and provide a stable and renewable source of electricity. This project is consistent with the Aleutian and Pribilof Islands Regional Energy Plan. The City of False Pass believes that this project will provide significant benefits to the public and represents a relatively low risk and high value hydroelectric project.

### DNR/DMLW Feasibility Comments

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Feasibility study and conceptual design of Unga Man Creek for potential hydro involves State submerged lands within OS� 977 (DOT&PF False Pass Airport) and ADL 224133 management agreement for airport. This project involves placement of stream gauges, which may require DMLW or DOT&PF permits.

### Financing Opportunities/Limitations

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N/A

# Renewable Energy Fund: Round 9 Application Summaries



## False Pass Hydroelectric Feasibility Study and Conceptual Design

App #1219

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	18.69	Stage 2 Tech & Econ Score (100)	73.67
2. Matching Resources (15)	0.00	Benefit/Cost Ratio	1.87
3. Stage 2 Feasibility (20)	11.22		
4. Project Readiness (5)	2.50	<b>Project Rank</b>	
5. Benefits (15)	12.12	Statewide (of 38 Standard applications)	17
6. Local Support (5)	5.00	Regional (of all applications)	3
7. Sustainability (5)	3.17	Stage 3 Ranking Score (100)	52.70
<b>Total Stage 3 Score (100)</b>	<b>52.70</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$4,621,500	\$4,380,000	Cost of Electricity	\$0.42/kWh
REF9 Grant Funds	\$187,000	\$187,000	Price of Fuel	\$4.39/Gal
Matching Funds	\$33,000	\$33,000	Household Energy Cost	\$8,145

### AEA Review Comments & Recommendation

### Full Funding

The City's recent reconnaissance report on Unga Man Creek, prepared by Polarconsult, shows potential for a small run of river hydroelectric project that could potentially provide economically positive benefits. The City has completed prior phase work and is actively pursuing further development. Additionally, the proposed consultant has extensive experience in this type of work. The proposed schedule is reasonable and the recommendations to begin focused study on the hydrology and aquatic biology is appropriate. The City has started off well with this development although it is noted that the southwest sub-basin to Unga Man Creek was overlooked. AEA previously found that development to have comparable economics to Unga Creek (as opposed to Waterfall Creek) with the possible advantage of not having fisheries issues. Recommended for full funding for feasibility work that should include alternative analysis of projects such as the combined sub-basin and Unga Man project.

## Renewable Energy Fund: Round 9 Application Summaries



### Waterfall Creek Hydroelectric Construction Project

App #1220

Standard Application

**Project Type:** Hydro

**Energy Region:** Aleutians

**Applicant:** City of King Cove

**Proposed Phase(s):** Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Construction

#### Project Description

Construction of a 350 kW new run of river hydro on Waterfall Creek serving the community of King Cove utilizing 12 cfs and 470 ft of head to approximately generate 1167 MWh of energy and displacing 720 MWh of diesel energy (49 k gallons of fuel, 31% of existing diesel generation) annually at an estimated total project cost of 6.9 million with a projected online date of 2017. Proposed project features include a 20 foot high diversion structure, 4630 feet of 20 inch diameter penstock, a single pelton turbine, and 5000 feet of access road. This facility will be a working partner to the City's existing and highly successful Delta Creek hydroelectric project, which has been operating for the last eighteen years.

#### DNR/DMLW Feasibility Comments

Not on State Land. No SCRO involvement but may require water rights certificate from DMLW Water Section.

#### Financing Opportunities/Limitations

The City of King Cove has in place a loan from the Alaska Municipal Bond Bank that will provide \$525,000 and will borrow another \$1,000,000 (already approved) from the Bond Bank in September 2015. The City completed a loan application to AEA's Power Project Fund (PPF) an amount between \$1,300,000 and \$1,975,000, depending on the success of this RE application.

# Renewable Energy Fund: Round 9 Application Summaries



## Waterfall Creek Hydroelectric Construction Project

App #1220

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	13.89	Stage 2 Tech & Econ Score (100)	41.83
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	0.72
3. Stage 2 Feasibility (20)	0.61		
4. Project Readiness (5)	3.83	<b>Project Rank</b>	
5. Benefits (15)	0.75	Statewide (of 38 Standard applications)	25
6. Local Support (5)	5.00	Regional (of all applications)	6
7. Sustainability (5)	3.50	Stage 3 Ranking Score (100)	42.58
<b>Total Stage 3 Score (100)</b>	<b>42.58</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$6,950,000	\$6,874,498	Cost of Electricity	\$0.30/kWh
REF9 Grant Funds	\$675,000	\$675,000	Price of Fuel	\$3.32/Gal
Matching Funds	\$5,525,000	\$5,525,000	Household Energy Cost	\$6,054

### AEA Review Comments & Recommendation

### Full Funding

The Waterfall Creek project will allow the community to generate power with diesels off for a portion of the year and will lower the amount of new debt for the community to complete the project. Using grant funds, the project remains economical to the community with the increased expenditure despite AEA assumed bypass flow requirements. A Renewable Energy Fund (REF) Round 6 grant (#7060929) in the amount of \$2,600,000 was provided by AEA to fund the construction phase of the proposed project through completion. The grant application was evaluated using the grantee's expected total project cost provided at the time. The project is currently expecting higher construction costs and is seeking additional funding to complete the construction phase. AEA recommends full funding with special provisions. The applicant shall satisfy the following special provisions prior to the issuance of a subsequent grant. 1. Demonstrate site control 2. Become current on financial and progress reports 3. Amend existing grants to reflect proposed milestone and deliverables 4. Provide a work scope and budget for staff, consultants, and/or vendors to commission the integration of the new hydro with existing hydro and diesel plant. Scope shall include head to spill to energy relationship development and integration based on operational constraints and maximizing hydro generation.

# Renewable Energy Fund: Round 9 Application Summaries



## Old Harbor Hydroelectric Project –Geotechnical Study and Final Design

App #1221

Standard Application

**Project Type:** Hydro

**Energy Region:** Kodiak

**Applicant:** Alaska Village Electric Cooperative, Inc.

**Proposed Phase(s):** Design

**Applicant Type:** Utility

**Recommended Phase(s):** Design

### Project Description

Design of a 525 kW new diversion hydro on Mountain Creek (discharging to Lagoon Creek) serving the community of Old Harbor utilizing 12 cfs and 790 ft of head to approximately generate 3520 MWh of energy and displacing 850 MWh of diesel energy (96 k gallons of fuel, 100% of existing diesel generation) annually at an estimated total project cost of 9.3 million with a projected online date of 2019. Proposed project features include a 6 foot high diversion structure, 10,000 feet of 16-20 inch diameter penstock, one of two pelton turbines, 3 miles of access road, and 1 mile of transmission line. The Alaska Village Electric Cooperative (AVEC), the electrical utility provider in Old Harbor, is proposing to complete geotechnical field work and final design for a hydroelectric project in Old Harbor, Alaska. The 262 kilowatt (kW) (initial, 525 kW future) basin diversion project will be located on East Fork Mountain Creek and Lagoon Creek Tributary. The project will be capable initially of generating an average of about 2,300,000 kilowatt-hours (kWh) annually and will run year-round and meet all the existing electricity demands of the community. Power from the facility would also be used to heat the school, saving up about 8,370 gallons of diesel heating fuel annually.

### DNR/DMLW Feasibility Comments

Property is subject to EVOS/Conservation Easements. A FERC license is required for DNR to amend the conservation easement.

### Financing Opportunities/Limitations

It is important to note that all loan and bonding financing options, even those with small interest rates, will necessarily increase the customers' cost of electricity and/or heat. Since its members already pay some of the highest electric rates in the nation, AVEC therefore endeavors to complete project funding packages with grant funds. AVEC managers will explore State funding programs (such as, the Renewable Energy Fund and Community Development Block Grants) and, increasingly more important, federal grants such as the USDA's Rural Utility Service, the Tribal Clean Energy Program (with a tribal partner), and the Indian Community Development Block Grant. However, AVEC is not adverse to pursuing loans or bonds. AVEC now has an approximate total debt of \$65 Million but is not close to its mandated debt ceiling. The Board of Directors may be inclined to approve loan applications particularly if the loan would complete an otherwise nearly complete construction project budget.

# Renewable Energy Fund: Round 9 Application Summaries



## Old Harbor Hydroelectric Project –Geotechnical Study and Final Design

App #1221

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	27.75	Stage 2 Tech & Econ Score (100)	68.50
2. Matching Resources (15)	7.00	Benefit/Cost Ratio	1.38
3. Stage 2 Feasibility (20)	9.50		
4. Project Readiness (5)	3.33	<b>Project Rank</b>	
5. Benefits (15)	8.50	Statewide (of 38 Standard applications)	9
6. Local Support (5)	4.00	Regional (of all applications)	1
7. Sustainability (5)	4.50	Stage 3 Ranking Score (100)	64.59
<b>Total Stage 3 Score (100)</b>	<b>64.59</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$10,317,500	\$9,317,500	Cost of Electricity	\$0.61/kWh
REF9 Grant Funds	\$1,092,500	\$792,500	Price of Fuel	\$4.69/Gal
Matching Funds	\$57,500	\$41,711	Household Energy Cost	\$12,095

### AEA Review Comments & Recommendation

### Partial Funding

Comments from the previous round reviews centered on licensing, site control, and budget (for design and geotech). Review of the project in its current state finds that licensing risk is now low with FERC issuing a FEA in partnership with USFWS. Also, the site control issues appear on track to resolution with a complete Exhibit G and apparent willingness by all parties, including the Exxon Valdez Oil Spill Trustee Council, to issue authorization for land use. It is noted that AVEC should pay particular attention to the lease requirements of FERC in drafting leases for this project.

Previous reviews also found that the budget for the design appears excessive particularly with regard to the geotech work. This project is economically challenged and AVEC should endeavor to develop this project with potential for cost savings a priority. AEA believes remote sensing geotech investigations would be a much lower cost investigation and are likely to provide the necessary data to proceed with full design.

Recommend funding full design and partial geotech funding with the recommendation that GPR and/or seismic surveys be done prior to investing in costly helicopter supported drilling. Also, as a condition of award, AVEC will be required to provide proposed staff for AEA approval of the design and geotech work or provide an RFP and award process approved by AEA for the selection of proposed staff.



## Bethel Power Plant Heat Recovery Module Construction

App #1222

Heat Application

**Project Type:** HeatRecovery

**Energy Region:** Lower Yukon Kuskokwim

**Applicant:** Alaska Village Electric Cooperative, Inc.

**Proposed Phase(s):** Construction

**Applicant Type:** Utility

**Recommended Phase(s):** Construction

### Project Description

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Alaska Village Electric Cooperative, Inc. (AVEC) is requesting \$2,555,489 to construct a new heat recovery module at the Bethel Power Plant. The new module will isolate the generator cooling loop from the existing recovered heat distribution loop to enable expansion of the recovered heat system. The new approximately 800-square foot module and associated piping located immediately adjacent to the Bethel Power Plant will enable expansion of the existing system including future connection of exhaust heat recovery at the power plant, creating a significant increase in recovered heat available for the community. The heat recovery module will also allow expansion of the existing loop and an additional future second loop that could supply heat to the Aquatic Center and the new alcohol treatment facility currently under construction.

### DNR/DMLW Feasibility Comments

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Not on State Land. No SCRO involvement.

### Financing Opportunities/Limitations

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It is important to note that all loan and bonding financing options, even those with small interest rates, will necessarily increase the customers' cost of electricity and or heat. Since its members already pay some of the highest electric rates in the nation, AVEC endeavors to complete project funding packages with grant funds. AVEC now has an approximate total debt of \$65 M but is not close to its mandated debt ceiling.

# Renewable Energy Fund: Round 9 Application Summaries



## Bethel Power Plant Heat Recovery Module Construction

App #1222

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	24.7	Stage 2 Tech & Econ Score (100)	71.67
2. Matching Resources (15)	9.00	Benefit/Cost Ratio	2.16
3. Stage 2 Feasibility (20)	10.56		
4. Project Readiness (5)	2.00	<b>Project Rank</b>	
5. Benefits (15)	12.00	Statewide (of 14 Heat applications)	4
6. Local Support (5)	5.00	Regional (of all applications)	2
7. Sustainability (5)	2.33	Stage 3 Ranking Score (100)	65.59
<b>Total Stage 3 Score (100)</b>	<b>65.59</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$9,000,000	\$8,233,369	Cost of Electricity	\$0.45/kWh
REF9 Grant Funds	\$2,555,489	\$2,555,489	Price of Fuel	\$6.11/Gal
Matching Funds	\$283,943	\$283,943	Household Energy Cost	\$10,766

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

Bethel has ample waste heat available for recovery and numerous significant loads within a one mile radius to the powerhouse. The existing system is near the end of its useful life and an analysis of alternatives including a complete rebuild is in progress with funding through Round 8 of the Renewable Energy Fund.

This project application is the second phase of the rehabilitation of the Bethel Heat Recovery System. In this phase, the equipment to capture the heat from the cooling system of the generators will be replaced with a properly designed modular system. No additional recovered heat will be utilized as a result of this phase, but this phase is critical to the future expansion of the heat recovery system.

The economic analysis is based on the capital estimate provided by the applicant and an estimate of fuel displacement for the expansion of the heat recovery system to 10 buildings. Because this project is still in the evaluation stage, these capital and fuel displacement estimates must be refined.

Recommend full funding with the provision that the economic evaluation be rerun at the completion of the design phase. This evaluation must include total capital costs including building integration and displaced fuel for each additional building serviced by the heat recovery system. Construction funding will be released only if the benefit/cost ratio remains strong.

Election District: S-38 Lower Kuskokwim

## Renewable Energy Fund: Round 9 Application Summaries



### Shishmaref Wind Energy Feasibility and Conceptual Design Project

App #1223

Standard Application

**Project Type:** Wind

**Energy Region:** Bering Straits

**Applicant:** Alaska Village Electric Cooperative, Inc.

**Proposed Phase(s):** Feasibility

**Applicant Type:** Utility

**Recommended Phase(s):** Feasibility

#### **Project Description**

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This proposal requests \$152,000 and provides a match of \$8,000 to conduct a wind power feasibility and conceptual design project for the community of Shishmaref. The Alaska Village Electric Cooperative (AVEC), with the cooperation of the community, proposes to assess the feasibility of wind resources to provide power to Shishmaref and to prepare a conceptual design of a wind generation system.

#### **DNR/DMLW Feasibility Comments**

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The project is proposed on DOT -owned lands (1983 quitclaim deed from Shishmaref Native Corporation to DOT/PF). The application acknowledges that applicant must obtain site use authorization from DOT.

#### **Financing Opportunities/Limitations**

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N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Shishmaref Wind Energy Feasibility and Conceptual Design Project

App #1223

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	35	Stage 2 Tech & Econ Score (100)	52.50
2. Matching Resources (15)	7.00	Benefit/Cost Ratio	0.93
3. Stage 2 Feasibility (20)	4.17		
4. Project Readiness (5)	3.00	<b>Project Rank</b>	
5. Benefits (15)	1.13	Statewide (of 38 Standard applications)	13
6. Local Support (5)	5.00	Regional (of all applications)	3
7. Sustainability (5)	2.67	Stage 3 Ranking Score (100)	57.96
<b>Total Stage 3 Score (100)</b>	<b>57.96</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$2,689,400	\$2,529,400	Cost of Electricity	\$0.66/kWh
REF9 Grant Funds	\$152,000	\$152,000	Price of Fuel	\$5.91/Gal
Matching Funds	\$8,000	\$8,000	Household Energy Cost	\$15,812

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

The project is proposed in a Class 4 to 5 wind regime. The applicant, AVEC, has a long track record of operating wind projects in remote Alaska. The project scope is consistent with other wind projects and the economics are expected to improve once site-specific wind data is available. AEA recommends full funding with the provision that a US Fish & Wildlife consultation be completed before proceeding with the project.



## Mountain Village-St. Mary's Wind Intertie Project – Final Design and Construction

App #1224

Standard Application

**Project Type:** Transmission

**Energy Region:** Lower Yukon Kuskokwim

**Applicant:** Alaska Village Electric Cooperative, Inc.

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Utility

**Recommended Phase(s):** Design, Construction

### Project Description

Alaska Village Electric Cooperative, Inc. (AVEC) is seeking \$3,196,000 from this Grant Program for the construction of an electrical intertie to connect Mtn. Village to the St. Mary's/Pitka's Point Wind Energy Project. The intertie will include 16.1 miles of new 3-phase overhead power line along the existing gravel road between the St. Mary's Airport and the Mtn. Village Airport. The project will also include upgrading 4.0 miles of existing electrical distribution system near both communities from single-phase to three-phase. The existing power plant in Mtn. Village will be put into standby mode, with installation of an electric boiler to keep the existing generators warm. This intertie project will enable the community of Mtn. Village to benefit from the new wind energy system in St. Mary's /Pitka's Point.

### DNR/DMLW Feasibility Comments

Not on State Land. No SCRO involvement.

### Financing Opportunities/Limitations

It is important to note that all loan and bonding financing options, even those with small interest rates, will necessarily increase the customers' cost of electricity and/or heat. Since its members already pay some of the highest electric rates in the nation, AVEC endeavors to complete project funding packages with grant funds. AVEC managers will explore State funding programs including the Community Development Block Grant program by teaming with the City of Mtn. Village and federal grants such as the USDA's RUS and the Tribal Clean Energy Program and the Indian Community Development Block Grant with the Mtn. Village Tribe. AVEC is not adverse to pursuing loans or bonds. AVEC now has an approximate total debt of \$65 M but is not close to its mandated debt ceiling. The Board of Directors may be inclined to approve loan applications particularly if the loan would complete an otherwise nearly complete construction project budget.

# Renewable Energy Fund: Round 9 Application Summaries



## Mountain Village-St. Mary's Wind Intertie Project – Final Design and Construction

App #1224

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	28.36	Stage 2 Tech & Econ Score (100)	66.00
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	1.00
3. Stage 2 Feasibility (20)	8.67		
4. Project Readiness (5)	3.00	<b>Project Rank</b>	
5. Benefits (15)	3.75	Statewide (of 38 Standard applications)	5
6. Local Support (5)	5.00	Regional (of all applications)	1
7. Sustainability (5)	4.50	Stage 3 Ranking Score (100)	68.28
<b>Total Stage 3 Score (100)</b>	<b>68.28</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$6,400,000	\$6,196,000	Cost of Electricity	\$0.60/kWh
REF9 Grant Funds	\$3,196,000	\$3,196,000	Price of Fuel	\$6.51/Gal
Matching Funds	\$3,000,000	\$3,000,000	Household Energy Cost	\$12,362

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

The proposed project makes better use of the funding already approved for the REF 8 wind energy project. 65% design is complete on the intertie. The wind turbine proposed has a solid track record in Alaska as does the applicant as an owner and operator. AEA reduced the expected energy production due to observed icing events during the wind resource study. Recommend full funding with the special provision that the final wind turbine selection not lower the economic score.

# Renewable Energy Fund: Round 9 Application Summaries



## Grant Lake Hydroelectric Project

App #1225

Standard Application

**Project Type:** Hydro

**Energy Region:** Railbelt

**Applicant:** Kenai Hydro LLC

**Proposed Phase(s):** Design

**Applicant Type:** IPP

**Recommended Phase(s):** Design

### Project Description

Design of a 5000 kW new storage hydro on Grant Lake, located near the community of Moose Pass, serving the railbelt utilizing 385 cfs and 185 ft of head and 18,790 acre ft of storage to generate approximately 19,500 MWh of energy and displacing 19,500 MWh of natural gas energy annually at an estimated total project cost of \$59 million with a projected start date of 2020. Proposed project features include an intake structure, 3300 feet of 10 foot diameter tunnel and surge tank, two Francis turbines, 2 miles of access road and a bridge across Trail Lakes, and 3.5 miles of transmission line. The layout has been recently revised to minimize the project footprint. The current design omits the construction of a diversion structure (dam) at the outlet of Grant Lake. All 13-feet of storage that will be utilized for power generation will be drawn from below the natural lake outlet.

### DNR/DMLW Feasibility Comments

This project is on State land within the legislatively designated Kenai River Special Management Area (AS 41.21.500-41.21.514). The project appears to be incompatible with the purpose and management of KRSMA and would require legislative action to make this activity allowable. Local opposition (Kenai Peninsula Borough, City of Seward and the community of Moose pass) has been stated during the FERC review process. Site access via a crossing of the Alaska Railroad has not been obtained. DMLW has serious questions about the feasibility of this project if issues related to KRSMA and the AKRR crossing are not resolved.

### Financing Opportunities/Limitations

The total anticipated project cost is \$59,067,808. The phase III anticipated costs are \$4,875,528 and the phase III grant request is for \$4,000,000. Kenai Hydro will match the grant funds with \$725,528 of cash and \$150,000 of in-kind administrative and project management labor. Kenai Hydro has received \$2,100,000 in previous renewable energy grant funds for Phase I & II work. Homer Electric has spent or committed to spend \$3,744,000. It is anticipated that the balance of funds will come from a combination of financing, federal grants, state grants, private grants and possible legislative appropriation.

# Renewable Energy Fund: Round 9 Application Summaries



## Grant Lake Hydroelectric Project

App #1225

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	15.24	Stage 2 Tech & Econ Score (100)	56.67
2. Matching Resources (15)	10.00	Benefit/Cost Ratio	1.10
3. Stage 2 Feasibility (20)	5.56		
4. Project Readiness (5)	3.00	<b>Project Rank</b>	
5. Benefits (15)	4.13	Statewide (of 38 Standard applications)	23
6. Local Support (5)	2.00	Regional (of all applications)	3
7. Sustainability (5)	4.17	Stage 3 Ranking Score (100)	44.09
<b>Total Stage 3 Score (100)</b>	<b>44.09</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$59,067,808	\$58,936,366	Cost of Electricity	\$0.23/kWh
REF9 Grant Funds	\$4,000,000	\$4,000,000	Price of Fuel	\$2.13/Gal
Matching Funds	\$875,528	\$875,528	Household Energy Cost	\$6,643



## Grant Lake Hydroelectric Project

App #1225

Standard Application

### AEA Review Comments & Recommendation

### Full Funding

Last year the project was initially not recommended for design and permitting due a lack of a complete feasibility study. Major deficiencies included not having project concept designs and economic analysis completed sufficiently. The applicant requested and received reconsideration of AEA's initial decision. AEA accepted the appeal and the project was recommended contingent on completion of the feasibility and concept design work. However, the project was not funded due to its ranking on the recommendations list. The application this year shows significant progress on the project with concept designs (Exhibit F) and economic analysis (Exhibit D) submitted as part of the Draft License Application. The Exhibit D analysis includes avoided cost rates that are calculated by the applicant (seller), a wholly owned subsidiary of the utility (buyer), which has the sole authority to provide electric service and set tariffs for power and energy paid by the public and approved by the Regulatory Commission of Alaska (RCA). The RCA would be expected to review the proposed rate analysis and is the entity that issues approval of rates. AEA finds that the ability to contract for the sale of power at the proposed rates significant enough that funding was not recommended until Kenai Hydro obtain RCA approval of a power sales agreement and interconnection agreement or, if not necessary, demonstrate concurrence from the RCA that such agreements are unnecessary. Kenai Hydro requested reconsideration explaining that a contract was not necessary, that the project was not subject to RCA review because it was a wholly owned subsidiary of HEA, and that rates charged to HEA would fall under the existing AEECI contract with HEA or the project would merged with AEECI assets creating a blended rate. The appeal was accepted by the AEA Executive Director and staff were directed to complete project evaluation and scoring. ADNR comments regarding the Kenai River Special Management Area appear to primarily pertain to the location of the Iditarod National Historic Trail and are being addressed through the FERC licensing and NEPA process. The INHT trail and trail corridor is to have a conveyance of a 1,000-foot-wide easement to include a visual and sound buffer between the recreation corridor and adjacent uses. No permanent structures or equipment are to be placed within the trail corridor. In keeping with the management plan, the Project has provided an alternate route for the INHT easement, keeping the 1,000-foot-wide corridor away from any permanent structures and adjacent uses. Recommended for full funding contingent on providing a means for transmission of power from outside HEA service territory demonstrated by a wheeling arrangement or RCA approval to build redundant transmission infrastructure and contingent on concurrence from easement holders and management plan authorities that the proposed project is consistent with the KRSMA.



# Renewable Energy Fund: Round 9 Application Summaries



## Fivemile Creek Hydroelectric Project

App #1226

Standard Application

**Project Type:** Hydro

**Energy Region:** Copper River Chugach

**Applicant:** Chitina Electric Inc. (CEI)

**Proposed Phase(s):** Construction

**Applicant Type:** Utility

**Recommended Phase(s):** Construction

### Project Description

Construction of a 300 kW new run of river hydro on Fivemile Creek serving the community of Chitina utilizing 5 cfs and 900 ft of head to generate approximately 2,000 MWh of energy and displacing 500 MWh of diesel energy (40 k gallons of fuel, 100% of existing diesel generation) annually at an estimated total project cost of 6.6 million with a projected online date of 2019. Proposed project features include a 10 foot high diversion structure, 10,000 feet of 12-16 inch diameter penstock, a single pelton turbine, and 2,900 feet of access road. This project will serve the native community of Chitina which currently is an isolated micro grid and entirely diesel dependent. The diesel plant will function primarily as a backup system after the hydro is constructed. An electric boiler will be installed in the existing diesel module and connected to the existing hydronic heat recovery system currently utilized to heat the clinic building and the aboveground storage tank used to store diesel fuel for the diesel plant. The boiler will provide a dual purpose; provide frequency control during operation of the hydro turbine, and allow for continued utilization of the existing heat recovery system infrastructure. During most times of the year, excess water will be available beyond the community's demand. During these times, the excess energy will be available for space heating during winter months via electric boilers installed in various community buildings, residential living facilities, and commercial facilities. In the summer, when flow in Fivemile Creek is higher, there will be considerable excess energy available for commercial and industrial uses such as ice making, sawmill operation, etc.

### DNR/DMLW Feasibility Comments

Not on State Land. No SCRO involvement but may require water rights certificate from DMLW Water Section.

### Financing Opportunities/Limitations

There are a number of low-interest loan opportunities from federal and state agencies. However, CEI is a relatively small utility and the addition of substantial debt burden could endanger the financial sustainability of the utility. CEI is actively researching the possibility of utilizing federal loan programs available through USDA, DOE, and the state of Alaska. A final decision on the ability to take on debt will depend upon the terms and financial options available.

# Renewable Energy Fund: Round 9 Application Summaries



## Fivemile Creek Hydroelectric Project

App #1226

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	28.15	Stage 2 Tech & Econ Score (100)	75.67
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	1.71
3. Stage 2 Feasibility (20)	11.89		
4. Project Readiness (5)	3.00	<b>Project Rank</b>	
5. Benefits (15)	12.50	Statewide (of 38 Standard applications)	1
6. Local Support (5)	5.00	Regional (of all applications)	1
7. Sustainability (5)	4.17	Stage 3 Ranking Score (100)	79.70
<b>Total Stage 3 Score (100)</b>	<b>79.70</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$6,580,000	\$6,589,090	Cost of Electricity	\$0.71/kWh
REF9 Grant Funds	\$3,400,000	\$3,400,000	Price of Fuel	\$3.24/Gal
Matching Funds	\$2,600,000	\$2,600,000	Household Energy Cost	\$12,269

### AEA Review Comments & Recommendation

### Full Funding

Past evaluation found low economic benefit and incomplete phases as factors for not recommending additional funding. Project revisions include preparing a design build contract to overcome insufficient development funding and performing value engineering such as eliminating the intake gate and changes in the pipeline concept. In conjunction with AEA's inclusion of O&M savings from diesel off projects the economics have improved significantly and the design build approach is expected to result in a net savings and faster implementation. Recommended for full funding.

# Renewable Energy Fund: Round 9 Application Summaries



## Hoonah Waste-to-Energy Project

App #1227

Standard Application

**Project Type:** Transmission, HeatBiofuel

**Energy Region:** Southeast

**Applicant:** City of Hoonah

**Proposed Phase(s):** Feasibility, Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Construction

### Project Description

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The proposed project involves the development of a waste-to-energy facility that will use the process of anaerobic digestion (AD) to generate methane from waste water biosolids and other biomass feedstocks and then burn the methane to generate electricity. The project includes the design and construction of the AD facility, a transmission line to convey electricity to the City of Hoonah and ancillary facilities to dispose of digestate by-products. The project is being developed by the City of Hoonah, in close collaboration with the Hoonah Indian Association.

### DNR/DMLW Feasibility Comments

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May require a public easement from the state.

### Financing Opportunities/Limitations

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Our biggest challenge has been finding funding for pre-development costs. We have identified private funding for final design and construction, but this source does not cover pre-development costs. Further, the interest rates are likely to be higher and the pay back periods likely to be shorter than public funding sources. We would welcome access to low interest loan with a longer payback period.

# Renewable Energy Fund: Round 9 Application Summaries



## Hoonah Waste-to-Energy Project

App #1227

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 0.54
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$5,559,000	\$5,289,000	Cost of Electricity	\$0.59/kWh
REF9 Grant Funds	\$5,282,000	\$0	Price of Fuel	\$3.74/Gal
Matching Funds	\$277,000	\$0	Household Energy Cost	\$9,956



## Hoonah Waste-to-Energy Project

App #1227

Standard Application

### AEA Review Comments & Recommendation

**Not Recommended**

The City of Hoonah is proposing the feasibility, final design, and construction of a waste-to-energy facility that will use anaerobic digestion to generate methane from waste water biosolids and other biomass feedstocks. The methane would be burned to generate electricity for City of Hoonah buildings. The project includes the design and construction of the anaerobic digestion facility, a transmission line to convey electricity to the City of Hoonah, and ancillary facilities to dispose of digestate by-products. The bio-solids would be sourced from the City and Borough of Juneau, where CBJ is currently spending up to \$2MM annually to transport waste water treatment biosolids to the Lower 48. The project schedule states that feasibility work funded by the applicant will be complete by December 2015. There is not enough information in the application without the feasibility study to make an informed technical analysis or economic evaluation of the proposal. Per Section 2 and further detailed in sub-sections 2.2 through 2.4, AEA requires the applicant to "include sufficient information to allow for the evaluation and ranking of the application." There are many significant questions that need to be addressed in a completed feasibility study before AEA would recommend REF funding for design and construction. The proposed content of the feasibility study is comprehensive, and we look forward to evaluating this project in a future application of the Renewable Energy Fund. The following information is critical for the proper evaluation of the project: 1. Information from the RCA stating that electricity can be directly provided to the target buildings and the local utility does not need to be involved in the project. 2. Detailed analysis of the cost of generation and its impact to the community energy rates. 3. A letter of support/interest from the City and Borough of Juneau stating that they will consider this proposal for the disposal of their sewage waste. 4. Proposed disposal method and costs for the digestate. 5. Estimated capital and O&M costs for the anaerobic digestion technology, including the gas cleaning process. 6. The assumptions that resulted in the projected energy generations of 750,000 kWh/year. 7. Assessment of the impact to the local electric grid and the current generation sources of hydro and diesel, including impacts to the heat recovery system. 8. A permitting evaluation. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.



# Renewable Energy Fund: Round 9 Application Summaries



## Point McKenzie Correction Farm (PMCF) PV Solar Project

App #1228

Standard Application

**Project Type:** Solar

**Energy Region:** Railbelt

**Applicant:** State of Alaska Department of Corrections

**Proposed Phase(s):** Recon, Feasibility, Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Recon, Feasibility, Design, Construction

### Project Description

This grant application requests \$140,000 to assist in the purchase and installation of a 100.4 kW Photovoltaic Solar Energy System to supply a portion of the energy needs at the Point Mackenzie Correctional Farm (PMCF). It is estimated that this size PV system may produce 92,973 kWh annually. The stated goal of the project is to install a 100.4 kW Solar Energy System that will produce an estimated \$64,153 in electricity annually to contribute a portion of PMCF's electrical supply needs.

### DNR/DMLW Feasibility Comments

The PMCF is located on State owned, DMLW managed lands that have been assigned to the Department of Corrections for the PMCF facility (DNR's file reference is ADL 227302). Please note that Item 7 of Attachment B of the ILMA document states that "The DOC shall comply with the requirements of AS 38.95.160 during the term of this ILMA. AS 38.95.160 requires that publically financed improvements costing more than \$100,000 be documented by a recorded plat." As this request is for \$140,000, and is proposed to be located on state lands, SCRO requests that DOC coordinate the completion of this survey with DMLW. Additional questions about this requirement may be directed to Candice Snow, SCRO ILMA coordinator, at 269-5032, or [candice.snow@alaska.gov](mailto:candice.snow@alaska.gov).

### Financing Opportunities/Limitations

Will provide at a later date, additional research is needed.

# Renewable Energy Fund: Round 9 Application Summaries



## Point McKenzie Correction Farm (PMCF) PV Solar Project

App #1228

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 0.29
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$350,000	\$448,663	Cost of Electricity	\$0.17/kWh
REF9 Grant Funds	\$140,000	\$0	Price of Fuel	\$1.99/Gal
Matching Funds	\$210,000	\$0	Household Energy Cost	\$6,260



## Point McKenzie Correction Farm (PMCF) PV Solar Project

App #1228

Standard Application

### AEA Review Comments & Recommendation

**Not Recommended**

The State of Alaska Department of Corrections applied for a \$140,000 grant to fund all phases (reconnaissance, feasibility, design and construction) of a 100kW solar photovoltaic project at the Point McKenzie Correctional Farm. The Alaska Energy Authority has reviewed the application and determined that it does not meet the minimum requirements for funding. The initial application lacked sufficient information to pass stage 1 review. In a 9/23/15 e-mail, AEA gave the applicant until 9/28/15 to complete the application. A revised application was submitted, but still does not meet minimum standards. The applicant did not respond to AEA's 10/8/15 e-mail requesting additional information by 10/13/15, did not provide information regarding electric utility interconnection standards and rates, and did not provide information on projected operations and maintenance costs. The lack of utility standards and rates information is described as a common pitfall in the AEA Solar Program Best Practices Checklist. The requirement to respond in a timely manner to information requests is described in Section 4.0 of the Request for Applications. AEA also heard from the applicant's electric utility, Matanuska Electric Association (MEA), that the applicant has not contacted the utility about the proposed project. According to MEA, the project is above the 25kW threshold of a net metering project, so would require a separate contract with MEA if it is under 100kW. If it is over 100kW, it would require approval from the Regulatory Commission of Alaska. The applicant has not provided any indication that these requirements have been addressed. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.



# Renewable Energy Fund: Round 9 Application Summaries



## Knik Arm Power Plant Recycled Biomass to Power

App #1229

Standard Application

**Project Type:** Other, HeatBiofuel  
**Applicant:** Central Environmental Inc.  
**Applicant Type:** IPP

**Energy Region:** Railbelt  
**Proposed Phase(s):** Recon, Design  
**Recommended Phase(s):** Recon

### Project Description

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Knik Arm Power Plant (KAPP) provided heat and power from 1952 until it was decommissioned in 1985. Over the last decade, there have been numerous attempts to reopen energy operations at KAPP. The proposed project intends to demonstrate 400 kWe from recycled construction and demolition cellulose biomass waste at a levelized cost of \$0.05 per kWh. Power would be sold to the Alaska Railroad Corporation, Anchorage Municipal Light & Power or Chugach Electric Association. Additional benefits are an increase in recycling of construction and demolition cellulose from 75% to 90%. Other benefits stated in the application include distributed generation benefits to utilities and diversion of 1,000 tons from Alaska landfills.

### DNR/DMLW Feasibility Comments

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Review finds no SCRO involvement.

### DNR/DOF Feasibility Comments

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This project is for reconnaissance, feasibility and conceptual design of an electrical power plant that will utilize recycled construction and demolition cellulose biomass waste. No additional biomass from timber harvest operations will be required. It is anticipated that up to 2,000 tons of material will be diverted from Alaskan landfills. Biomass supply appears sustainable for this project and Central Environmental Incorporated maintains a recycling service which is able to separate out the cellulose biomass required for this project.

### Financing Opportunities/Limitations

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N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Knik Arm Power Plant Recycled Biomass to Power

App #1229

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100) 31.17
2. Matching Resources (15)		Benefit/Cost Ratio 0.42
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$3,000,000	\$3,000,000	Cost of Electricity	\$0.18/kWh
REF9 Grant Funds	\$400,000	\$0	Price of Fuel	\$1.93/Gal
Matching Funds	\$2,600,000	\$0	Household Energy Cost	\$5,594



## Knik Arm Power Plant Recycled Biomass to Power

App #1229

Standard Application

### AEA Review Comments & Recommendation

**Did Not Pass Stage 2**

Central Environmental Incorporated (CEI), Inc. requested funding for reconnaissance, feasibility and conceptual design to determine the viability of a waste to energy project in Anchorage. Construction and demolition debris currently being landfilled would be used as fuel for the plant. The plant would utilize Organic Rankine Cycle (ORC) technology to generate electricity to sell to a local utility or the Alaska Railroad Corporation. The application states that the ORC system will deliver an electrical efficiency of 18% - 20%. The review team had a number of concerns with the technical feasibility of the project: 1. The application states that there are up 2,000 tons per year of combustible materials that could be diverted from the Anchorage landfill. However, the economics were based on 4,525 tons per year of fuel. There is concern about the actual availability of the waste resource in a radius that is economically feasible. 2. Because this is an incineration project (construction & demolition debris, tires), permitting could be contentious in the Anchorage area. 3. The proposed site is an EPA brownfield site and the permitting implications are unknown. 4. The State of Alaska has supported the installation of four Organic Rankine Cycle systems, and all of the systems have performed at an efficiency significantly less than the manufacturer's claims. No actual operating data on a system achieving 18% - 20% electrical efficiency was found. 5. The review team had concerns that the technical partner, Supercritical Technologies, did not have experience in a sub-arctic environment. The company is a small start-up, with limited operational experience. The project scored low for economic viability demonstrating a benefit/cost ratio of 0.42. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.



# Renewable Energy Fund: Round 9 Application Summaries



## Kotzebue 100 Kilowatt Solar Array

App #1230

Standard Application

**Project Type:** Solar

**Energy Region:** Northwest Arctic

**Applicant:** Kotzebue Electric Association, Inc.

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Utility

**Recommended Phase(s):** Design, Construction

### Project Description

Kotzebue Electric Association (KEA) has applied for a \$384,730 grant to fund a \$449,178 100kW solar photovoltaic project at the electric utility's wind energy site. Solar PV panels provide little energy in the arctic during the winter but there is a solar resource during the shoulder seasons and Kotzebue experiences 35 days of constant daylight during the summer. The applicant states that recent declines in prices for PV panels mean that there is sufficient power produced during the spring, summer and early fall months to justify the cost of installing a solar array in Kotzebue. Using NREL's September 2014 release of PV Watts's photovoltaic modeling software, an optimized estimate of the useful power that would be produced by a solar array was prepared. KEA has successfully worked with piling systems on its wind site since 1996 using both standard and freeze-back pilings to install wind turbines. KEA's significant experience with foundations on the site will allow the use of a piling system to be used for a solar installation which will reduce design costs. The site has had three extensive geophysical surveys that will be relied upon to assist in the foundation design and help minimize costs. Inverters can be installed in the existing wind farm structures.

### DNR/DMLW Feasibility Comments

Project is not on state land. As per application, it is located on land already leased from Kikikitagrug Inupiat Corporation.

### Financing Opportunities/Limitations

KEA Financial loan covenant ratios such as Current Ratio, Equity Ratio, TIER, OTIER, and margin/revenue cannot support investment in this project without subsidization.

# Renewable Energy Fund: Round 9 Application Summaries



## Kotzebue 100 Kilowatt Solar Array

App #1230

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 0.43
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
<hr/>		
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$449,178	\$800,000	Cost of Electricity	\$0.43/kWh
REF9 Grant Funds	\$384,730	\$0	Price of Fuel	\$6.53/Gal
Matching Funds	\$64,448	\$0	Household Energy Cost	\$11,759

### AEA Review Comments & Recommendation

**Not Recommended**

Kotzebue Electric Association (KEA) has applied for a \$384,730 grant to fund a \$449,178 100kW solar photovoltaic project at the electric utility's wind energy site. AEA does not recommend funding this project for the following reasons: The application included a confusing combination of solar racking configurations: section 5.1.1 describes a dual-axis tracking array, section 5.3.1 states the panels will be south-facing, yet the array plan submitted with the application shows fixed panels oriented E, SE, S, SW, and W. The application is for final design, permitting and construction, yet did not provide the feasibility study and conceptual design information required per section 4, criteria 7 of the Request for Applications. The integration concept on p.15 of the application does not address curtailment of the solar output even though KEA currently curtails its wind output. If sufficient thermal loads are planned to allow for use of all solar output this should be described so that the economics can be properly analyzed. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.

# Renewable Energy Fund: Round 9 Application Summaries



## Kaktovik Wind Diesel Design

App #1231

Standard Application

**Project Type:** Wind

**Energy Region:** North Slope

**Applicant:** North Slope Borough

**Proposed Phase(s):** Design

**Applicant Type:** Local Government

**Recommended Phase(s):** Design

### Project Description

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The North Slope Borough (NSB) envisions an area-wide energy production and management system consisting of integrated wind-diesel generation, end-use energy efficiency, automated building controls, and conservation. The proposed project is the design and permitting phase of a three-phase project which will include construction and commissioning of three wind turbines to supplement the existing power generation and distribution system for the community of Kaktovik.

### DNR/DMLW Feasibility Comments

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The wind facility is not on state land (application notes that it is on Kaktovik Inupiat Corporation-own land); permitting list includes ADNR Coastal Zone Consistency Determination, and plans to coordinate permitting through the ADNR Office of Coastal and Ocean Management Permitting - this is outdated, as ACMP program is no longer implemented.

### Financing Opportunities/Limitations

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This application is for the design and permitting phase. When this project proceeds, bond funds will be requested from the North Slope Borough Assembly to assist in the final construction of the project. As with all projects, funding through general obligation bonds will be weighed against the other capital improvement project requiring funding in the communities across the North Slope.

# Renewable Energy Fund: Round 9 Application Summaries



## Kaktovik Wind Diesel Design

App #1231

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	14.44	Stage 2 Tech & Econ Score (100)	58.17
2. Matching Resources (15)	9.00	Benefit/Cost Ratio	0.79
3. Stage 2 Feasibility (20)	6.06		
4. Project Readiness (5)	4.00	<b>Project Rank</b>	
5. Benefits (15)	0.75	Statewide (of 38 Standard applications)	26
6. Local Support (5)	2.00	Regional (of all applications)	2
7. Sustainability (5)	4.33	Stage 3 Ranking Score (100)	40.58
<b>Total Stage 3 Score (100)</b>	<b>40.58</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$7,751,695	\$7,606,795	Cost of Electricity	\$0.15/kWh
REF9 Grant Funds	\$440,000	\$440,000	Price of Fuel	\$3.00/Gal
Matching Funds	\$44,000	\$44,000	Household Energy Cost	\$6,293

### AEA Review Comments & Recommendation

### Full Funding

Kaktovik has received REF Round 4 funding to complete a wind resource analysis, feasibility study and conceptual design. That project is complete. The existing power plant is easily adaptable to integration of wind energy. The application includes a good summary of permitting and environmental concerns. NSB has a long history of maintaining village power systems at a high level of reliability and functionality. The budget is higher than standard wind project designs due to increased avian/environmental assessment and permitting needed on Barter Island. The project will need to address cold weather design considerations for the proposed wind turbine. Good wind resource. Recommend full funding.



## Atqasuk Transmission Line Design and Permitting

App #1232

Standard Application

**Project Type:** Transmission, Other  
**Applicant:** North Slope Borough  
**Applicant Type:** Local Government

**Energy Region:** North Slope  
**Proposed Phase(s):** Design  
**Recommended Phase(s):** Design

### Project Description

This phase of the Barrow to Atqasuk Transmission Line Project is for final design and permitting required for the construction of the transmission line and conversion of homes and buildings in Atqasuk to electric space heating.

### DNR/DMLW Feasibility Comments

The application states that a portion of the intertie project will cross State of Alaska land, and acknowledges that DNR utility easements and water permit will be required. The anticipated timeline for permitting, however, is described as "July 2016 to August 2016". If this is intended to reflect an anticipated application to issuance turnaround of 1 month, this timeline is not possible for an easement. It could take a year or possibly longer to process easements from the point of application to final issuance, as easements require review and resolution of any conflicts, a period of public notice, written decision with appeal timelines, and potentially survey requirements. Applicant is encouraged to contact DMLW Northern Region as soon as possible to verify land ownership and if applicable, begin application process.

### Financing Opportunities/Limitations

This application is for the design and permitting phase. When this project proceeds, bond funds will be requested from the North Slope Borough Assembly to assist in the final construction of the project. As with all projects, funding through general obligation bonds will be weighed against the other capital improvement project requiring funding in the communities across the North Slope.

# Renewable Energy Fund: Round 9 Application Summaries



## Atqasuk Transmission Line Design and Permitting

App #1232

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	7.84	Stage 2 Tech & Econ Score (100)	78.00
2. Matching Resources (15)	9.00	Benefit/Cost Ratio	2.02
3. Stage 2 Feasibility (20)	12.67		
4. Project Readiness (5)	2.50	<b>Project Rank</b>	
5. Benefits (15)	12.87	Statewide (of 38 Standard applications)	19
6. Local Support (5)	2.00	Regional (of all applications)	1
7. Sustainability (5)	4.83	Stage 3 Ranking Score (100)	51.71
<b>Total Stage 3 Score (100)</b>	<b>51.71</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$19,772,275	\$32,840,509	Cost of Electricity	\$0.15/kWh
REF9 Grant Funds	\$2,017,818	\$2,017,818	Price of Fuel	\$1.40/Gal
Matching Funds	\$201,782	\$201,782	Household Energy Cost	\$3,417

### AEA Review Comments & Recommendation

### Full Funding

This current application is for final design and permitting for the “Barrow to Atqasuk Transmission Line and Home Conversions to Electric Space Heating”.

This project was funded in rounds 2 and 4 of the Renewable Energy Fund for feasibility study and conceptual/preliminary design. The North Slope Borough also applied for but did not receive funding in round 7 as the preliminary design from round 4 was not yet complete.

Prior to application during round 9 the Preliminary design report was completed in a satisfactory manner and thus, AEA recommends full funding for the final design and permitting of this project.

# Renewable Energy Fund: Round 9 Application Summaries



## Grayling Water System Heat Recovery

App #1233

Heat Application

**Project Type:** HeatRecovery

**Energy Region:** Yukon-Koyukuk Upper Tanana

**Applicant:** City of Grayling

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design

### Project Description

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The proposed project will take recovered heat from the existing Alaska Village Electric Cooperative (AVEC) power plant and use it to heat the City of Grayling's water system, via a connection into the water treatment plant glycol loop prior to the boilers. The estimated fuel savings from this heat recovery system is projected to save the water treatment plant 6,518 gallons of heating oil per year.

### DNR/DMLW Feasibility Comments

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The previous comment from 2014 is unchanged: No SCRO involvement.

### Financing Opportunities/Limitations

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The community is not interested in applying for financing for this project at this time.

# Renewable Energy Fund: Round 9 Application Summaries



## Grayling Water System Heat Recovery

App #1233

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	29.03	Stage 2 Tech & Econ Score (100)	54.50
2. Matching Resources (15)	6.00	Benefit/Cost Ratio	0.98
3. Stage 2 Feasibility (20)	4.83		
4. Project Readiness (5)	4.00	<b>Project Rank</b>	
5. Benefits (15)	1.88	Statewide (of 14 Heat applications)	7
6. Local Support (5)	5.00	Regional (of all applications)	2
7. Sustainability (5)	5.00	Stage 3 Ranking Score (100)	55.74
<b>Total Stage 3 Score (100)</b>	<b>55.74</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$439,982	\$431,982	Cost of Electricity	\$0.62/kWh
REF9 Grant Funds	\$427,705	\$50,000	Price of Fuel	\$5.75/Gal
Matching Funds	\$4,277	\$5,000	Household Energy Cost	\$12,652

### AEA Review Comments & Recommendation

### Partial Funding

The proposed heat recovery system has the potential to offset a significant amount of heating oil. As proposed, however, the project demonstrates marginal economic value. AEA believes that cost saving measures can be identified during the final design phase that can significantly improve the project economics.

AEA recommends funding only the design phase to allow for improved construction cost estimates prior to funding the construction phase. Requested design costs of \$75,760 (17.5% of total project cost) is higher than expected based on the complexity of the project. Partial funding of \$50,000 recommended for final design phase only.

## Renewable Energy Fund: Round 9 Application Summaries



### Wales Water System Heat Recovery

App #1234

Heat Application

**Project Type:** HeatRecovery

**Energy Region:** Bering Straits

**Applicant:** City of Wales

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design, Construction

#### Project Description

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The proposed project will take recovered heat from the existing Wales power plant and use it to heat the City of Wales' water system via a buried heating connection to the washeteria and water treatment plant. The estimated fuel savings to save the washeteria and water treatment plant is 9,726 gallons of heating oil per year.

#### DNR/DMLW Feasibility Comments

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Project not on state-owned land, however RS 2477 Right of Way is in the vicinity. If RS T 1623 will be used as a route for pipe system, DMLW should be contacted to determine if use will require public notice or permitting.

#### Financing Opportunities/Limitations

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The community is not interested in applying for financing for this project at this time.

# Renewable Energy Fund: Round 9 Application Summaries



## Wales Water System Heat Recovery

App #1234

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	35	Stage 2 Tech & Econ Score (100)	72.50
2. Matching Resources (15)	6.00	Benefit/Cost Ratio	1.44
3. Stage 2 Feasibility (20)	10.83		
4. Project Readiness (5)	3.33	<b>Project Rank</b>	
5. Benefits (15)	9.00	Statewide (of 14 Heat applications)	1
6. Local Support (5)	5.00	Regional (of all applications)	1
7. Sustainability (5)	5.00	Stage 3 Ranking Score (100)	74.17
<b>Total Stage 3 Score (100)</b>	<b>74.17</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$656,613	\$653,277	Cost of Electricity	\$0.71/kWh
REF9 Grant Funds	\$650,047	\$650,047	Price of Fuel	\$6.49/Gal
Matching Funds	\$6,566	\$6,566	Household Energy Cost	\$17,269

### AEA Review Comments & Recommendation

### Full Funding

The project demonstrates the best economic value of any heat recovery applications received this year with a B/C ratio of 1.44.

AEA recommends full funding of the final design and construction phases.

# Renewable Energy Fund: Round 9 Application Summaries



## Scammon Bay Hydroelectric Project

App #1235

Standard Application

**Project Type:** Hydro

**Energy Region:** Lower Yukon Kuskokwim

**Applicant:** City of Scammon Bay

**Proposed Phase(s):** Feasibility

**Applicant Type:** Local Government

**Recommended Phase(s):** Feasibility

### Project Description

Feasibility and design of a 190 kW new run of river hydro on Hillside Creek serving the community of Scammon Bay utilizing 6 cfs and 480 ft of head to generate approximately 756 MWh of energy and displacing 646 MWh of diesel energy (48,000 gallons of fuel, 38% of existing diesel generation) annually at an estimated total project cost of \$4.3 million with a projected start date of 2021. Proposed project features include a 6 foot high diversion structure, 4300 feet of 16 inch diameter penstock, a single pelton turbine, and 4300 feet of access road. In 2013, AEA provided funding to the City of Scammon Bay through the Renewable Energy Fund for initial planning and feasibility analysis of hydroelectric potential. This initial study was completed in 2014 and identified the best locations for hydroelectricity development in Scammon Bay, which had a variety of creeks available for development. The most promising site, located 12 miles to the west of town, located on Ekashluak creek was found to have a significant salmon population, and the community of Scammon Bay was not interested in developing the location. The small creek running through town, Hillside Creek, was found to be an economic and low impact run-of-river hydro alternative opportunity. The project will also would improve and stabilize access to clean water for the water treatment plant. In order to secure permitting and allow for a design that maximizes the potential of the resource, three years of stream gauging is recommended. This phase will fund survey and 35% design.

### DNR/DMLW Feasibility Comments

The previous comment from 2014 is unchanged: A Water Rights Certificate may be required from the DMLW Water Section. No SCRO involvement.

### Financing Opportunities/Limitations

N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Scammon Bay Hydroelectric Project

App #1235

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	29.13	Stage 2 Tech & Econ Score (100)	49.67
2. Matching Resources (15)	6.00	Benefit/Cost Ratio	1.25
3. Stage 2 Feasibility (20)	3.22		
4. Project Readiness (5)	1.83	<b>Project Rank</b>	
5. Benefits (15)	6.50	Statewide (of 38 Standard applications)	16
6. Local Support (5)	5.00	Regional (of all applications)	4
7. Sustainability (5)	2.50	Stage 3 Ranking Score (100)	54.19
<b>Total Stage 3 Score (100)</b>	<b>54.19</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$4,114,132	\$4,283,056	Cost of Electricity	\$0.63/kWh
REF9 Grant Funds	\$305,000	\$90,000	Price of Fuel	\$6.72/Gal
Matching Funds	\$3,050	\$900	Household Energy Cost	\$12,698

### AEA Review Comments & Recommendation

### Partial Funding

The City of Scammon Bay requested funding for stream gauging and preliminary design for the continued development of the hydro project based on the recommendations of the feasibility study completed in 2014. Those recommendations included verifying the hydrology followed by design and permitting. AEA is limiting the funding to stream gauging only for the first year in order to verify the resource potential. The City did not provide a detailed budget and scope for the stream gauging. AEA believes the proposed scope is higher than need be and is recommending a reduced amount of funding.

AEA recommends the project for partial funding to complete stream gauging to better understand the hydroelectric resource potential of Hillside Creek in Scammon Bay. AEA notes that AVEC is currently performing a feasibility study of the wind energy potential in Scammon Bay. Following the completion of this phase, a feasibility update should be conducted to compare diesel electric generation, heat recovery, wind, and hydro to identify the best mix of energy solutions for the community.

AEA recommends partial funding of \$90,000 for stream gauging only. The work shall generally conform to USGS procedures.

# Renewable Energy Fund: Round 9 Application Summaries



## West Creek Hydroelectric Project

App #1236

Standard Application

**Project Type:** Hydro

**Energy Region:** Southeast

**Applicant:** Municipality of Skagway Borough

**Proposed Phase(s):** Recon

**Applicant Type:** Local Government

**Recommended Phase(s):** Design

### Project Description

The Municipality of Skagway (MOS) proposes to construct the West Creek Hydroelectric Project located approximately 7 miles west of Skagway and adjacent to the small community of Dyea. The primary purpose of the Project would be offsetting diesel generation by cruise ships that dock in Skagway during the months of May through September each year. A secondary purpose of the Project is to provide winter energy to the local utility when they have a shortfall of hydro energy from their hydroelectric projects (Dewey Lakes Hydro, Lutak Hydro, Goat Lake Hydro, Kasidaya Creek Hydro) as well as to sell winter energy to other utilities in the area.

### DNR/DMLW Feasibility Comments

The City and Borough of Skagway and/or Alaska Power & Telephone Company (per MOU dated August 7, 2014) will need to apply for a Permit to Appropriate Water for this project and may need to apply for a Temporary Water Use Authorization if the project moves forward to the permitting stage and prior to the construction phase, respectively. The DMLW Water Resources Section recommends the applicant consult with our Southeast Office to determine specific water use authorization requirements.

### Financing Opportunities/Limitations

N/A

# Renewable Energy Fund: Round 9 Application Summaries



## West Creek Hydroelectric Project

App #1236

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 0.47
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
<hr/>		
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$	\$168,000,000	Cost of Electricity	\$0.26/kWh
REF9 Grant Funds	\$320,000	\$0	Price of Fuel	\$3.55/Gal
Matching Funds	\$25,000	\$0	Household Energy Cost	\$7,750

### AEA Review Comments & Recommendation

**Not Recommended**

The scope of work is to conduct an environmental review to meet the requirements of FERC licensing. The basis for undertaking the licensing and development of the project has not been demonstrated through a feasibility study. Per the Request for Applications #16012, Sections 2, 2.4, 2.5, applicants must complete prior phases of work prior to receiving funding for future phases. The feasibility study should be prepared by a licensed Alaska professional engineer. Lacking a feasibility study AEA performed a basic analysis of the project benefits and technical feasibility. Significant issues remain unaddressed, particularly whether the City would be able to acquire a long term (20+ years) power sales agreement with the multiple cruise ships sufficient to finance the project. Alternatively, there is no identifiable revenue stream associated with the emissions from the ships and the detrimental air quality results. The City itself does not appear to require the power and energy available from the project, yet under-developing the resource is probably not feasible or desirable either. A long-term development plan identifying regional opportunities for demand growth coupled with a regional hydroelectric resource evaluation is the recommended first step for Skagway. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.

# Renewable Energy Fund: Round 9 Application Summaries



## Sand Point High Penetration Wind System

App #1237

Standard Application

**Project Type:** Wind

**Energy Region:** Aleutians

**Applicant:** Sand Point Generating, LLC - TDX Power, Inc.

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Utility

**Recommended Phase(s):** Design, Construction

### Project Description

Sand Point Generating LLC (SPG) proposes a high penetration wind diesel operation for the City of Sand Point. The proposed system will utilize a high speed low load generator. This unit can run at 10% of its 600KW rating continuously. The power converter, which is integral to the Innovus IP MVS 600 variable speed generator proposed, can operate even when its diesel engine is turned off. Ultra-capacitors on the DC Bus provide short term electrical storage to facilitate load pick up and diesel starting sequence. The IP MVS 600 power converter and ultracapacitor energy storage can and will be used to maintain the frequency and voltage of the wind turbines, allowing (during steady wind) the Utility to power City loads with only wind power (diesels off).

### DNR/DMLW Feasibility Comments

The previous comment from 2014 is unchanged: No SCRO involvement.

### Financing Opportunities/Limitations

Innovus has made offers to provide project financing based upon performance. Innovus's offer would reduce the front end payments significantly and require regular payments as fuel saving as documented by the utility. Firm negotiations on this point have not begun.

# Renewable Energy Fund: Round 9 Application Summaries



## Sand Point High Penetration Wind System

App #1237

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	24.76	Stage 2 Tech & Econ Score (100)	83.33
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	2.19
3. Stage 2 Feasibility (20)	14.44		
4. Project Readiness (5)	3.50	<b>Project Rank</b>	
5. Benefits (15)	12.25	Statewide (of 38 Standard applications)	2
6. Local Support (5)	4.00	Regional (of all applications)	1
7. Sustainability (5)	4.67	Stage 3 Ranking Score (100)	78.62
<b>Total Stage 3 Score (100)</b>	<b>78.62</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$1,072,305	\$1,067,309	Cost of Electricity	\$0.62/kWh
REF9 Grant Funds	\$649,030	\$649,030	Price of Fuel	\$5.52/Gal
Matching Funds	\$423,275	\$423,275	Household Energy Cost	\$10,793

### AEA Review Comments & Recommendation

### Full Funding

The proposed system offers a new option in balancing diesel generation with variable wind energy generation. Reduced diesel loading is possible without damaging under loading that is seen with standard fixed-RPM gensets. The ultra-capacitor bridging allows the system to provide spinning reserve while keeping voltage and frequency within spec. The system will allow for significant periods of diesel-off operation and the generator's power converter doubles as a grid-forming inverter during periods when the wind turbines are the sole power generator on the system. The applicant has a good track record with wind energy projects in Sand Point and Saint Paul and is very cooperative in providing high-resolution operational data for those systems.

Recommend full funding.

# Renewable Energy Fund: Round 9 Application Summaries



## Koyuk Water System Heat Recovery

App #1238

Heat Application

**Project Type:** HeatRecovery

**Energy Region:** Bering Straits

**Applicant:** City of Koyuk

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design

### Project Description

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The proposed project will take recovered heat from the existing Alaska Village Electric Cooperative (AVEC) power plant and use it to offset the heating oil consumption in City of Koyuk's Water Treatment Plant and Washeteria. The estimated fuel savings from this heat recovery system is projected to be 11,971 gallons of heating oil per year.

### DNR/DMLW Feasibility Comments

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As per the application, project facilities are not on state-owned land.

### Financing Opportunities/Limitations

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The community is not interested in applying for financing for this project at this time.

# Renewable Energy Fund: Round 9 Application Summaries



## Koyuk Water System Heat Recovery

App #1238

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	35	Stage 2 Tech & Econ Score (100)	61.50
2. Matching Resources (15)	6.00	Benefit/Cost Ratio	1.06
3. Stage 2 Feasibility (20)	7.17		
4. Project Readiness (5)	4.00	<b>Project Rank</b>	
5. Benefits (15)	4.13	Statewide (of 14 Heat applications)	3
6. Local Support (5)	5.00	Regional (of all applications)	2
7. Sustainability (5)	5.00	Stage 3 Ranking Score (100)	66.29
<b>Total Stage 3 Score (100)</b>	<b>66.29</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$703,269	\$695,269	Cost of Electricity	\$0.95/kWh
REF9 Grant Funds	\$688,386	\$90,922	Price of Fuel	\$6.50/Gal
Matching Funds	\$6,884	\$909	Household Energy Cost	\$18,742

### AEA Review Comments & Recommendation

### Partial Funding

The proposed heat recovery system has the potential to offset a significant amount of heating oil. As proposed, however, the project demonstrates marginal economic value. AEA believes that cost saving measures can be identified during the design phase that can significantly improve the project economics.

Partial funding of \$90,922 recommended for the final design phase only.

## Renewable Energy Fund: Round 9 Application Summaries



### Ouzinkie Hydroelectric Power Project

App #1239

Standard Application

**Project Type:** Hydro

**Energy Region:** Kodiak

**Applicant:** City of Ouzinkie

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design, Construction

#### Project Description

Design and construction of 150 kW replacement storage hydro on Spruce Island serving the community of Ouzinkie utilizing 9 cfs and 230 ft of head and 183 acre ft of storage to approximately generate 475 MWh of energy and displacing 475 MWh of diesel energy (36,000 gallons of fuel, 55% of existing diesel generation) annually at an estimated total project cost of \$4.6 million with a projected start date of 2018 for the reconstructed project. Reconstructed project features include a 17 foot high dam (recently completed), 5,100 feet of 24 inch diameter penstock, and a single turgo or crossflow turbine. Ouzinkie currently operates a makeshift hydroelectric operation that has served the village for many years. However, the dam failed in the fall of 2013 even while a new project was being planned to replace the dam. The proposed project in Ouzinkie will work to install new hydroelectric capacity in conjunction with the recent new dam construction. A new Ossberger 150 KW hydroelectric turbine will be installed to maximize electrical generation in the community. The turbine is to operate efficiently at flow rates from 2 cfs to 10 cfs.

#### DNR/DMLW Feasibility Comments

A Water Rights Certificate may be required from the DMLW Water Section. No SCRO involvement. The project may require review by the DNR Dam Safety Program.

#### Financing Opportunities/Limitations

The community is not interested in applying for financing for this project at this time.

# Renewable Energy Fund: Round 9 Application Summaries



## Ouzinkie Hydroelectric Power Project

App #1239

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	17.12	Stage 2 Tech & Econ Score (100)	40.67
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	0.73
3. Stage 2 Feasibility (20)	0.22		
4. Project Readiness (5)	2.33	<b>Project Rank</b>	
5. Benefits (15)	0.63	Statewide (of 38 Standard applications)	24
6. Local Support (5)	5.00	Regional (of all applications)	3
7. Sustainability (5)	3.33	Stage 3 Ranking Score (100)	43.63
Total Stage 3 Score (100)	43.63		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$401,441	\$4,603,385	Cost of Electricity	\$0.36/kWh
REF9 Grant Funds	\$397,427	\$397,427	Price of Fuel	\$2.94/Gal
Matching Funds	\$4,014	\$4,014	Household Energy Cost	\$7,460

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

The City of Ouzinkie's application seeks funding for the design and replacement of a turbine and generator which is a component of a larger project to reconstruct the existing hydro in Ouzinkie which has reached the end of its useful life. The replacement effort began when the Alaska Native Tribal Health Consortium (ANTHC) constructed a new dam to replace the wooden dam that failed recently. The City proposes to have ANTHC complete the remainder of the project reconstruction. In Round 8 AEA concluded the replacement penstock and turbine is an addition to the existing hydro project and that only the projected incremental increase in hydro power production is allowable in the economic analysis. However, it is noted that the dam failed and the turbine and generator apparently require replacement. The pipeline is also reported to have issues as well. Despite continued operation it appears that the project is at the end of its useful life.

The City's application only requested grant funding for the turbine and generator replacement. In evaluating the project economics consistently AEA has included the entire project cost and benefits. The prior investment of the dam has also been included as match. AEA has concerns that the proposed budget for design work is too low. Recommended for full funding.

## Renewable Energy Fund: Round 9 Application Summaries



### Solar Panels for Kake Community Buildings

App #1240

Standard Application

**Project Type:** Solar

**Energy Region:** Southeast

**Applicant:** City of Kake

**Proposed Phase(s):** Feasibility, Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Feasibility, Design, Construction

#### Project Description

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Feasibility, design, and construction of solar panels on Kake community building and liquor store to reduce electricity costs.

#### DNR/DMLW Feasibility Comments

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No impacts to state land.

#### Financing Opportunities/Limitations

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Any cost overruns or other financing opportunities would have to be approved by city council.

# Renewable Energy Fund: Round 9 Application Summaries



## Solar Panels for Kake Community Buildings

App #1240

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$255,000	\$	Cost of Electricity	\$0.59/kWh
REF9 Grant Funds	\$255,000	\$0	Price of Fuel	\$4.59/Gal
Matching Funds	\$00	\$0	Household Energy Cost	\$11,412

**AEA Review Comments & Recommendation**

**Did Not Pass Stage 1**

# Renewable Energy Fund: Round 9 Application Summaries



## Minto PV Solar Project

App #1241

Standard Application

**Project Type:** Solar

**Energy Region:** Yukon-Koyukuk Upper Tanana

**Applicant:** Minto Development Corporation

**Proposed Phase(s):** Recon, Feasibility, Design, Construction

**Applicant Type:** Government Entity

**Recommended Phase(s):** Recon, Feasibility, Construction

### Project Description

Minto Development Corporation submitted an application for \$22,748.80 to partially fund the feasibility study, conceptual and final design, and construction of a \$56,872, 10.8kW solar photovoltaic system in Minto. The original application requested \$140,000 to assist in the purchase and installation of a 100.4 kW photovoltaic solar energy system. After the grant application deadline, the applicant approached AVEC (the local utility) regarding interconnection standards. AVEC agreed to allow a 10kW solar PV system to be intertied, so the applicant reduced the scope to a 10kW system.

### DNR/DMLW Feasibility Comments

Project does not appear to be on state-owned land, but application does not yet contain info regarding permit which may be required.

### Financing Opportunities/Limitations

Additional financing is being explored. The Seth-De-Ya-Ah Corporation has the capacity to cover the outstanding balance. However, legislative assistance is being pursued, as is bank loan options.

# Renewable Energy Fund: Round 9 Application Summaries



## Minto PV Solar Project

App #1241

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 0.37
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$350,000	\$86,400	Cost of Electricity	\$0.59/kWh
REF9 Grant Funds	\$140,000	\$0	Price of Fuel	\$3.80/Gal
Matching Funds	\$210,000	\$0	Household Energy Cost	\$9,471

# Renewable Energy Fund: Round 9 Application Summaries



## Minto PV Solar Project

App #1241

Standard Application

### AEA Review Comments & Recommendation

**Not Recommended**

Minto Development Corporation submitted an application for \$22,748.80 to partially fund the feasibility study, conceptual and final design, and construction of a \$56,872, 10.8kW solar photovoltaic system in Minto. This application is not recommended for funding for the following reasons: 1. Per Section 2 of the Round 9 Request for Applications #16012, there is not enough information provided in the application to assess the feasibility and cost of this project, or properly review the design for construction funding eligibility. The application is for all four phases of construction. 2. The applicant did not document that it had reached a written agreement with the electric utility regarding interconnection standards or rates. The Request for Applications #16012 on page 1 directed applicants to the Best Practices Checklists to ensure complete applications. This was a checklist item under "Common Pitfalls" on the Solar Program Best Practices Checklist. The original application was ineligible because the applicant was the Minto Development Corporation. AEA gave the project developers an opportunity to amend the application, which resulted in the Native Village of Minto becoming the applicant. When AEA pointed out that the application violated AVEC's interconnection standards for maximum distributed generation capacity and did not include a written agreement with AVEC, the applicant got verbal agreement from AVEC to allow interconnection of a 10kW solar PV system. The application still does not address interconnection standards or costs, net metering, or electric rates. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.



## Renewable Energy Fund: Round 9 Application Summaries



### Heat Pump System for City of Seward Owned Buildings

App #1242

Heat Application

**Project Type:** HeatPump

**Energy Region:** Railbelt

**Applicant:** City of Seward

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Design, Construction

#### Project Description

Design and construction of a ground source heat pump system to displace approximately 96% of the heating oil usage of four existing City buildings and one future building. A field of sixteen vertical boreholes, 6" diameter x 300 ft depth, will be drilled on City land adjacent to the existing waterfront bike path. Vertical double u-bend 1" HDPE loops will be installed in each of these boreholes. A single u-bend loop will be installed in the existing 300 ft deep test hole. The vertical loops will be charged with a 20% methanol and 80% water heat transfer fluid. The loops will serve as 50 year design life underground heat exchanger, warmed by the ocean tides of Resurrection Bay. The vertical loops will connect via a reverse return manifold to buried insulated supply and return trunk mains that will deliver ground heat to the four City buildings via loop pumps. A pair of blank tees will be provided on the trunk mains to allow connection of the new year round Adams Street Shower House to be built in the fall of 2016. Four high efficiency water to water heat pumps, one buffer tank, and loop pumps will be installed in the existing mechanical rooms of the Library and City Hall. One buffer tank will be installed in the Annex and the Fire Hall. One existing heating oil boiler will remain in each building to serve as a standby and lag boiler. On the load (hot) side of the heat pumps, buffer tanks will be heated from 125F to 145F, these will in turn supply heat to existing hydronic space heating and domestic hot water systems in the buildings. The total quantity of #1 heating oil anticipated to be displaced annually is 20,020 gallons, which equates to 2,146 MMBTU.

#### DNR/DMLW Feasibility Comments

No DMLW Managed lands per ADL 215129 Muni. Entitlement and ADL 18018 Tideland Conveyance. No water withdrawal associated with closed-loop system design.

#### Financing Opportunities/Limitations

No limitations to fund the City's portion of match funding currently exists as the funds have already been allocated by Council Resolution and City Manager authorization.

# Renewable Energy Fund: Round 9 Application Summaries



## Heat Pump System for City of Seward Owned Buildings

App #1242

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	20.66	Stage 2 Tech & Econ Score (100)	83.17
2. Matching Resources (15)	11.00	Benefit/Cost Ratio	1.97
3. Stage 2 Feasibility (20)	14.39		
4. Project Readiness (5)	5.00	<b>Project Rank</b>	
5. Benefits (15)	12.25	Statewide (of 14 Heat applications)	2
6. Local Support (5)	4.00	Regional (of all applications)	1
7. Sustainability (5)	4.33	Stage 3 Ranking Score (100)	71.64
Total Stage 3 Score (100)	71.64		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$922,999	\$955,458	Cost of Electricity	\$0.18/kWh
REF9 Grant Funds	\$725,000	\$725,000	Price of Fuel	\$3.37/Gal
Matching Funds	\$125,000	\$125,000	Household Energy Cost	\$9,005

### AEA Review Comments & Recommendation

### Full Funding

The City of Seward, applying as a local government, requests funding in the amount of \$725,000 for the design and construction of an ocean/ground source heat pump system to offset the use of #1 diesel for heat in buildings owned by the City. The proposed project's total cost is estimated at \$995,458 including the cost of a major component replacement in year 25 and the capital cost associated with connecting to the new shower house. \$125,000 will be provided as match and the applicant has expended \$72,999 in completing a feasibility study and conceptual design that provides the foundation for the proposed project. Additionally, the buildings proposed for inclusion in the heat pump system have undergone \$32,497 in energy efficiency upgrades. The City of Seward has experience installing and operating heat pumps and the proposed district heat loop architecture may provide a model for other communities wishing to use heat pumps. Full funding is recommended. A 65% design must be accepted by AEA prior to release of funds for items requiring long lead times. A 95% design must be accepted by AEA prior to release of funds for construction. All deliverables must be accepted by AEA prior to the release of the final 10% of funds.



## Maximizing Cordova Hydropower Utilization with Controlled Electro-Thermal Systems

App #1243

Heat Application

**Project Type:** HeatHydro, HeatRecovery

**Energy Region:** Copper River Chugach

**Applicant:** Cordova Electric Cooperative, Inc.

**Proposed Phase(s):** Feasibility

**Applicant Type:** Utility

**Recommended Phase(s):** Feasibility

### Project Description

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Cordova Electric Cooperative's hydroelectric power plants are both run of the river and have no capacity to store energy. When 100% of the load is met with hydro, excess water is spilled and used for spinning reserve. This situation occurs for substantial amounts of time for over half the year. Backup diesel power plant must also be kept warm to keep the generators on standby; diesel-fired heaters are used for this purpose. The proposed REF project will: 1) Assess in detail the frequency, amplitude and duration of availability of excess hydropower, 2) Develop economic assessments, and RFP-quality specifications for controlled electrothermal system, implementation at the diesel power plant and the local pool to supplement and displace diesel fuel-based heating systems, 3) Develop economic assessments, and RFP-quality specifications for efficiency upgrades of the cooling systems at the Orca Power Plant, and 4) Provide an assessment of total potential for demand managed electro-thermal systems to maximize hydropower utilization economically. A preliminary study concluded in 2015 that 4,500-10,500 gallons of diesel could potentially be saved annually by managing the loads via electrical heating of the CEC diesel power plant, electrical heating of the pool, and adding heat storage to the system.

### DNR/DMLW Feasibility Comments

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No DMLW permits required at this time; proposal is for continued and expanded data collection, review and interpretation requiring installation of interial facility monitoring devices.

### Financing Opportunities/Limitations

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N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Maximizing Cordova Hydropower Utilization with Controlled Electro-Thermal Systems

App #1243

Heat Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 1.15
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 14 Heat applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$	\$392,959	Cost of Electricity	\$0.34/kWh
REF9 Grant Funds	\$95,733	\$0	Price of Fuel	\$3.68/Gal
Matching Funds	\$61,996	\$0	Household Energy Cost	\$11,122



## Maximizing Cordova Hydropower Utilization with Controlled Electro-Thermal Systems

App #1243

Heat Application

### AEA Review Comments & Recommendation

### Not Recommended

This project is not recommended due primarily to poor economics: high cost of study for marginal benefits, required long life for the investment to achieve economic payback and the associated uncertainty about whether the resource will be available for its economic life. The proposed project economics require a 17 year project life to achieve parity with the diesel alternative. It is noted that about half the potential savings (preheating the diesel plant) requires the demand to remain relatively the same and the percentage of hydro generation and the operation methods to remain relatively the same. Additional changes such as alternative utilization of excess power (i.e. transportation), installation of a flywheel and/or battery, or major demand changes could curtail the electric boiler completely (a similar change in conditions appears to have resulted in the ORCs current inoperable state). A static situation is unlikely and the feasibility study currently underway for the Crater Lake hydro should include an excess energy analysis that will shed more light on the potential benefits for heat utilization. Frequency controlling electric load governors, which also perform as electric boilers, are prevalent and commonly used to regulate small hydroelectric plant operation. Overall, AEA does not expect the actual installation and use of electric boilers powered by excess energy only to be an overly challenging or costly effort, probably not much more costly than the proposed feasibility work itself (AEA estimated construction costs to be less than \$100k per boiler). The proposed feasibility study appears to cost nearly the same as performing the proposed work. Past efforts have already concluded the potential for savings and found the project to be technically feasible. There appears to be little value to the additional study other than making operational improvements at existing generation facilities (work that is potentially excluded from Renewable Energy Fund eligibility). Further, the additional study, by being such a large component of cost, significantly reduces economic benefit without an apparent commensurate gain. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.



# Renewable Energy Fund: Round 9 Application Summaries



## IPEC Gunnuk Creek Hydro Rehabilitation in Kake

App #1244

Standard Application

**Project Type:** Hydro

**Energy Region:** Southeast

**Applicant:** Inside Passage Electric Cooperative

**Proposed Phase(s):** Construction

**Applicant Type:** Utility

**Recommended Phase(s):** Construction

### Project Description

Construction of a 500 kW hydro addition to a water supply dam on Gunnuk Creek serving the community of Kake utilizing 130 cfs and 69 ft of head to displace 1,620 MWh of diesel energy (115,000 gallons of fuel, 55% of existing diesel generation) annually at an estimated total project cost of \$5.7 million with a projected start date of 2018. Proposed project features include 2,100 feet of 54 inch diameter penstock and a single crossflow or francis turbine. IPEC proposes to expand and rehabilitate the existing 7kW hydro project that makes use of the existing water supply dam and hatchery facilities at Gunnuk Creek in Kake, Alaska. Costs and construction risks are minimized because the dam and intake facility have already been constructed, and no new transmission lines or access roads are required.

### DNR/DMLW Feasibility Comments

Inside Passage Electric Cooperative will need to apply for a Permit to Appropriate Water for this project and may need to apply for a Temporary Water Use Authorization if the project moves forward to the permitting stage and prior to the construction phase, respectively. The DMLW Water Resources Section recommends the applicant consult with our Southeast Office to determine specific water use authorization requirements.

### Financing Opportunities/Limitations

IPEC will pursue DOE Indian Energy grants over the next several months, and will apply for funds from the next round of RUS' High Energy Cost Grant Program. We believe our chances are fair to good in finding additional grant funding. The economics show that grant funding will provide a much greater economic benefit to IPEC's members. If IPEC's efforts at securing 100% grant funding from the REF and other sources fails over the coming year we will delay the project until we are satisfied we can produce a project with substantial economic benefits to ratepayers. IPEC believes it has the ability to finance projects through NRUCFC loans, if necessary. In fact, IPEC financed a portion of the Gartina Falls project with CFC loans. IPEC didn't borrow any long term funds for about 16 years from 1999-2015. During this period, IPEC worked to pay down debt incurred from the Chilkat Valley Electrification project. IPEC had a high equity ratio of over 56% at 12/31/2014, and is in good financial condition to take on this project.

# Renewable Energy Fund: Round 9 Application Summaries



## IPEC Gunnuk Creek Hydro Rehabilitation in Kake

App #1244

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	24.23	Stage 2 Tech & Econ Score (100)	73.00
2. Matching Resources (15)	13.00	Benefit/Cost Ratio	2.23
3. Stage 2 Feasibility (20)	11.00		
4. Project Readiness (5)	1.50	<b>Project Rank</b>	
5. Benefits (15)	12.12	Statewide (of 38 Standard applications)	4
6. Local Support (5)	5.00	Regional (of all applications)	1
7. Sustainability (5)	4.00	Stage 3 Ranking Score (100)	70.85
<b>Total Stage 3 Score (100)</b>	<b>70.85</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$5,795,000	\$5,715,000	Cost of Electricity	\$0.59/kWh
REF9 Grant Funds	\$3,920,000	\$3,920,000	Price of Fuel	\$4.05/Gal
Matching Funds	\$1,545,000	\$1,545,000	Household Energy Cost	\$10,561

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

The City of Kake's application for construction funding is based on a reconnaissance report and IPECs self-funded continuance of the feasibility and design phases. The reconnaissance report is of good quality and demonstrates the excellent economic benefits that follow from the utilization of existing infrastructure. The existing infrastructure includes a dam with an outlet sized for the future penstock and an existing building proposed to serve as the powerhouse. Overall the project technical and development risk appears very low.

AEA notes some concerns including an unrealistic timeframe for completion of design and permitting. Additionally the conclusions in the reconnaissance study stated further feasibility work is required to determine whether two other alternatives warrant further consideration. AEA also suggests additional feasibility work address, in detail, additional head potential through powerhouse, dam modifications, and turbine selection (francis versus crossflow) and the subsequent costs and benefits. Finally, there are no concept designs provided from which to base the construction costs.

Based on the low technical and permitting risk, this project is recommended for funding contingent upon completing remaining feasibility, design, and permitting work prior to issuing an award.

## Renewable Energy Fund: Round 9 Application Summaries



### Adak Hydro Power Generator

App #1245

Standard Application

**Project Type:** Hydro

**Energy Region:** Aleutians

**Applicant:** TDX Adak Generating, Inc. (TAG) - TDX Power, Inc.

**Proposed Phase(s):** Feasibility, Design, Construction

**Applicant Type:** Utility

**Recommended Phase(s):** Feasibility

#### Project Description

Feasibility, design, and construction of a 75-90 kW power recovery turbine on a water supply line serving the community of Adak utilizing 3-3.5 cfs and 440 ft of head to generate approximately 330-760 MWh of energy and displace 330-760 MWh of diesel energy (25-54k gallons of fuel, 17-38 % of existing diesel generation) annually at an estimated total project cost of \$1.75 million with a projected start date of 2020. Proposed project features include an unspecified turbine type in place of a pressure reducing valve. Adak has high mountains with good snow cover that provide a water resource for hydropower. Currently the pipe line infrastructure is owned by the City of Adak. TDX Adak Generating (TAG) will work with the City on the design, final configuration approvals, construction and operation. A Hydroelectric Reconnaissance Study by HATCH (dated 2/16/2013, AEA REF grant 2195450) provided the basis for assessing the hydro power potential. An existing 10" ductile iron pipe from Lake Bonnie Rose to a pressure reducing station, originally used to provide potable water to the now closed military base, will be used as a penstock to keep the construction cost low. The turbine house location will be at the existing PRV station. The estimated power production is 89 kW.

#### DNR/DMLW Feasibility Comments

On-going feasibility study. DNR MLW is recognized as the water rights manager for Alaska & applicant notes that additional consultation with DNR and DFG is required with respect to management of environmental flow restrictions (described as a significantly limiting factor affecting power generation and reservoir development.) Land ownership presumed to be Aleut Corp. or City.

#### Financing Opportunities/Limitations

N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Adak Hydro Power Generator

App #1245

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	34.33	Stage 2 Tech & Econ Score (100)	59.50
2. Matching Resources (15)	13.00	Benefit/Cost Ratio	1.75
3. Stage 2 Feasibility (20)	6.50		
4. Project Readiness (5)	2.67	<b>Project Rank</b>	
5. Benefits (15)	11.75	Statewide (of 38 Standard applications)	3
6. Local Support (5)	3.00	Regional (of all applications)	2
7. Sustainability (5)	2.00	Stage 3 Ranking Score (100)	73.24
Total Stage 3 Score (100)	73.24		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$420,146	\$1,750,000	Cost of Electricity	\$1.03/kWh
REF9 Grant Funds	\$294,102	\$19,600	Price of Fuel	\$6.85/Gal
Matching Funds	\$126,044	\$8,400	Household Energy Cost	\$14,961

### AEA Review Comments & Recommendation

### Partial Funding

Adak appears to have good hydroelectric potential if water use issues can be mitigated to allow for increased project benefits which are needed to reach economic parity with the cost of development. Both the Mitt Lake project and the PRV power recovery, if technically feasible, are impacted by existing water reservations for non-anadromous aquatic habitat. TDX proposes to proceed with the PRV project under the assumption that the development time will be short and that the economics are about equal. It is noted that there is a considerable range in the estimated development cost for the power recovery project and that the overall project size is significantly below present energy needs.

It is clear from the previous reconnaissance study by Hatch that continued hydroelectric development should be pursued. The next step would be a feasibility study. TDXs proposal to perform the feasibility study for the power recovery turbine represents a component of the required overall feasibility work that would include the Mitt Lake project.

Recommended for partial funding to complete only the feasibility study proposed by TDX, not design or construction phases.

# Renewable Energy Fund: Round 9 Application Summaries



## St. Paul Island 80% Renewable Energy Feasibility Study

App #1246

Standard Application

**Project Type:** Wind, Transmission, Solar, Storage

**Energy Region:** Aleutians

**Applicant:** TDX Power, Inc.

**Proposed Phase(s):** Recon, Feasibility

**Applicant Type:** Utility

**Recommended Phase(s):** Recon, Feasibility

### Project Description

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St. Paul has a goal of 80% local renewable energy generation for electric, heat and transportation. TDX owns and operates three 225 kW wind turbines that provide wholesale power the City of St. Paul Utility as well as the TDX owned and operated St. Paul Airport. However, most of the electric power on the island is still generated with diesel. TDX is committed to establishing a sustainable source of energy that makes the island essentially independent of imported energy. In order to achieve this, TDX proposes to install additional renewable energy sources such as wind and solar to increase renewable generation. On the demand side TDX proposes to promote, facilitate and install energy savings efficiency measures and technology that takes advantage of excess renewable energy to heat space and water. To initiate the project, TDX proposes a detailed feasibility study to assess the current situation and identify the most cost effective path to achieve the declared goal.

### DNR/DMLW Feasibility Comments

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Feasibility study to determine economically viable options/potential improvements to combined wind and deisel power generation system. No improvements planned at this time.

### Financing Opportunities/Limitations

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N/A

# Renewable Energy Fund: Round 9 Application Summaries



## St. Paul Island 80% Renewable Energy Feasibility Study

App #1246

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	19.64	Stage 2 Tech & Econ Score (100)	48.83
2. Matching Resources (15)	11.00	Benefit/Cost Ratio	1.66
3. Stage 2 Feasibility (20)	2.94		
4. Project Readiness (5)	2.33	<b>Project Rank</b>	
5. Benefits (15)	10.25	Statewide (of 38 Standard applications)	18
6. Local Support (5)	4.00	Regional (of all applications)	4
7. Sustainability (5)	2.17	Stage 3 Ranking Score (100)	52.33
<b>Total Stage 3 Score (100)</b>	<b>52.33</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$	\$5,731,500	Cost of Electricity	\$0.47/kWh
REF9 Grant Funds	\$265,200	\$265,200	Price of Fuel	\$4.48/Gal
Matching Funds	\$66,300	\$66,300	Household Energy Cost	\$8,560

### AEA Review Comments & Recommendation

### Full Funding

The project would produce valuable information on choosing between renewable energy, fossil-fuels and energy efficiency for high-contribution wind systems. The proposal is thin on details. The cost is high for a normal reconnaissance and feasibility scope with no met tower or other renewable resource assessment. Recommend full funding but with a series of gating deliverables to be determined by AEA and written into the grant agreement, if issued, that must be reviewed before funding for the next deliverable is released.

# Renewable Energy Fund: Round 9 Application Summaries



## Chignik Hydroelectric Dam Project

App #1247

Standard Application

**Project Type:** Hydro

**Energy Region:** Bristol Bay

**Applicant:** City of Chignik

**Proposed Phase(s):** Design

**Applicant Type:** Local Government

**Recommended Phase(s):** Design

### Project Description

The Lake and Peninsula Borough applied on behalf of the City of Chignik for the design and permitting of a reconfigured and new 385 kW storage hydro on Indian Creek serving the community of Chignik Bay utilizing 18 cfs and 380 ft of head and 200 acre ft of storage to generate approximately 2,140 MWh of energy and displacing 900 MWh of diesel energy (64,000 gallons of fuel, 95% of existing diesel generation) annually at an estimated total project cost of \$8 million with a projected start date of 2020. Proposed project features include a 25 foot high dam, 7280 feet of 24 inch diameter penstock, a single pelton or turgo turbine, 9170 ft of access road, and 1,600 ft of transmission line. The City, Tribal Council, Borough, CE2 Engineers, and the Alaska Native Tribal Health Consortium are in a collaborative venture to manage the project successfully with ANTHC taking the lead on project management. Through this project the City will see enhancements in the areas of water supply delivery, elimination of the diversion of 2 cfs from the anadromous habitat due to the existing project which would be decommissioned, reduced dependence on fossil fuels, and reduced maintenance of electric generation infrastructure. The City of Chignik is already a FERC license holder for the hydroelectric project which can significantly reduce the permitting timeline.

### DNR/DMLW Feasibility Comments

A DMLW Water Resources authorization is recognized to be required. City of Chignik holds title to most affected uplands, remaining potentially impacted parcel owned by Chignik Lagoon Native Corporation.

### Financing Opportunities/Limitations

ANTHC has accounted for cost overruns related to potential changes in site conditions, unknown or unforeseen issues, logistics, etc. and have included that projection into the costs requested for the project.

# Renewable Energy Fund: Round 9 Application Summaries



## Chignik Hydroelectric Dam Project

App #1247

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	20.07	Stage 2 Tech & Econ Score (100)	73.67
2. Matching Resources (15)	7.00	Benefit/Cost Ratio	1.86
3. Stage 2 Feasibility (20)	11.22		
4. Project Readiness (5)	3.50	<b>Project Rank</b>	
5. Benefits (15)	13.25	Statewide (of 38 Standard applications)	8
6. Local Support (5)	5.00	Regional (of all applications)	1
7. Sustainability (5)	4.83	Stage 3 Ranking Score (100)	64.87
<b>Total Stage 3 Score (100)</b>	<b>64.87</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$7,200,000	\$7,783,428	Cost of Electricity	\$0.49/kWh
REF9 Grant Funds	\$1,025,175	\$1,025,175	Price of Fuel	\$3.81/Gal
Matching Funds	\$60,251	\$60,251	Household Energy Cost	\$8,746

### AEA Review Comments & Recommendation

### Full Funding

The City of Chignik has made significant progress on rehabilitation and development of the proposed project since acquiring the aging hydro and water conveyance system from private ownership. The ownership transfer allowed the City to utilize REF funds for the feasibility study which found that a modified project with a powerhouse located near the upstream limit of salmon habitat had the best economic and environmental benefits. Significant benefits include improvement in resource utilization, public water system improvement, potential for hatchery development, access and recreation improvement. Potential concerns include aquatic and permitting issues.

This grant request is for funding the design and permitting work required to advance the development which is expected to result in nearly complete displacement of diesel electric generation for the long established fishing community. Proposed work consists of aquatic, cultural, FERC permitting investigations, LIDAR topographic surveying, geotechnical investigations, and hydroelectric engineering design with the end goal of having a construction ready project.

AEA recommends the applicant focus on retaining qualified engineering, regulatory, biological, and cultural consultants through an experienced hydroelectric developer/project manager as a condition of award.

# Renewable Energy Fund: Round 9 Application Summaries



## Crater Lake Power and Water Project

App #1248

Standard Application

**Project Type:** Hydro, Storage, Other

**Energy Region:** Copper River Chugach

**Applicant:** Cordova Electric Cooperative, Inc.

**Proposed Phase(s):** Design

**Applicant Type:** Utility

**Recommended Phase(s):** Design

### Project Description

Design of a new 500 kW storage hydro at Crater Lake serving the community of Cordova utilizing 5 cfs and 1440 ft of head and 790 acre ft of storage to generate approximately 2,260 MWhs of energy and displace 2,000 MWhs of diesel energy (145,000 gallons of fuel, 25% of existing diesel generation) annually at an estimated total project cost of \$17.3 million with a projected start date of 2020. Proposed project features include a low height high dam, 3,500 feet of 16 inch diameter penstock, and a single pelton turbine. Crater Lake is a perched lake located directly above existing City of Cordova chlorinator building and water supply line, and a CEC transmission line from the Humpback Creek Hydroelectric Project to Cordova. In addition to providing improved generation, in part from storage capability (Cordova's first water storage project), the project is expected to improve water supply to the City of Cordova.

### DNR/DMLW Feasibility Comments

DNR OPMP coordinated permitting process underway or completed including RSAs with MLW Land and Water Sections.

### Financing Opportunities/Limitations

CEC is near 50% equity, and recent meetings with CEC's lenders indicate that CEC can comfortably finance the estimated construction portion of this project. CEC anticipates strong construction-phase partner contributions from the City of Cordova for the water resource element, and the possibility of federal funding assistance from one of the many municipal water system or energy system grant or loan programs.

# Renewable Energy Fund: Round 9 Application Summaries



## Crater Lake Power and Water Project

App #1248

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	25.52	Stage 2 Tech & Econ Score (100)	45.17
2. Matching Resources (15)	13.00	Benefit/Cost Ratio	0.91
3. Stage 2 Feasibility (20)	1.72		
4. Project Readiness (5)	1.50	<b>Project Rank</b>	
5. Benefits (15)	2.00	Statewide (of 38 Standard applications)	21
6. Local Support (5)	2.00	Regional (of all applications)	2
7. Sustainability (5)	4.00	Stage 3 Ranking Score (100)	49.74
<b>Total Stage 3 Score (100)</b>	<b>49.74</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$17,306,696	\$17,306,696	Cost of Electricity	\$0.34/kWh
REF9 Grant Funds	\$1,227,000	\$1,227,000	Price of Fuel	\$3.68/Gal
Matching Funds	\$420,680	\$420,680	Household Energy Cost	\$11,122

### AEA Review Comments & Recommendation

### Full Funding with Special Provision

This application was initially not recommended due to incomplete prior phase (per the Request for Applications #16012, Sections 2, 2.4, 2.5, applicants must complete prior phases of work prior to receiving funding for future phases). AEA found uncertainty both in the technical and economic aspects and recommended CEC apply for design funding when the feasibility study is complete, as long as it indicates a technically and economically feasible project. The applicant requested reconsideration and provided recently completed draft memoranda from the feasibility study contractor. The draft memoranda describe a 500 kW power project with an estimated total cost of approximately \$17 million that will offset approximately 2 million kWh's of diesel electric generation annually. Through the appeal process, AEA agreed with the applicant in that feasibility data was available and requested that staff score the project. Consequently staff scored the project and is recommending it for full funding with the special condition that the feasibility study is completed, reviewed and approved by AEA, and demonstrates a technically and economically feasible project.

# Renewable Energy Fund: Round 9 Application Summaries



## Indian River Hydroelectric Project - Construction

App #1249

Standard Application

**Project Type:** Hydro

**Energy Region:** Southeast

**Applicant:** City of Tenakee Springs DbA Tenakee Springs Electric Department

**Proposed Phase(s):** Construction

**Applicant Type:** Local Government

**Recommended Phase(s):** Construction

### Project Description

The proposed project is construction of a 180 kW new run of river hydro on Indian River serving the community of Tenakee Springs utilizing 50 cfs and 65 ft of head to generate approximately 680 MWhs of energy and displace 350 MWhs of diesel energy (34,000 gallons of fuel, 95% of current diesel generation) annually at an estimated total project cost of \$5.5 million with a projected start date of 2017. Proposed project features include a diversion structure with integrated fish ladder, 1,700 feet of 36 inch diameter penstock, a single crossflow turbine, and 4,300 ft transmission line. At least an additional 6,500 gallons of fuel oil can be displaced by heating public buildings (community building and school) with excess energy from the hydro project.

### DNR/DMLW Feasibility Comments

The City of Tenakee Springs holds a current Permit to Appropriate Water (LAS 27836). The City of Tenakee Springs may need to apply for a Temporary Water Use Authorization prior to the construction phase of the project. The DMLW Water Resources Section recommends the applicant consult with our Southeast Office to determine specific water use authorization requirements. A shoreland public easement may be needed and an upland easement ADL 106204 to USFS exists.

### Financing Opportunities/Limitations

The City is eligible to secure additional funding for the project through the AEA Power Project Fund (PPF), State Municipal Bond Fund (MBF), or the AIDEA SETS Fund. The City has held initial discussions with the PPF and MBF and intends to make a decision on funding program and apply for funds before the end of 2015. Project pro forma financials indicate utility rates will initially be comparable with existing diesel-based rates without the requested RE program grant funds, slowly decreasing over time as diesel fuel costs escalate. The Requested grant funds would lower utility rates by approximately \$0.13 per kWh. See project pro forma financials in application Attachment G.

# Renewable Energy Fund: Round 9 Application Summaries



## Indian River Hydroelectric Project - Construction

App #1249

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	26.38	Stage 2 Tech & Econ Score (100)	56.33
2. Matching Resources (15)	15.00	Benefit/Cost Ratio	0.94
3. Stage 2 Feasibility (20)	5.44		
4. Project Readiness (5)	5.00	<b>Project Rank</b>	
5. Benefits (15)	2.00	Statewide (of 38 Standard applications)	11
6. Local Support (5)	5.00	Regional (of all applications)	3
7. Sustainability (5)	4.17	Stage 3 Ranking Score (100)	62.99
<b>Total Stage 3 Score (100)</b>	<b>62.99</b>		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$2,298,280	\$5,473,280	Cost of Electricity	\$0.70/kWh
REF9 Grant Funds	\$809,000	\$809,000	Price of Fuel	\$4.26/Gal
Matching Funds	\$1,115,280	\$1,115,280	Household Energy Cost	\$11,498

### AEA Review Comments & Recommendation

### Full Funding

The grant request is to augment existing funding to reduce the new debt applicant requires to complete the project. The project recently completed the first phase of construction and is expected to resume construction after bids are advertised the first half of 2016.

If awarded, the additional funding is expected to reduce the cost of energy by \$0.13/kWh through a decrease of \$45k in the predicted annual debt service payment.

The applicant has performed well recently in executing the development and construction phases of this project resulting in high scores for project management and qualifications. The first phase of construction completed the highest risk geotechnical portion of the project consisting of the access road and site grading at the intake and powerhouse sites. Remaining construction carries less risk and designs for infrastructure are complete and fully detailed. All permits have been obtained. Consequently the project scores well technically.

The additional funding request would cover project costs that are above the original estimates. As the overall project cost has increased and the benefit has remained constant the economic score has declined to slightly less than 1.

Recommended for full funding.

# Renewable Energy Fund: Round 9 Application Summaries



## Elfin Cove Hydroelectric Permitting

App #1250

Standard Application

**Project Type:** Hydro

**Energy Region:** Southeast

**Applicant:** Community of Elfin Cove Non-Profit Corporation, Elfin Cove Utility Commission

**Proposed Phase(s):** Design

**Applicant Type:** Utility

**Recommended Phase(s):** Design

### Project Description

The proposed project is a 35 kW run-of-river upper project with a 105 kW storage lower project for a total installed capacity of 140 kW, based on updated hydrology and utility loan data reported in a January 2014 sizing analysis. The project will include a run-of-river hydroelectric plant between Crooked Creek and Jim's Lake (upper project) and a storage hydroelectric project between Jim's Lake and tidewater (lower project). The recommended project is estimated to displace 89% of the annual diesel fuel consumed by the electric utility generators.

### DNR/DMLW Feasibility Comments

The Elfin Cove Utility Commission (Community of Elfin Cove) has submitted two Applications for Water Rights (LAS 29817 and LAS 29818). The Elfin Cove Utility Commission may need to apply for a Temporary Water Use Authorization prior to the construction phase of the project. The DMLW Water Resources Section recommends the applicant consult with our Southeast Office to determine specific water use authorization requirements. May need a shoreland public easement.

### Financing Opportunities/Limitations

The community is open to financing construction with a combination of grants and loans to see the project completed and start realizing its benefits. While grants will of course provide the greatest immediate rate relief and public benefits, The community has previously debt-financed local infrastructure projects, and would consider debt finance for the hydro project. Our bulk fuel facility was financed with a loan from AEA/AIDEA. We are still paying off this loan and the loan is current.

# Renewable Energy Fund: Round 9 Application Summaries



## Elfin Cove Hydroelectric Permitting

App #1250

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis	
1. Cost of Energy (35)	27.55	Stage 2 Tech & Econ Score (100)	67.33
2. Matching Resources (15)	11.00	Benefit/Cost Ratio	1.22
3. Stage 2 Feasibility (20)	9.11		
4. Project Readiness (5)	4.33	<b>Project Rank</b>	
5. Benefits (15)	6.63	Statewide (of 38 Standard applications)	6
6. Local Support (5)	4.00	Regional (of all applications)	2
7. Sustainability (5)	3.67	Stage 3 Ranking Score (100)	66.29
Total Stage 3 Score (100)	66.29		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$3,835,000	\$3,705,000	Cost of Electricity	\$0.75/kWh
REF9 Grant Funds	\$88,000	\$88,000	Price of Fuel	\$4.37/Gal
Matching Funds	\$22,000	\$22,000	Household Energy Cost	\$12,008

### AEA Review Comments & Recommendation

### Full Funding

The Community of Elfin Cove Non-profit Corporation applied for an \$88,000 grant to partially fund a \$110,000, 140kW hydro project's permitting process.

AEA has the following concerns about this project, which should be monitored if it is funded by the legislature: The population is low and has decreased in recent years. The electric demand is very seasonal. If population continues to decrease in the off-season, it may be difficult to operate the hydro facility continuously. Many hydro projects experience cost overruns. If this one is financed by the community, cost overruns could be problematic for the project and the community.

This project is recommended for full funding.

# Renewable Energy Fund: Round 9 Application Summaries



## Circle 100 Kilowatt Solar Array

App #1251

Standard Application

**Project Type:** Solar

**Energy Region:** Yukon-Koyukuk Upper Tanana

**Applicant:** Circle Utilities, Inc.

**Proposed Phase(s):** Construction

**Applicant Type:** Utility

**Recommended Phase(s):** Feasibility

### Project Description

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Solar power feasibility for the community of Circle including resource assessment, integration and interconnection studies, and cost and preliminary design for a 100 kW solar array.

### DNR/DMLW Feasibility Comments

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As per application, project is not on state-owned land.

### Financing Opportunities/Limitations

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N/A

# Renewable Energy Fund: Round 9 Application Summaries



## Circle 100 Kilowatt Solar Array

App #1251

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio <span style="float: right;">0.44</span>
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$	\$00	Cost of Electricity	\$0.71/kWh
REF9 Grant Funds	\$75,000	\$0	Price of Fuel	\$3.30/Gal
Matching Funds	\$10,000	\$0	Household Energy Cost	\$9,399

### AEA Review Comments & Recommendation

**Not Recommended**

Circle Utilities Inc. applied for a \$75,000 grant to fund a \$85,000 feasibility study of a 100kW to 200kW solar photovoltaic project. The project would be located adjacent to the powerplant on utility property. This project is not recommended for the following reasons:

1. 100kW to 200kW is too large a solar PV project to integrate onto a grid that had annual average loads of 44kW in FY15 unless a significant percentage of the solar output is curtailed.
2. The smallest genset is 100kW. According to John Deere, it should not be run below 30% load for extended periods of time. Since the loads are already below this threshold, adding solar PV would only reduce the minimum loads on the diesel genset.
3. The project economics are poor. Even when evaluated with a more reasonably sized 10kW solar system, at an installed cost of \$8 per Watt (less than Eagle's recent experience at approximately \$10 per Watt), the benefit cost ratio is 0.44. The total construction cost in this scenario is only \$80,000, which is less than was requested in this application for a feasibility study.
4. Not enough detail was included in the application. It does not appear that the applicant used the best practices checklist for solar, as was recommended on the first page of the Request for Applications #16012.

This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.

# Renewable Energy Fund: Round 9 Application Summaries



## Igiugig RivGen® Power System Commercial Project

App #1252

Standard Application

**Project Type:** Hydrokinetic

**Energy Region:** Bristol Bay

**Applicant:** Igiugig Village Council d/b/a Igiugig Electric Company

**Proposed Phase(s):** Design, Construction

**Applicant Type:** Government Entity

**Recommended Phase(s):** Design, Construction

### Project Description

Igiugig Village Council (IVC) requests Alaska Energy Authority (AEA) funding through the Renewable Energy Fund Round IX program (RFA 16012) in the amount of \$1,490,077 for the Igiugig RivGen Power System Commercial Project (Project), which includes Phase III Final Design and Permitting and Phase IV Construction of a 20-kilowatt RivGen Power System by ORPC Alaska, LLC, a wholly-owned subsidiary of Ocean Renewable Power Company (collectively ORPC). As a remote village that has extremely high energy costs and relies on diesel fuel to meet electricity and heating needs, IVC seeks to lower energy costs by utilizing the Kvichak River as a local, clean, renewable energy source. This Project will be the first commercial installation of a hydrokinetic power system of any type in the state of Alaska. The Project follows IVCs successful completion of previous project phases funded by AEA, i.e., Phase I Reconnaissance and Phase II Feasibility and Conceptual Design. The Project also follows ORPCs successful demonstration of the RivGen Power System, which generated electricity from the Kvichak River in August 2014, and of the optimized system, which provided over 2 MWh of clean power to Igiugigs local grid during the 2015 demonstration, also funded in part by AEA. On April 1, 2015, IVC submitted a draft Federal Energy Regulatory Commission pilot license application. The proposed REF project works synergistically with a proposal submitted to the US Department of Energy in July 2015 (EE1310-1517), which will provide matching construction funds.

### DNR/DMLW Feasibility Comments

An easement (or other appropriate authorization as determined by SCRO) will be required for any submerged electrical cable in the Kvichak River, and a lease (or other appropriate authorization as determined by SCRO) from SCRO will likely be required for the RivGen unit itself. (Depending on how ORPC connects a submerged electric cable from the unit in the Kvichak River, it could impact ADL 226067, an avigation and hazards easement to DOT&PF, Central Region, ADL 221403, a Management Right issued to DOT&PF, ADL 230875, a private, non-exclusive easement issued to United Utilities, Inc., and ADL 231288, a public utility easement issued to the Village of Igiugig. If any portion of electrical cable would cross uplands it may impact three seperate management agreements (ADLs 221403, 224031, and 228387) for the Airport at Igiugig.)

### Financing Opportunities/Limitations

As a federally recognized tribe, IVC will be eligible for federal funding opportunities or able to leverage private grants. Our tribe is the majority owner of an 8(a) contracting company that has invested in a large rock quarry, to quarry rock for the next 30+ years. In order to purchase the property, we took out a large loan from the Small Business Administration, which imposes certain restrictions that prevents IVC from borrowing without prior permission. IVC works closely with Igiugig Native Corporation for smaller loans and financing for village projects when needed. In the past we borrowed from the native corporation to purchase houses. The regional corporation, Bristol Bay Development Fund, is supportive of this project and willing to invest if needed.

# Renewable Energy Fund: Round 9 Application Summaries



## Igiugig RivGen® Power System Commercial Project

App #1252

Standard Application

### Stage 3 Scoring Summary

Criterion (Max Score)	Score	Feasibility Analysis
1. Cost of Energy (35)		Stage 2 Tech & Econ Score (100)
2. Matching Resources (15)		Benefit/Cost Ratio 0.20
3. Stage 2 Feasibility (20)		
4. Project Readiness (5)		<b>Project Rank</b>
5. Benefits (15)		Statewide (of 38 Standard applications)
6. Local Support (5)		Regional (of all applications)
7. Sustainability (5)		Stage 3 Ranking Score (100)
Total Stage 3 Score (100)		

Funding & Cost	Requested	Recommended		
Total Cost Through Construction	\$2,131,740	\$2,131,740	Cost of Electricity	\$0.81/kWh
REF9 Grant Funds	\$1,490,077	\$0	Price of Fuel	\$7.33/Gal
Matching Funds	\$641,663	\$0	Household Energy Cost	\$16,003

## Igiugig RivGen® Power System Commercial Project

App #1252

Standard Application

### AEA Review Comments & Recommendation

### Not Recommended

The proposal from the Igiugig Village Council to complete final design and construction of a river hydrokinetic power project follows years of work starting in 2008 with resource assessment and continuing with site characterization through device demonstration. It also builds on experience and information gained from an Emerging Energy Technology Fund (EETF) award and other significant state and federal investments in hydrokinetics. The community has actively pursued a hydrokinetic installation and the project team has been on the forefront of hydrokinetic development, including design and permitting. The proposed location in the Kvichak River is widely considered the most promising for a hydrokinetic device in the state with clear water, consistent current velocities, and lack of river ice formation. Significant salmon runs will play a central role in project permitting and require extensive biological monitoring. While the site and river characteristics are unique in Alaska, many aspects of the project could result in information transferrable to other sites and other device types and could contribute to lowering costs for similar projects in the future. The project proposes to use a second generation device that has not yet been constructed and would still need to overcome numerous hurdles to be successful. As a first-of-a-kind project, costs are expected to be high. Costly device retrieval and redeployment would need to occur annually, at a minimum. As proposed, the calculated benefit to cost ratio under current assumptions is around 0.2. Given the state of development of the technology, the proposed project does not compete favorably in the Renewable Energy Fund (REF) process on economic or technical terms with more mature technologies. AEA examined what it would take to obtain a benefit to cost ratio of 1. In order to be economical it is projected permitting and engineering costs must be drastically reduced, the device cost would need to drop, and operations costs would have to be very low. It is within the realm of possibility that continued development and testing could result in a significant reduction in the upfront engineering work and a streamlined permit process. Continued development and testing could also result in lower capital and maintenance costs. Advancing this technology may solve the economic issues. The Renewable Energy Fund regulations require that for demonstration projects, recommendation can be made if there is potential for application in other areas of the state; the need for the project is shown; and the risks of the proposed system are reasonable and warrant demonstration. There is certainly a large need, and potential, for a viable hydrokinetic project. Extrapolating application of this device to other hydrokinetic sites throughout the state remains a significant hurdle. The Kvichak River site in Igiugig is somewhat unique in that the water in that portion of the river is very clean and generally lacks debris and sediment load because it is at the outlet of a large lake. Most sites across Alaska however have significant amounts of debris and sediment loads. Progress is being made on a debris diverter but such a device adds to the cost of the system further challenging the project economics. On the basis that the ORPC technology appears to have limited potential economical application at other river sites throughout the state this project is not recommended. AEA recognizes that the quality of the resource, the outstanding commitment of the community and project team, and the investment in site characterization and preparation combine to make this a compelling river hydrokinetic project. However, the technical and economic challenges of this developing technology do not yet allow it to compete well as a standard REF project, and the project's ability as a demonstration project to apply to other parts of the state are limited due to unique river characteristics. Therefore AEA does not recommend funding this project at this time. This project is not recommended for funding and will not advance past Stage 2 of the evaluation process per REF statutes and regulations (AS 42.45.045, 3 AAC 107.600-695), and per Section 4 of the Request for Applications #16012.

