RENEWABLE ENERGY FUND

STATUS REPORT AND ROUND IX RECOMMENDATIONS

MAY 2016

ALASKA ENERGY AUTHORITY

INTRODUCTION

Renewable Energy Fund appropriations totaling $257 million have been issued since 2008. This funding has been matched with hundreds of millions in funding from local sources. State funding in the early, higher-risk stages of project development create opportunity to leverage significant private investment to see projects through to completion.

The Alaska Renewable Energy Fund (REF) provides benefits to Alaskans by assisting communities across the state to both reduce and stabilize the cost of energy. The program also creates jobs, uses local energy resources, and keeps money in local economies.

Currently generating REF projects have an overall benefit cost ratio of 2.50 and that is considering total project cost, of which state funding is only a portion. Investing in stable priced renewable energy is a wise investment that will save Alaska communities millions of dollars for decades to come.

The REF is managed by the Alaska Energy Authority (AEA) and provides public funding for the development of qualifying and competitively selected renewable energy projects in Alaska. The program is designed to produce cost-effective renewable energy for heat and power to benefit Alaskans statewide. As the program matures, the quality of the proposed projects continues to rise as does the knowledge base for designing, constructing, and operating renewable energy in Alaska's diverse climates and terrain.

CONTENTS:
This 2016 status report has two parts and a separate appendix:

1. A summary analysis of projects funded to date, including the performance and savings associated with projects that are currently generating heat and power. (pg. 1 - 8)

2. A summary of AEA's recommendations to the Legislature for funding in 2016 (Round IX). (pg. 9 - 19)

An appendix of individual project scopes and statuses for funded projects accompanies this report. It is available in searchable PDF form at www.akenergyauthority.org

Additional information on this year's recommendations and all current and past grants are available on AEA's website www.akenergyauthority.org and includes:

- Appendix of project statuses (Rounds I - VIII)
- Economic evaluations
- Application summaries

This report only includes performance of REF funded projects and so is not a complete view of renewable energy production in Alaska.

Figure 1 shows continued strong growth in energy generation and fuel displacement.

Renewable Energy Fund projects saved Alaska communities an estimated 27.8 million gallons of diesel fuel (equivalent) in 2015, a savings of more than $73.7 million dollars.

Two significant hydro projects came online in that period; Whitman Lake and Blue Lake expansion.

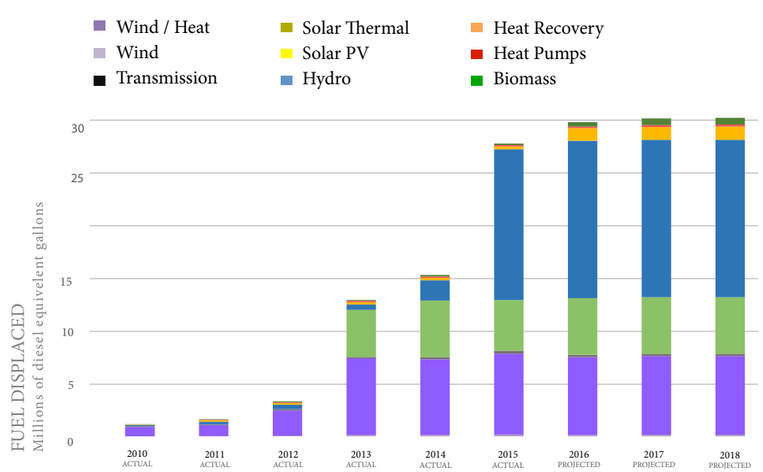
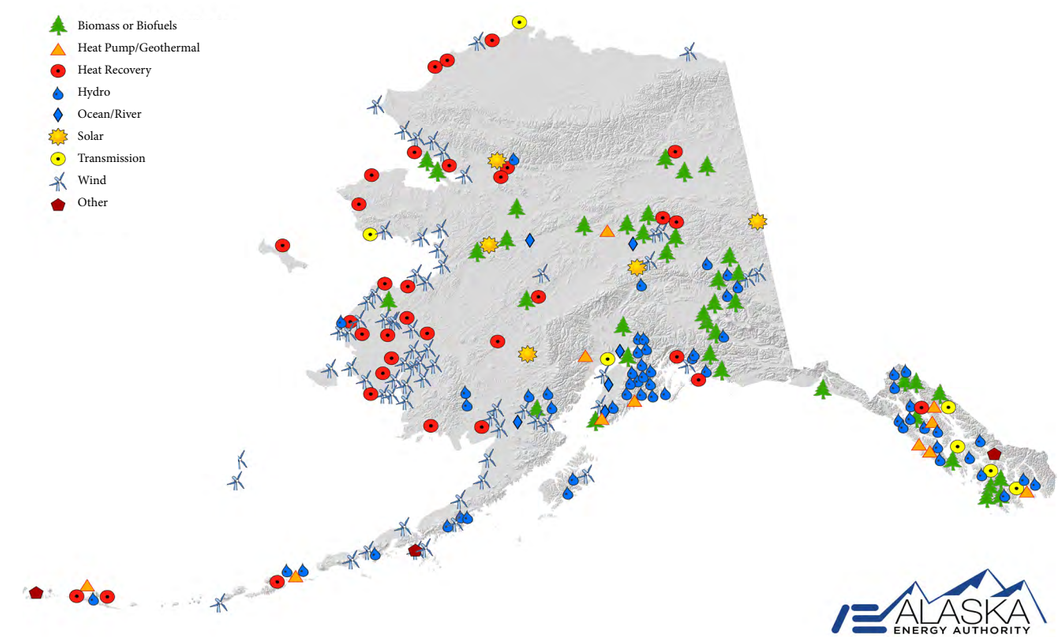


Figure 2 below demonstrates the wide geographic distribution of REF projects across all areas of the state. Most funding is provided to high cost-of-energy communities.

RENEWABLE ENERGY FUND PROJECTS
ROUNDS I-VIII



FUNDED GRANTS BY ENERGY RESOURCE ($ millions)
ROUNDS I-VIII

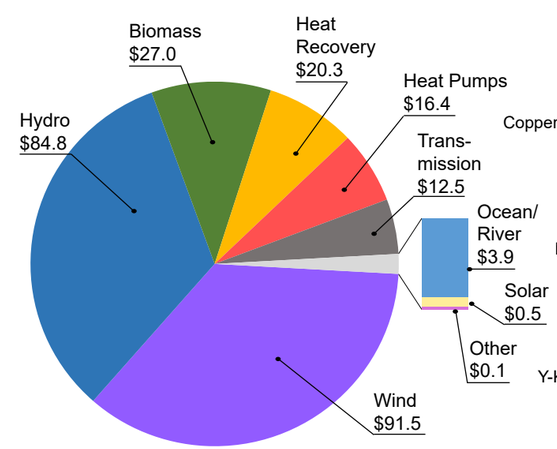


Figure 3 shows funding by energy resource, with wind and hydro grants making up just less than 70 percent of total funding.

FUNDED GRANTS BY ENERGY REGION ($ millions)
ROUNDS I-VIII

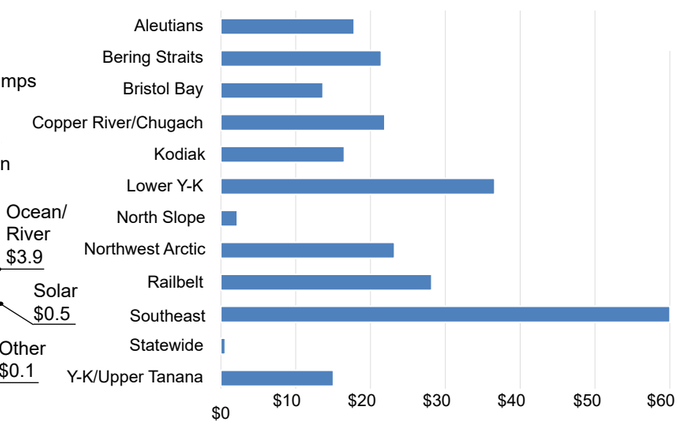


Figure 4 shows cumulative grant funding by AEA energy region totaling to $257 million in rounds I-VIII. The three highest recipients to date are Southeast with $60 million, Lower Yukon-Kuskokwim with $36.6 million, and Railbelt with $28.2 million.

PERFORMANCE & SAVINGS

- Figure 5 shows the net present value (NPV) of those REF projects that have been completed to date. Many of the 54 projects represented received initial funding in the early rounds of the REF program.
- The net present value of the capital expenditures used to build currently generating projects is $496M and the net present value of benefits is $1,237M. Based on the net present value of capital cost and future benefits, these projects have an overall benefit cost ratio of 2.5.
- For every dollar invested, these projects have an estimated return of $2.50. It is important to note that the REF invested $128.3 million of total project cost in these 54 projects. The balance was invested from other sources.
- The largest number of generating projects are wind, at 31 percent, this share continues to decline, from 40 percent in 2013 to 34 percent in 2014. Hydro projects continue to gain share, up to 19 percent of total generating projects this year.
- There are currently nine operational biomass projects, 17 percent of total, and an additional nine are expected to come online ion the next two years.
- More than half of the projects included in the calculation for future projected energy generation are heat projects, either biomass or heat recovery.
- Though still small as a percentage of total NPV of capital benefits, the number of heat projects still comprise a substantial portion, 39 percent, of total projects. This large number of individual heat projects are smaller in cost and benefits and include heat recovery, heat pumps and biomass.
- See pages 6 and 7 for information about where these $1.2 billion in benefits accrue.

REF CURRENTLY OPERATING PROJECTS

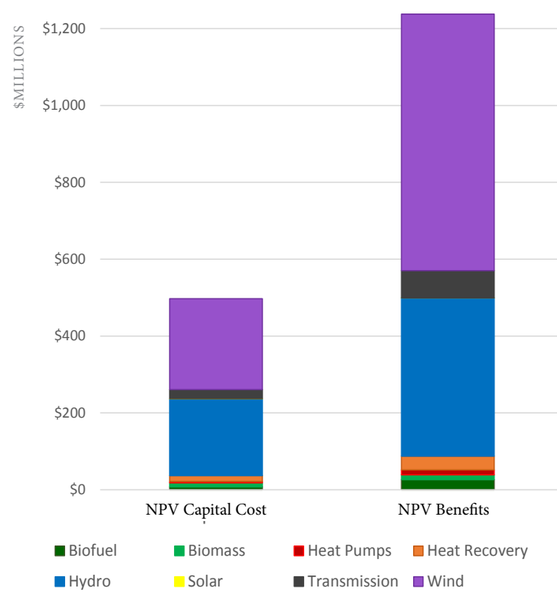


Figure 5 shows the present value (PV) of the 55 projects that have been completed to date.

NOTES:

1. Total grant amount requested by all applicants.
2. $26.6 million was appropriated for round IV, and an additional $10 million was re-appropriated from previous rounds for use in round IV.
3. $20 million was appropriated for round VII, and an additional $2.8 million was re-appropriated from previous rounds for use in round VII.
4. $9.5 million was re-appropriated from the Mt. Spurr geothermal project (FSSLA 2011 CH5, P137) for round VIII, and an additional $2.0 million was re-appropriated from previous rounds for use in round VIII.
5. Represents only amounts recorded in the grant document and does not capture all funding need to complete all phases of the project.

GRANT AND FUNDING SUMMARY

	Round I	Round II	Round III	Round IV	Round V	Round VI	Round VII	Round VIII	Totals
Applications received	115	118	123	108	97	85	86	67	799
Applications funded	80	30	25	74	19	23	26	10	287
Current active grants	13	6	8	30	18	22	26	10	133
Amount requested[1] ($M)	$ 453.8	$ 293.4	$ 223.5	$ 123.1	$ 132.9	$ 122.6	$ 93.0	$ 43.8	$ 1,486.1
AEA recommended ($M)	$ 100.0	$ 36.8	$ 65.8	$ 36.6	$ 43.2	$ 56.8	$ 59.1	$ 20.6	$ 418.9
Appropriated ($M)	$ 100.0	$ 25.0	$ 25.0	$ 26.6[2]	$ 25.9	$ 25.0	$ 20.0[3]	$ 9.5[4]	$ 257.0
Grant match Budget[5] ($M)	$ 23.6	$ 4.5	$ 11.0	$ 61.6	$ 9.0	$ 5.7	$ 36.7	$ 1.2	$ 153.3

RENEWABLE ENERGY FUND SUCCESS STORY

GAMBELL and CHEVAK EXCESS WIND for WATER SYSTEM HEAT: using excess wind generation to heat water systems and optimize wind-diesel hybrid power systems.

REF AWARDS | $480,000
MATCHING FUNDS | $26,000
TOTAL PROJECT COST | $506,000

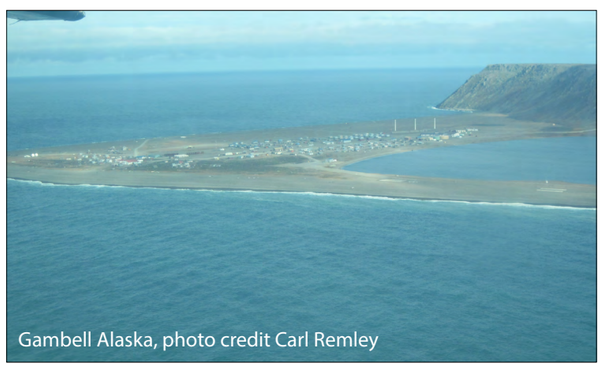
Chevak wind turbines

The communities of Chevak and Gambell are together saving 15,800 gallons of fuel every year by using excess electrical production from a previously installed wind-diesel system to help heat their water systems. Both of these projects were developed through a collaboration between the Alaska Village Electric Cooperative (AVEC) and the Alaska Native Tribal Health Consortium (ANTHC) using $480,520 in Renewable Energy Fund grants and $25,290 in matching funds.

In all hybrid systems there are times, during peak production or when demand is low, that there is excess electrical production. The experience gained through REF and earlier projects has demonstrated the importance of addressing excess electrical production from both a technical and economic standpoint; in current hybrid system design, secondary loads are installed to use this otherwise wasted energy.

The Gambell and Chevak projects retrofitted the community water treatment plant with electric boilers to serve as secondary loads when excess wind energy is generated and to heat the domestic water loop, water storage tanks and facility space.

In 2015 fuel prices in Chevak and Gambell hovered around $4 per gallon. At this price, the new system is saving just over $63,000 in fuel costs annually. There is value to community residents in both direct cost savings from the water utility (as a result of lower operating costs) and potential rate reductions at the electric utility (as a result of new revenue from sale of renewable energy heat).


Gambell Alaska, photo credit Carl Remley

AVEC charges $0.05/kWh for the excess energy used for heat. AVEC uses revenue from heat sales to pay for: operations and maintenance associated with delivering excess wind energy, improving the local utility infrastructure and to reduce rates. At current prices, a little less than half the value of the fuel savings goes to the electric utility and the rest to the water utility.

The electric utility also benefits from the availability of new dispatchable loads for their wind-diesel hybrid systems. As with most renewable resources, wind power is variable and relatively unpredictable. Even with modern controls, the sudden addition or loss of a large amounts of power can be a problem for these power systems. The ability to divert excess power whenever necessary is a valuable tool for ensuring the utility's safe, reliable and efficient operation.

Chevak is a community of just under 1,000 residents located in western Alaska in the Kusilvak census area in the Calista region. Chevak has a hybrid power system with about one third of the electricity generated from wind and two-thirds generated with diesel. Project metrics:

- Total project cost of $253K
- Annual fuel savings of more than 8,600 gallons of diesel
- Benefit-cost ratio of 2.50

Gambell is a community of more than 700 residents located on St. Lawrence Island, 200 miles southwest of Nome, in the Bering Sea. Gambell has a hybrid power system with around 14 percent of the electricity generated from wind and the balance generated from diesel. Project metrics:

- Total project cost $253K
- Annual fuel savings of more than 7,200 gallons of diesel
- Benefit-cost ratio 2.07

PERFORMANCE OF RENEWABLE ENERGY FUND PROJECTS

PROJECTS IN OPERATION DURING THE PERIOD 2009- 2015

						2014				2015				Cumulative Total (2009 - 2015)			
						Energy Production		Fuel Displaced		Energy Production		Fuel Displaced		Energy Production		Fuel Displaced	
	Technology Type	Fuel Displaced	Grantee	Project Name	Start date	Electrical (MWh)	Thermal (MMBtu)	Diesel (Gal x 1000)	Value ($ x 1000)	Electrical (MWh)	Thermal (MMBtu)	Diesel (Gal x 1000)	Value ($ x 1000)	Electrical (MWh)	Thermal (MMBtu)	Diesel (Gal x 1000)	Value ($ x 1000)
	ELECTRICAL PROJECTS																
1	Hydro	Diesel	Inside Passage Electric Co-op	Gartina Falls - Hoonah	07/15	-	-	-	$ -	568	-	38	$ 144	568	-	38	$ 144
2	Hydro	Diesel	Chignik Lagoon Power Utility	Packers Creek	03/15	-	-	-	$ -	562	-	52	$ 235	562	-	52	$ 235
3	Hydro	Diesel	City of Akutan	Akutan Hydro	12/14	-	-	-	$ -	11	-	1	$ 5	11	-	1	$ 5
4	Hydro	Diesel	City and Borough of Sitka	Blue Lake Expansion	11/14	8,755	-	674	$ 2,155	59,272	-	4,559	$ 14,594	68,027	-	5,233	$ 16,749
5	Hydro	Diesel	City of Ketchikan	Whitman Lake	10/14	2,487	-	191	$ 809	8,762	-	674	$ 2,851	11,249	-	865	$ 3,660
6	Hydro	Diesel	Kodiak Electric Assoc.	Terror Lake	01/14	12,406	-	827	$ 3,680	118,044	-	8,432	$ 34,233	127,349	-	9,052	$ 36,993
7	Hydro	Diesel	Cordova Electric Co-op	Humpback Creek	07/11	2,814	-	217	$ 762	3,074	-	236	$ 768	14,469	-	1,108	$ 3,955
8	Hydro	Diesel	Gustavus Electric	Falls Creek	07/09	1,871	-	144	$ 557	2,149	-	165	$ 613	12,052	-	892	$ 3,316
9	Hydro	Diesel	City of Atka	Chuniixsax Creek	12/12	287	-	22	$ 121	381	-	29	$ 150	1,057	-	81	$ 434
10	Landfill Gas	Nat Gas	Municipality of Anchorage	Anchorage Landfill Gas	08/12	56,167	-	5,352	$ 2,416	50,032	-	4,783	$ 1,079	152,913	-	14,586	$ 7,545
11	Solar PV	Diesel	AK Village Electric Co-op	Kaltag Solar	10/12	9	-	1	$ 2	8	-	1	$ 2	26	-	2	$ 7
12	Transmission	Diesel	AK Electric Light & Power	Snettisham - Juneau	01/14	1,247	-	96	$ 150	1,871	-	144	$ 225	1,871	-	144	$ 225
13	Transmission	Diesel	Alaska Power & Telephon	North Prince of Wales Intertie	09/11	931	-	72	$ 259	1,352	-	104	$ 289	4,524	-	312	$ 1,049
14	Transmission	Diesel	Nome Joint Utility System	Banner Wind Transmission	10/10	986	-	61	$ 206	1,650	-	102	$ 307	7,148	-	427	$ 1,339
15	Wind	Diesel	Nome Joint Utility System	Banner Peak Wind Expansion	08/13	1,283	-	78	$ 266	1,642	-	100	$ 304	3,537	-	216	$ 692
16	Wind	Naphtha	Golden Valley Electric Assoc.	Eva Creek	10/12	71,770	-	5,054	$ 13,074	72,639	-	5,115	$ 8,324	229,119	-	16,135	$ 36,673
17	Wind	Diesel	Kotzebue Electric Association	Kotz Wind-Battery-Diesel	05/12	3,374	-	229	$ 811	2,511	-	171	$ 542	9,908	-	674	$ 2,349
18	Wind	Diesel	AK Village Electric Co-op	Shaktoolik Wind	04/12	312	-	24	$ 97	283	-	22	$ 84	934	-	72	$ 284
19	Wind	Diesel	AK Village Electric Co-op	Emmonak/Alakanuk Wind	09/11	485	-	34	$ 136	327	-	23	$ 84	1,887	-	134	$ 519
20	Wind	Diesel	AK Village Electric Co-op	Quinhagak Wind Farm	11/10	415	-	32	$ 130	403	-	31	$ 115	2,338	-	176	$ 688
21	Wind	Diesel	AK Village Electric Co-op	Mekoryuk Wind Farm	11/10	173	-	12	$ 47	180	-	13	$ 48	940	-	64	$ 239
22	Wind	Naphtha	Alaska Environmental Power	Delta Area Wind Turbines	09/10	2,251	-	145	$ 392	2,013	-	130	$ 351	9,046	-	566	$ 1,456
23	Wind	Diesel	Kodiak Electric Assoc.	Pillar Mountain Wind	09/10	23,039	-	1,622	$ 5,066	29,107	-	2,050	$ 5,417	124,684	-	8,775	$ 28,081
24	Wind	Diesel	AK Village Electric Co-op	Toksook Wind Farm	08/09	42	-	3	$ 12	168	-	12	$ 46	1,159	-	82	$ 304
	ELECTRICAL PROJECTS SUBTOTAL					191,102	-	14,890	31,148	357,010	-	26,989	70,809	785,377	-	59,686	146,939
	ELECTRICAL & HEAT PROJECTS SUBTOTAL																
25	Hydro	Diesel	City of Pelican	Pelican Hydro Upgrade	03/13	1,004	431	76	$ 339	1,298	-	93	$ 415	3,011	431	220	$ 984
26	Biomass	Diesel	AK Gateway School District	Tok Wood Heating	10/10	269	6,106	59	$ 146	306	6,136	59	$ 124	575	25,422	239	$ 663
27	Heat Recovery	Diesel	City of Unalaska	Unalaska Heat Recovery	09/14	80	-	6	$ 21	470	19	36	$ 114	550	19	42	$ 135
28	Wind/Heat	Diesel	Tuntutuliak Comm Svs Assoc.	Tunt Wind-Diesel Smart Grid	01/13	158	256	12	$ 47	215	128	17	$ 64	565	696	44	$ 179
29	Wind/Heat	Diesel	Kwigillingok Power Company	Kwig Wind-Diesel Smart Grid	02/12	180	168	14	$ 58	464	238	38	$ 126	723	544	59	$ 217
30	Wind/Heat	Diesel	Aleutian Wind Energy	Sand Point Wind	08/11	1,105	394	81	$ 371	974	360	72	$ 326	3,838	773	282	$ 1,291
31	Wind/Heat	Diesel	Puvurnaq Power Company	Kong Wind-Diesel Smart Grid	12/10	322	551	30	$ 111	330	435	29	$ 96	1,238	1,612	109	$ 423
32	Wind/Heat	Diesel	Unalakleet Valley Electric Co	Unalakleet Wind Farm	12/09	1,090	236	83	$ 322	972	228	72	$ 273	5,636	779	404	$ 1,442
	ELECTRICAL & HEAT PROJECTS SUBTOTAL					4,208	8,142	361	$ 1,416	5,029	7,544	416	$ 1,537	16,138	30,276	1,399	$ 5,333
	HEAT PROJECTS																
33	Wind	Diesel	AK Village Electric Co-op	Chevak Surplus Wind to Heat Water	07/15	-	-	-	$ -	-	121	1	$ 6	-	121	1	$ 6
34	Wind	Diesel	AK Village Electric Co-op	Gambell Surplus Wind to Heat Water	07/15	-	34	0.3	$ 1	-	174	2	$ 6	-	209	2	$ 7
35	Biomass	Diesel	Lake and Peninsula Borough	Lake and Pen Wood Boilers	01/15	-	-	-	$ -	-	45	0.4	$ 2	-	45	0	$ 2
36	Biomass	Diesel	Interior Regional Housing	Wood Heating Interior Commmunities	01/15	-	-	-	$ -	-	272	3.8	$ 16	-	272	4	$ 16
37	Biomass	Diesel	Mentasta Traditional Council	Mentasta Community Facility Heat	10/14	-	-	-	$ -	-	542	5	$ 22	-	542	5	$ 22
38	Biomass	Diesel	City of Tanana	Tanana City-Tribe Biomass	01/14	-	1,972	17	$ 40	-	1,360	11	$ 57	-	3,332	28	$ 97
39	Biomass	Diesel	Southeast Island School District	Thorne Bay School Biomass	01/13	-	1,633	15	$ 36	-	2,121	19	$ 64	-	3,754	34	$ 100
40	Biomass	Diesel	Native Village of Eyak	Cordova Wood Processing	12/11	-	540	4	$ 10	-	840	7	$ 28	-	4,920	40	$ 148
41	Biomass	Diesel	Chilkoot Indian Association	Haines Central Wood Heating	10/11	-	267	3	$ 4	-	141	2	$ 2	-	852	8	$ 18
42	Biomass	Diesel	Delta/Greely School District	Delta Wood Chip Heating	09/11	-	4,673	45	$ 165	-	3,339	32	$ 105	-	15,037	145	$ 471
43	Biomass	Diesel	Gulkana Village Council	Gulkana Central Wood Heating	10/10	-	920	9	$ 25	-	198	2	$ 6	-	3,998	37	$ 123
44	Heat Pumps	Diesel	City of Seward	Sealife Center Seawater Heat Pump	11/11	-	4,809	46	$ 126	-	4,179	40	$ 105	-	14,509	140	$ 373
45	Heat Pumps	Diesel	City and Borough of Juneau	Airport Ground Source Heat Pump	05/11	-	6,400	46	$ 153	-	6,400	46	$ 153	-	29,717	220	$ 755
46	Heat Pumps	Diesel	City and Borough of Juneau	Aquatic Cntr Ground Source Heat Pump	04/11	-	4,222	36	$ 95	-	4,621	39	$ 68	-	14,965	127	$ 320
47	Heat Recovery	Diesel	City of Saint Paul Electric Utility	Saint Paul Fuel Economy Upgrade	02/15	-	-	-	$ -	-	5,680	51	$ 265	-	5,680	51	$ 265
48	Heat Recovery	Diesel	Sleetmute Traditional Council	Heat Recovery to Water Plant	11/14	-	-	-	$ -	-	175	2	$ 9	-	175	2	$ 9
49	Heat Recovery	Diesel	City of Ambler	Ambler Heat Recovery	10/13	-	426	4	$ 48	-	494	5	$ 26	-	1,010	10	$ 85
50	Heat Recovery	Diesel	North Slope Borough	Point Lay Heat Recovery	08/13	-	2,153	20	$ 98	-	1,555	15	$ 71	-	3,708	35	$ 169
51	Heat Recovery	Diesel	Inside Passage Electric Co-op	Hoonah Heat Recovery Project	08/12	-	4,869	47	$ 210	-	4,099	39	$ 148	-	14,805	142	$ 588
52	Heat Recovery	Diesel	City and Borough of Wrangell	Wrangell Hydro Electric Boilers	02/11	-	8,162	84	$ 145	-	7,588	78	$ 25	-	37,678	383	$ 665
53	Heat Recovery	Diesel	McGrath Light & Power	McGrath Heat Recovery	05/10	-	2,427	23	$ 176	-	2,390	23	$ 95	-	13,992	131	$ 749
54	Heat Recovery	Naphtha	Golden Valley Electric Assoc.	North Pole Heat Recovery	11/09	-	2,706	50	$ 193	-	2,040	23	$ 93	-	15,212	264	$ 751
55	Solar Thermal	Propane	Golden Valley Electric Assoc.	McKinley Village Solar Thermal	06/10	-	108	1	$ 10	-	120	1	$ 11	-	661	7	$ 43
	HEAT PROJECTS SUBTOTAL					-	46,321	450	$ 1,535	-	48,494	447	$ 1,384	-	185,194	1,815	$ 5,782
	GRAND TOTAL					195,310	54,463	15,700	$ 34,099	362,039	56,038	27,851	$ 73,729	801,516	215,470	62,900	$ 158,053

Savings are equal to the value of the displaced fossil fuel minus the cost of the renewable energy fuel, where appropriate (e.g. the cost of wood for a biomass project). For projects with no renewable fuel costs (e.g. wind, hydro), savings are equal to the value of the fossil fuel displaced. These savings estimates do not account for changes in operation and maintenance costs or additional costs associated with purchasing and/or selling renewable energy through an independent power producer.

The generation amounts presented in the table are the annual amounts produced by projects that have received REF investment. In certain cases the interactions between REF-funded and previously existing or subsequently built projects are impossible to seperate. These cases are noted and total renewable generation is provided.

Project specific notes:

Row 4 - Blue Lake Expansion: REF funds assisted in the expansion of the Blue Lake hydro facility. The production numbers shown are for the whole system.

Row 6 - Terror Lake Hydro: REF funded the installation of turbine three at Terror Lake. The production numbers shown are for the whole hydro system, of which turbine three is one part. Years prior to 2015 reported modelled estimates of turbine three contributions. The cunmmulative total is the sum of all years as reported.

Row 12 - Snettisham Transmission Line Avalanche Mitigation: actual production values are not available, the figures reported are estimates based on initial economic valuation.

Row 19 - Emmonak Wind: generation is lower in 2015 due to a fire at their substation which eliminated wind generation from mid-May to late August.

Rows 22 and 24 - Delta and Toksook wind performance reported is only for REF funded turbines, not the whole wind farm.

Row 26 - Tok Wood Heating: the project produces energy used for space heating and electricity production. The REF program funded the space heating component but performance reporting is provided for the whole system.

Row 28 - Tuntutuliak Wind: actual reported values were not available for the project. Electric values are estimates based on the PCE reporting by the utility. Heat values are estimates based on past reporting.

Row 29 - Kwigillingok Wind: fourth quarter performance is estimated based on prior years performance. Q1 - Q3 are actual generation values.

Row 37 - Mentasta Biomas: the project is currently not operational and awaiting parts for repair.

Row 40 - Cordova Wood Processing: production data was not provided. Estimates averaging all prior year production is presented.

Row 45 - Juneau Airport Ground Source Heat Pump: the project does not have metering that can provide exact heat displacement. The values reported are estimates based on information provided by the grantee.

Totals may not equal sum of individual figures due to independent rounding.

RENEWABLE ENERGY FUND SUCCESS STORY

PACKERS CREEK HYDRO

REF AWARD | $4,500,000
MATCHING FUNDS | $1,000,000
TOTAL PROJECT COST | $5,500,000
EXPECTED LIFE | 50 YEARS

In 2015 Chignik Lagoon experienced a dramatic change within the community. The noise and emissions from the diesel generator plant ceased but the power was still on. The shift from powering the community with diesel to a water powered generator, a vastly simpler system, occurred with the flick of a switch. Yet the path to building the hydroelectric generation project was not so simple. Chignik Lagoon, with a 2010 census population of 78, is one of three communities in the vicinity of the Chignik River located on the south shore of the Alaska Peninsula 450 miles southwest of Anchorage.

In 1980 a regional reconnaissance study found two economical projects (Through Creek and Crazy Creek). The next known investigation was the 1995 feasibility for development on Packers Creek.

The rising price of oil in the mid 2000's and the desire to create economic development opportunities prompted proactive residents and the utility to pursue the development of a local hydroelectric resource. The main objectives were to reduce electrical costs to the city and to reduce dependency on diesel fuel.

The utility quickly discovered that developing a hydroelectric project was not as simple as the technology.

Packers Creek ribbon cutting in Chignik Lagoon.

Packers Creek powerhouse and tailrace.

Development stalled because of a lack of funding for the costly upfront engineering and permitting expenses. Then in 2008 the Renewable Energy Fund (REF) grant program was able to help provide the funding needed for this early work.

Alaska's REF grant program jump started the development and later awarded grants for final design and construction. The 167 kW project now generates about 85 percent of Chignik Lagoon's electrical needs. Construction of the project also improved other infrastructure and opportunities in the community.

A new mile-long gravel road leading to the Packers Creek dam nearly doubles the total amount of road in Chignik Lagoon opening up new areas for recreation and subsistence. The project also improved electrical distribution, reduced noise and diesel emissions, and will potentially motivate new business and stimulate the local economy due to lower cost power.

The switch from diesel electric generation to hydroelectric generation in Chignik Lagoon was summed up in a poem written by 10th grader Isabelle Erickson:

"I can finally hear the birds, they're singing in the sky, the noise, that noise is gone. Oh, I can already smell a change, the air is fresh and clean, the clouds, those black clouds are gone. I can see a time ahead, with more space for a town to grow. The days, those cramped days are gone."

ROUND IX RECOMMENDED APPLICATIONS

AEA recommended 39 out of 52 applications reviewed for Round IX funding. These 39 projects requested $40.9 million in funding and offered $33.2 in matching funds. Following AEA's technical and economic reviews and scoring, AEA recommends funding of $36.1 million for these 39 projects. To meet the Governor's budget target of $5 million, and following consultation with the Renewable Energy Fund Advisory Committee (REFAC) on regional distribution, AEA recommends seven projects that fit within this proposed budget. One of the projects would need an additional $11,599 beyond the $5 million budget to receive the recommended funding.

REVIEW PROCESS

The recommendation process involves three stages of review and scoring and a fourth stage where regional distribution is applied. The first three stages evaluate and score: eligibility, technical and economic feasibility, cost of energy, experience and qualifications, and ranking based on criteria established in statute and regulation. The technical and economic evaluation is a thorough vetting process conducted by AEA technical reviewers, economists, and the Department of Natural Resources. Following the third stage of evaluation, AEA presents a ranked list of recommended projects, a list of not recommended projects, and a regional distribution recommendation to the REFAC to ensure that there is regional equity in the cumulative rounds I through IX funding.

ADVISORY COMMITTEE/REGIONAL DISTRIBUTION

Below is the approach to regional distribution.

Calculating a regional funding target: Use a regional population weighted "burden of energy cost" metric to establish regional funding bands. The burden of energy cost for a household is calculated based on regionally appropriate average annual residential heating fuel equivalent consumption, 6,000 kWh per year electric consumption and household income.

Burden of energy cost = (HH cost of electric + heat energy) / HH income

A regional population weighted burden of energy cost is calculated for each energy region in the state. The burden number is then used to calculate a target funding level for each region, such that regions with high energy cost burden are eligible to receive more funding cumulatively across all years of the REF.

Underserved: In order for a region to be classified as underserved they must have received less than 50 percent of the calculated target. Projects in underserved regions will be moved up on the list (if the project they are replacing is in an adequately or overserved region).

- Based on Round I-VIII funding both Yukon-Koyukuk/Upper Tanana and Bering Straits are considered underserved. In Round IX three projects were moved into the Governor's $5 million budget.

Overserved: For a region to be considered overserved they must have received more than two times their calculated target. To achieve a better balance of funding across the state, regions that are determined to be overserved will be capped so their share of the overall fund cannot grow.

- Based on Round I-VIII funding both Southeast and the Railbelt are considered overserved; neither region had a project that ranked within the Governor's budget so this rule did not affect any region this round.

AEA'S RECOMMENDATIONS

The REFAC met on January 13, 2016 and voted to accept the REF recommended project list presented by AEA staff and provided guidance on several points. With the support of the committee, AEA presents the legislature with the following tables of recommended projects for a funding determination. Pages 10 and 11 identify all projects that are recommended for funding by AEA in ranked order.

The first $5 million of projects that fit within the Governor's budget appear above a bold line denoting $5 million in cumulative recommended funding. Standard electric projects are blue and heat projects are orange. Notes for both recommended and not recommended project tables appear after the not recommended list on page 14.

REF Round IX Recommended Projects Rank List

Blue cells indicate a standard electric generation application

Orange cells indicate a heat project application

Recommended Projects										Project Cost			Recommendation			
Energy Region	ID	Project Name	Applicant	Energy Source	B/C Ratio	Impacted Pop.	Household Energy Cost	Tech/ Econ Score	State-wide Rank	Project Cost Through Construction	Applicant Grant Requested	Applicant Match Offered	Recommended Phase(s)	AEA Recomnd	Recommended Funding	Cumulative Funding
Copper River/Chugach	1226	Fivemile Creek Hydroelectric Project	Chitina Electric Inc. (CEI)	Hydro	1.71	116	$12,269	75.67	1	$6,589,090	$3,400,000	$2,600,000	Constr	Full	$3,400,000	$3,400,000
Aleutians	1237	Sand Point High Penetration Wind System	Sand Point Generating, TDX	Wind	2.19	946	$10,793	83.33	2	$1,067,309	$649,030	$423,275	Design, Constr	Full	$649,030	$4,049,030
Bering Straits	**1234**	**Wales Water System Heat Recovery**	**City of Wales**	**Heat Recovery**	**1.44**	**146**	**$17,269**	**72.50**	**3**	**$653,277**	**$650,047**	**$6,566**	**Design, Const**	**Full**	**$650,047**	**$4,699,077**
Aleutians	1245	Adak Hydro Power Generator	TDX Adak Generating, TDX	Hydro	1.75	247	$14,961	59.50	4	$1,750,000	$294,102	$126,044	Feas	Partial	$19,600	$4,718,677
Bering Straits	**1238**	**Koyuk Water System Heat Recovery**	**City of Koyuk**	**Heat Recovery**	**1.06**	**321**	**$18,742**	**61.50**	**8**	**$695,269**	**$688,386**	**$6,884**	**Design**	**Partial**	**$90,922**	**$4,809,599**
Bering Straits	**1223**	**Shishmaref Wind Feasibility & Conceptual Design**	**Alaska Village Electric Coop**	**Wind**	**0.93***	**607**	**$15,812**	**52.50**	**18**	**$2,529,400**	**$152,000**	**$8,000**	**Feas**	**Full SP**	**$152,000**	**$4,961,599**
Y-K/Upper Tanana	***1233***	***Grayling Water System Heat Recovery***	***City of Grayling***	***Heat Recovery***	***0.98****	***191***	***$12,652***	***54.50***	***21***	***$431,982***	***$427,705***	***$4,277***	***Design***	***Partial***	***$38,401***	***$5,000,000***
Y-K/Upper Tanana	***1233***	***Grayling Water System Heat Recovery***	***City of Grayling***	***Heat Recovery***	***0.98****	***191***	***$12,652***	***54.50***	***21***	***$431,982***	***$427,705***	***$4,277***	***Design***	***Partial***	***$11,599***	***$5,011,599***
Railbelt	1242	Heat Pump System for City of Seward	City of Seward	Heat Pump	1.97	2,768	$9,005	83.17	5	$955,458	$725,000	$125,000	Design, Constr	Full	$725,000	*$5,736,599*
Southeast	1244	IPEC Gunnuk Creek Hydro Rehab in Kake	Inside Passage Electric Coop	Hydro	2.23	1,913	$10,561	73.00	6	$5,715,000	$3,920,000	$1,545,000	Constr	Full SP	$3,920,000	$9,656,599
Lower Yukon-Kuskokwim	1224	Mountain Village-St. Mary's Wind Intertie	Alaska Village Electric Coop	Trans, Wind	1.00	1,524	$12,362	66.00	7	$6,196,000	$3,196,000	$3,000,000	Design, Constr	Full SP	$3,196,000	$12,852,599
Southeast	1250	Elfin Cove Hydroelectric Permitting	Elfin Cove Utility Commission	Hydro	1.22	16	$12,008	67.33	9	$3,705,000	$88,000	$22,000	Design	Full	$88,000	$12,940,599
Northwest Arctic	1216	Shungnak Wind-Diesel Conceptual Design	Native Village of Shungnak	Wind	1.04	460	$17,752	50.00	10	$5,598,500	$135,000	$39,000	Feas	Full SP	$135,000	$13,075,599
Lower Yukon-Kuskokwim	1222	Bethel Power Plant Heat Recovery Module	Alaska Village Electric Coop	Heat Recovery	2.16	6,241	$10,766	71.67	11	$8,233,369	$2,555,489	$283,943	Constr	Full SP	$2,555,489	$15,631,088
Bristol Bay	1247	Chignik Hydroelectric Dam Project	City of Chignik	Hydro	1.86	96	$8,746	73.67	12	$7,783,428	$1,025,175	$60,251	Design	Full	$1,025,175	$16,656,263
Kodiak	1221	Old Harbor Hydro Geotech & Final Design	Alaska Village Electric Coop	Hydro	1.38	213	$12,095	68.50	13	$9,317,500	$1,092,500	$57,500	Design	Partial	$792,500	$17,448,763
Kodiak	1202	Upper Hidden Basin Geotech Investigation	Kodiak Electric Association	Hydro, Storage	4.24	8,465	$7,047	79.00	14	$79,247,000	$750,000	$750,000	Feas	Full	$750,000	$18,198,763
Southeast	1249	Indian River Hydroelectric Project - Construction	Tenakee Springs Electric	Hydro	0.94*	128	$11,498	56.33	15	$5,473,280	$809,000	$1,115,280	Constr	Full	$809,000	$19,007,763
Northwest Arctic	1212	Cosmos Hills Hydro Design & Permitting	NANA Regional Corporation	Hydro	1.08	734	$15,410	40.50	16	$50,797,871	$341,335	$37,200	Design	Full	$341,335	$19,349,098
Lower Yukon-Kuskokwim	1214	Eek Water System Heat Recovery	City of Eek	Heat Recovery	1.01	349	$12,572	59.50	17	$311,394	$308,311	$3,083	Design	Partial	$50,000	$19,399,098
Southeast	1211	Sitka Wastewater Plant Effluent Heat Pump	City and Borough of Sitka	Heat Pump	1.13	9,061	$6,991	72.50	19	$826,067	$667,000	$113,000	Design, Constr	Full	$667,000	$20,066,098
Y-K/Upper Tanana	**1207**	**Yerrick Creek Hydro Construction**	**Upper Tanana Energy**	**Hydro**	**1.23**	**1,539**	**$7,963**	**57.17**	**20**	**$20,744,264**	**$4,000,000**	**$15,000,000**	**Constr**	**Full SP**	**$3,925,000**	**$23,991,098**
Southeast	1205	Neck Lake Hydropower Project: Phases II-III	Alaska Power Company	Hydro	1.21	39	$9,630	63.17	22	$3,016,475	$395,200	$98,800	Feas, Design	Full	$395,200	$24,386,298
Lower Yukon-Kuskokwim	1235	Scammon Bay Hydroelectric Project	City of Scammon Bay	Hydro	1.25	528	$12,698	49.67	23	$4,283,056	$305,000	$3,050	Feas	Partial	$90,000	$24,476,298
Y-K/Upper Tanana	**1215**	**Huslia Water & Clinic Biomass Boiler**	**City of Huslia**	**Biomass**	**0.72***	**338**	**$13,795**	**44.67**	**24**	**$496,526**	**$491,610**	**$4,916**	**Design**	**Partial**	**$53,116**	**$24,529,414**
Aleutians	1219	False Pass Hydro Feasibility & Conceptual Design	City of False Pass	Hydro	1.87	34	$8,145	73.67	25	$4,380,000	$187,000	$33,000	Feas	Full	$187,000	$24,716,414
Aleutians	1246	St. Paul Island 80% Renewable Energy Feasibility	TDX Power, Inc.	Other, Wind	1.66	436	$8,560	48.83	26	$5,731,500	$265,200	$66,300	Recon, Feas	Full	$265,200	$24,981,614
Northwest Arctic	1213	Ambler Washeteria and City Office Biomass Heating	City of Ambler	Biomass	1.06	274	$11,345	49.17	27	$484,691	$429,892	$54,799	Design, Constr	Full SP	$429,892	$25,411,506
North Slope	1232	Atqasuk Transmission Line Design and Permitting	North Slope Borough	Trans, Other	2.02	4,698	$3,417	78.00	28	$32,840,509	$2,017,818	$201,782	Design	Full	$2,017,818	$27,429,324
Southeast	1218	Saxman Low-Rent Multifamily Air Source Heat Pump	Tlingit-Haida RHA	Heat Pump	0.93*	8,314	$6,194	60.83	29	$438,341	$296,038	$213,193	Design, Constr	Full	$296,038	$27,725,362
Aleutians	1201	Unalaska Water Treatment Inline Micro Turbines	City of Unalaska	Hydro	1.24	4,689	$7,677	58.00	30	$1,340,000	$1,100,000	$240,000	Feas, Design	Partial	$144,000	$27,869,362
Southeast	1208	Ketchikan High School Biomass Boiler	Ketchikan Gateway Borough	Biomass	1.33	8,314	$6,194	82.67	31	$1,365,890	$1,251,000	$0	Constr	Full	$1,251,000	$29,120,362
Southeast	1217	Klawock School Biomass Fuel Boiler Project	Klawock City School District	Biomass	1.38	802	$7,488	59.67	32	$858,556	$833,556	$25,000	Design	Partial	$111,986	$29,232,348
Copper River/Chugach	1248	Crater Lake Power and Water Project	Cordova Electric Cooperative	Hydro, Storage	0.91*	2,286	$11,122	45.17	33	$17,306,696	$1,227,000	$420,680	Design	Full SP	$1,227,000	$30,459,348
Railbelt	1210	Chugach Electric Solar Project	Chugach Electric Association	Solar	0.36*	172,380	$3,751	59.67	34	$1,814,049	$100,000	$100,000	Feas	Partial	$50,000	$30,509,348
Railbelt	1225	Grant Lake Hydroelectric Project	Kenai Hydro LLC	Hydro	1.10	49,918	$6,643	56.67	35	$58,936,366	$4,000,000	$875,528	Design	Full	$4,000,000	$34,509,348
Kodiak	1239	Ouzinkie Hydroelectric Power Project	City of Ouzinkie	Hydro	0.73*	171	$7,460	40.67	36	$4,603,385	$397,427	$4,014	Design, Constr	Full SP	$397,427	$34,906,775
Aleutians	1220	Waterfall Creek Hydro Construction	City of King Cove	Hydro	0.72*	905	$6,054	41.83	37	$6,874,498	$675,000	$5,525,000	Constr	Full	$675,000	$35,581,775
North Slope	1231	Kaktovik Wind Diesel Design	North Slope Borough	Wind	0.79*	251	$6,293	58.17	38	$7,606,795	$440,000	$44,000	Design	Full	$440,000	$36,021,775
Southeast	1209	Ketchikan Schools Recreation Heating Plant	Ketchikan Gateway Borough	Biomass	N/A†	8,314	$6,194	62.00	39	$2,600,000	$220,000	$0	Feas	Partial	$40,000	$36,061,775
Sub Totals, All Recommended Projects										**$374,029,773**	**$40,933,526**	**$33,240,642**			**$36,061,775**	

Please see notes for all tables on pages 14 & 15.
Individual project summaries are available on AEA's website (see page 2).

PARTIAL FUNDING ROUND IX RECOMMENDED PROJECTS

In the table on pages 10 and 11 there are a number of projects with a recommendation for partial funding. The table below provides the rationale behind each of these recommendations.

1245 Adak hydro: Application requested funding for feasibility, design and construction. AEA recommends partial funding to complete only the feasibility study.

1238 Koyuk water heat recovery: Application was for funding final design and construction. AEA recommends limiting funding to final design to evaluate the potential to improve project economics and better assess value.

1233 Grayling water heat recovery: Application was for funding final design and construction. AEA recommends funding only the design phase to allow for more refined construction cost estimates prior to making a determination about funding the construction phase. Additionally, the funds requested for design were higher than expected. AEA recommends partial funding for final design phase only.

1221 Old Harbor hydro: Applicant requested funding for final design, including extensive geotechnical work. AEA recommends fully funding the design and partially funding geotech work with the recommendation that ground penetrating radar and/or seismic surveys be done prior to investing in costly helicopter supported drilling.

1214 Eek water heat recover: Application was for final design and construction. AEA recommends funding only the design phase to allow for more refined construction cost estimates prior to making a determination about funding the construction phase. Additionally, funds requested for design are higher than expected. AEA recommends partial funding for final design phase only.

1235 Scammon Bay hydro: Application requested funding for stream gauging and preliminary design. AEA recommends the project for partial funding to complete stream gauging to better understand the hydroelectric resource potential of Hillside Creek.

1215 Huslia water and clinic biomass: Application was for funding final design and construction. Recommend partial funding of $53,116 to complete the design phase only and to better evaluate the potential for an economic project.

1201 Unlaska inline micro-turbines: Application was for funding feasibility, final design and construction. AEA recommends partially funding the feasibility and final design phases of this project to better understand operation of power recovery turbine and pressure reduction valve under varying flow conditions and events such as load rejection.

1217 Klawock school biomass: Application requested funding for final design and construction. While the economics of this project are good, the engineering will be challenging due to the site constraints. Recommend partial funding for the development of final design and a business/operating plan.

1210 Chugach community solar: The application for a 500 kW solar garden project is recommended for funding at 50% of the requested level. AEA estimates that the applicant should be able to complete the proposed feasibility study, conceptual design and cost estimate within this reduced budget.

1209 Ketchikan schools central heating: Application requested feasibility and design funding. AEA recommends partial funding of for a feasibility study phase only to better assess the potential economic benefit.

REF ROUND IX RECOMMENDED PROJECTS WITH LOW B/C RATIOS

The benefit-cost (B/C) ratio is an estimate of a project's life cycle present value (benefits) divided by present costs. A ratio of 1.0 is generally considered the break-even point where the benefits equal the costs, however, this economic metric is only an estimate. Benefits counted in the REF economic evaluation mostly take the form of displaced diesel fuel but this value will fluctuate as it follows the global price of oil. The B/C ratios become more reliable as projects move to later phases of development because more comprehensive cost and benefit information is available and there is less time for circumstances to change before construction. By design in statute and regulations, the B/C ratio is only one portion of the overall project score.

The REF evaluation considers other measures such the local cost of energy, the statewide distribution of grant funds, the amount of matching funds provided, the project's technical feasibility, project readiness, other economic development impacts, and other criteria. This mix of weighted factors allows projects with B/C ratios of less than 1.0 to be recommended if other project merits are high. See Round IX Project Summaries for more information. Early phase projects such as reconnaissance or feasibility studies are designed to determine economic and technical feasibility based on the renewable energy resource available. If there is a reasonable chance of improving economics, projects with moderately low B/C ratios often can advance through the REF evaluation process. Projects receive no points in the scoring criteria if the B/C ratio is below 0.9, and only 1 out of 10 points for 0.9 to 1.0.

Below is more project-specific information about projects with B/C ratios of less than 1.0.

1223 Shishmaref wind: The applicant requested funding for the feasibility stage. The B/C ratio could potentially increase based on site specific meteorological data once it is available for analysis. The state-wide wind model often under-predicts the wind resource on the west coast of Alaska. Wind measurement at the specific targeted site through the requested feasibility study will increase the confidence of the project economics.

1233 Grayling water heat recover: The applicant requested design and construction funding. AEA recommends funding only the final design. AEA believes that cost saving measures can be identified during the final design phase that can significantly improve the project economics.

1249 Indian River hydro: 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 in the first half of 2016. 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 B/C ratio has declined to slightly less than 1.0. If grant funded the applicant anticipates that the grant will reduce energy costs to residents by $0.13 per kWh.

1215 Huslia water and clinic biomass: The applicant requested design and construction funding. AEA recommends funding final design only with an emphasis on improving the project economics before committing to construction. If constructed, the project will save the community an estimated 8,474 gallons of fuel per year and would provide local wood fuel jobs. Many of the costs in the B/C ratio would remain in the local economy for wood harvest and biomass plant operator jobs.

1218 Saxman heat pump: The applicant requested funding for final design and construction of an air source heat pump to replace existing oil-fired boilers that are nearing the end of life. The project would replace 100 percent of their heating oil by efficiently using hydro-powered electricity through an air source heat pump to heat the low-income multi-family complex. The economics are challenged by the high renovation costs to allow for lower temperature emitters in the building.

1248 Crater lake hydro: The applicant requested funding for final design. The B/C ratio is based upon initial findings from a draft feasibility study that had not yet been finalized at the time of evaluation, nor accepted by the applicant or AEA. Once the final feasibility study is finalized, the B/C ratio may change up or down. AEA's issuance of the final design grant is contingent upon acceptance of the feasibility study that demonstrates a technically and economically feasible project.

1210 Chugach community solar: The project is recommended for partial funding as AEA believes the feasibility can be completed at half of the applicant's estimated total phase cost. The feasibility study will help determine the project economics, including possible use of federal incentives.

1239 Ouzinkie hydro: The applicant has recently reconstructed a failed dam which provides drinking water for the community. That project was funded through water project funding sources. The REF application seeks design and construction funding to rebuild the end-of-life penstock and hydro turbine to provide electricity. AEA's economic evaluations capture the full cost of each project. In this case the full cost of the dam is counted as a cost, and the full benefits of all hydro power displacing diesel generation is counted as the benefit. This method, while fair and consistent to all applicants, may be a conservative approach due to the dam construction having been completed with other funding. If only the turbine costs and the full hydro benefit are used in the model, the economics are very good. The AEA B/C ratio of 0.73 provides information about the net value of the overall project (drinking water and energy) over its lifetime.

1220 Waterfall creek hydro: This project is currently under construction however project costs have exceeded the original budget. The applicant is seeking additional grant funding to offset additional loans to reduce energy costs for ratepayers.

1231 Kaktovik wind: The applicant requests funds for final design for wind project. The budget is high due to arctic conditions but the application scored well elsewhere in the evaluation and wind may be the community's only renewable energy option.

APPLICATIONS NOT RECOMMENDED FOR FUNDING

Not Recommended Projects										Project Cost				Recommendation
Count	Energy Region	ID	Project Name	Applicant	Energy Source	B/C Ratio	Household Energy Cost	Tech/ Econ Score	State-wide Rank	Project Cost Through Construction	Applicant Grant Requested	Applicant Match Offered	Requested Phase(s)	AEA Recomnd
40	Y-K/Upper Tanana	1204	Clearwater Creek Hydropower Project: Phase II	Alaska Power Company	Hydro	0.74	$7,963	37.00	40	$15,400,000	$386,000	$100,000	Feas	DNP Stage 2
41	Railbelt	1229	Knik Arm Power Plant Biomass to Power	Central Environmental Inc.	Biofuel	0.42	$5,594	31.17	41	$3,000,000	$400,000	$2,600,000	Recon	DNP Stage 2
42	Southeast	1203	Craig Water Treatment Plant Micro-Hydro	City of Craig	Hydro	1.07	$7,351	N/A	42	$386,000	$80,000	$10,000	Feas, Design	Not Recomnd
43	Aleutians	1206	False Pass Hydrokinetic Feasibility Study	City of False Pass	Hydrokinetic	0.13	$8,145	N/A	43	$6,300,000	$440,319	$62,500	Feas	Not Recomnd
44	Southeast	1227	Hoonah Waste-to-Energy Project	City of Hoonah	Biofuel	0.54	$9,956	N/A	44	$5,289,000	$5,282,000	$277,000	Constr	Not Recomnd
45	Railbelt	1228	Point McKenzie Correction Farm Solar	SOA Dept. of Corrections	Solar	0.29	$6,260	N/A	45	$448,663	$140,000	$210,000	Recon, Feas, Design, Constr	Not Recomnd
46	Northwest Arctic	1230	Kotzebue 100 Kilowatt Solar Array	Kotzebue Electric Association, Inc.	Solar	0.43	$11,759	N/A	46	$800,000	$384,730	$64,448	Design, Constr	Not Recomnd
47	Southeast	1236	West Creek Hydroelectric Project	Municipality of Skagway Borough	Hydro	0.47	$7,750	N/A	47	$168,000,000	$320,000	$25,000	Design	Not Recomnd
48	Y-K/Upper Tanana	1241	Minto PV Solar Project	Minto Development Corporation	Solar	0.37	$9,471	N/A	48	$86,400	$140,000	$210,000	Recon, Feas, Constr	Not Recomnd
49	Copper River/Chugach	1243	Maximizing Cordova Hydro with Controlled Systems	Cordova Electric Cooperative, Inc.	Heat Hydro	1.15	$11,122	N/A	49	$392,959	$95,733	$61,996	Feas	Not Recomnd
50	Y-K/Upper Tanana	1251	Circle 100 Kilowatt Solar Array	Circle Utilities, Inc.	Solar	0.44	$9,399	N/A	50	N/A	$75,000	$10,000	Feas	Not Recomnd
51	Bristol Bay	1252	Igiugig RivGen© Power System	Igiugig Electric Company	Hydrokinetic	0.20	$16,003	N/A	51	$2,131,740	$1,490,077	$641,663	Design, Constr	Not Recomnd
52	Southeast	1240	Solar Panels for Kake Community Buildings	City of Kake	Solar	N/A	$11,412	N/A	52	N/A	$255,000	$0	Feas, Design, Constr	DNP Stage 1
	Totals, Not Recommended Projects									**$202,234,762**	**$9,488,859**	**$4,272,607**		

Some not recommended projects' B/C ratios may not be listed due to incomplete information

NOTES FOR TABLES PAGES 10-11

Individual project summaries are available on AEA's website www.akenergyauthority.org

If REF 9 funding is limited to $5M exactly, #1233 Grayling Water System Heat Recovery (italicized in recommended list) would be partially funded. To fully fund the project, a total of $5,011,599 must be appropriated.

B/C = AEA Benefit/Cost Ratio over the life of the project.

The rows that appear in bold font are those projects in underserved regions. Applications #1238, 1233 and 1223 were moved up the list during stage four regional distribution.

Impacted Population includes the population of a community(s) or utility service area(s) which a project is located in or may impact.

The Household Energy Cost is a measure of the annual heating and electricity costs for a typical household in a given community.

The technical and economic score is the total stage 2 score and is on a scale of 0 to 100. A minimum score of 40 is required to pass stage 2.

Match offered is applicant's offered cash and in-kind match, including supporting efficiency work and wood harvest value where applicable. If the awarded funding amount is reduced from the requested amount, the required match will also be reduced.

The Energy Region Yukon-Koyukuk/Upper Tanana was shortened to Y-K/Upper Tanana for printing purposes.

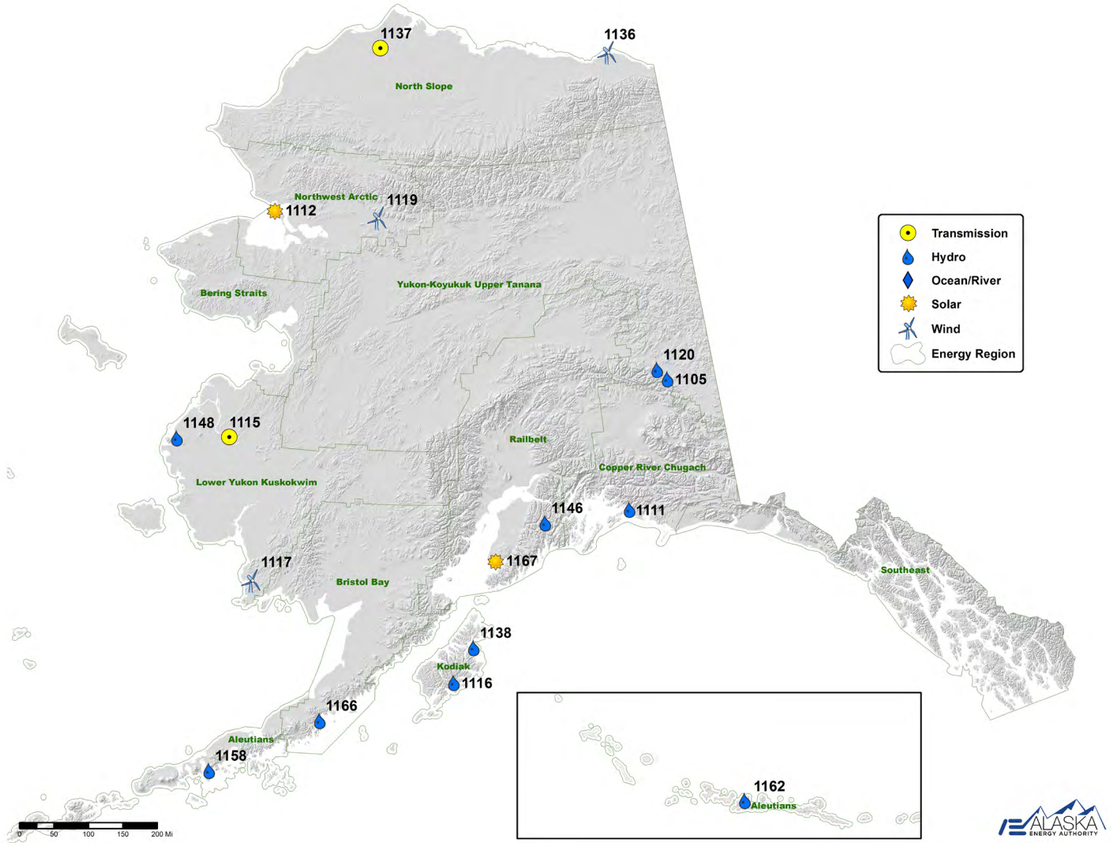
†The economic benefits of this project were ineligible for consideration in the REF evaluation because the project displaces renewable hydro generated energy.

#1207, Yerrick Creek Hydro, is in an under-served region but was not elevated because the funding request was $4 million and only $38,401 was available. Instead #1233, a smaller project from the same region was elevated for nearly full funding.

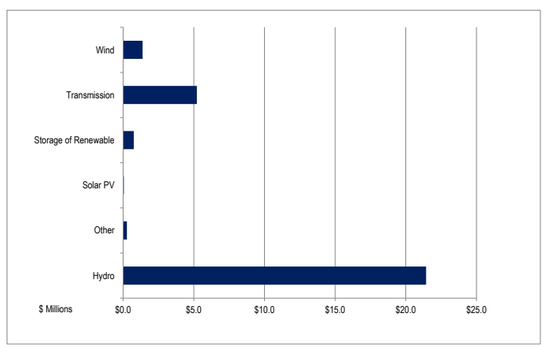
SP = Special Provisions

Allison Creek Hydro recieved feasibility and construction funding through REF. Construction is underway on the $39 million project which will provide 6.5 megawatts of clean renewable power to more than 8,000 consumers in the Copper Basin Region by fall 2016.

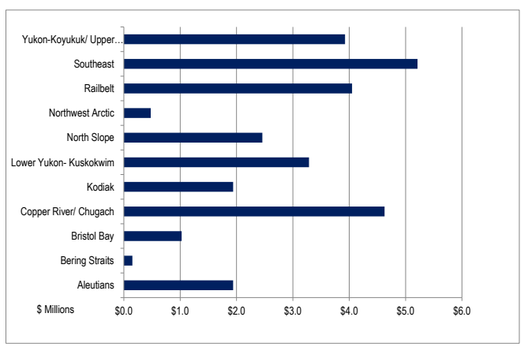
Photo credit: Copper Valley Electric Association



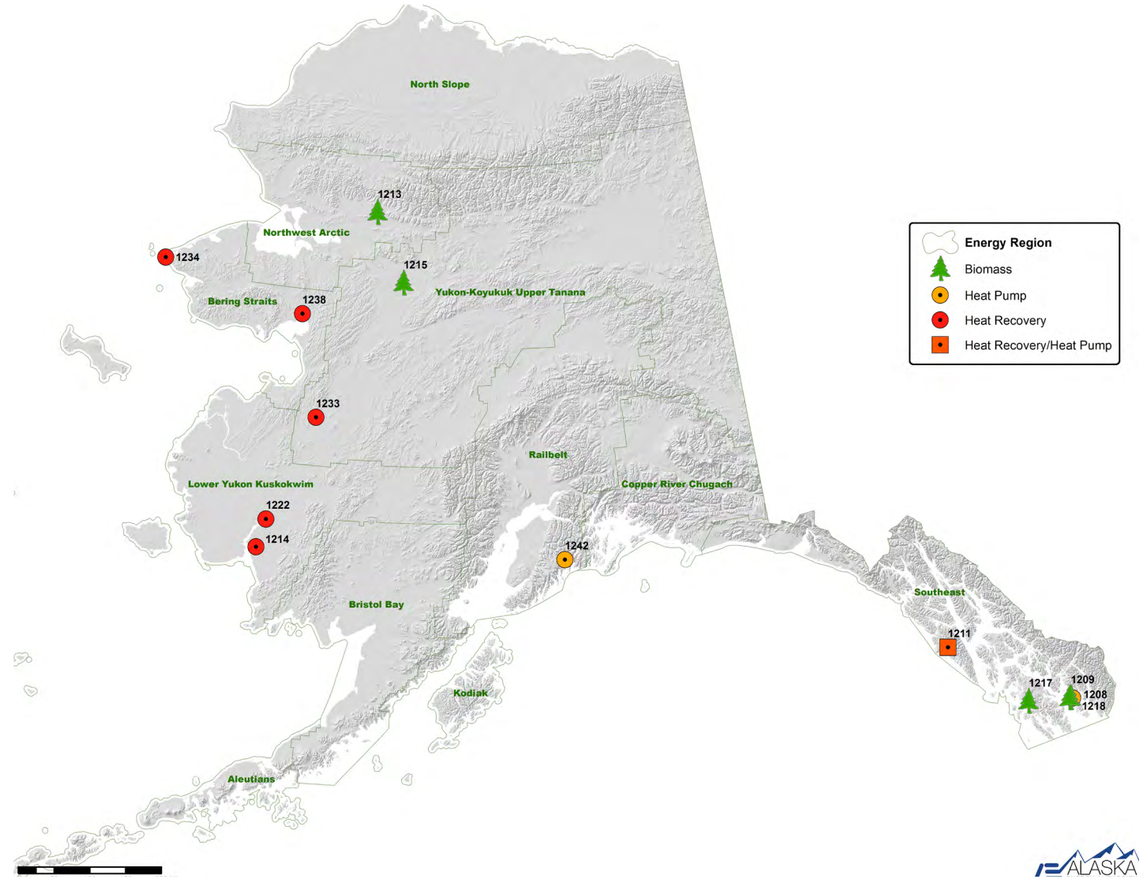
STANDARD PROJECTS
BY RESOURCE



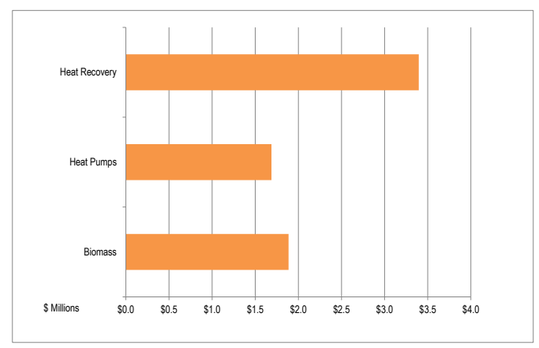
STANDARD PROJECTS
BY REGION



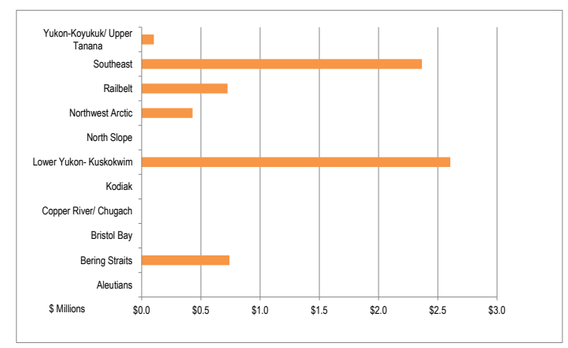
The two bar charts show Round IX recommended funding by energy resource and by region for standard projects. Not all of these projects fit into the Governor's proposed $5 million budget for REF Round IX. Four standard projects, two wind and two hydro, fit within the Governor's budget. These four projects fall within the Copper River/Chugach, Aleutians and Bering Straits energy regions.



HEAT PROJECTS
BY RESOURCE



HEAT PROJECTS
BY REGION



The two bar charts show Round IX recommended projects by energy resource and by region for heat projects. Not all of these projects fit into the Governor's proposed $5 million budget for REF Round IX. All three heat projects that fall within the Governor's budget are heat recovery projects, two in the Bering Straits and one in the Yukon-Koyukuk/Upper Tanana energy regions.

RENEWABLE ENERGY FUND ADVISORY COMMITTEE

The Renewable Energy Fund Advisory Committee (REFAC) is comprised of nine members, five of whom are appointed by the governor to staggered three-year terms, with representation from each of the following groups:

- One member from a small Alaska rural electric utility, Brad Reeve
- One member from a large Alaska urban electric utility, Bradley Evans
- One member from an Alaska Native organization, Jodi Mitchell
- One member from businesses or organizations engaged in the renewable energy sector, Chris Rose
- One member from the Denali Commission, Kathleen Wasserman
- Four remaining members come from the legislature:
  - Two members of the House of Representatives, appointed by the Speaker of the House of Representatives, Rep. Bryce Edgmon and Rep. Jim Colver
  - Two members of the Senate, appointed by the President of the Senate, Sen. Lyman Hoffman and Sen. Anna MacKinnon

In establishing the program, the REFAC worked with AEA to define eligibility criteria for the Renewable Energy Fund grants, to develop methods for ranking projects, and to adopt regulations identifying criteria to evaluate the benefit and feasibility of projects seeking legislative support. The REFAC continues to consult with AEA, offering valuable guidance and policy direction regarding the application and evaluation process, and final funding recommendations.

Following is a summary of REFAC involvement with REF Round VIII.

- AEA staff and REFAC members met in May and October, 2015 to discuss issues including the schedule and details of the Round IX request for applications, progress on funded projects, possible changes to the program evaluation, community assistance efforts and potential financing of REF projects.
- A staff and REFAC members met in January, 2016 following AEA evaluation of all applications to review the AEA recommendations for Stage 4 (regional distribution). The REFAC supported AEA staff recommendations and requested a few improvements to the way that the information was presented in the REF status report to the legislature.

Rep. Edgmon

Rep. Colver

Senator Hoffman

Senator MacKinnon

Brad Reeve

Bradley Evans

Jodi Mitchell

Chris Rose

Kathy Wasserman

DEFINITIONS

RECONNAISSANCE: A preliminary feasibility study designed to ascertain whether a feasibility study is warranted.

FEASIBILITY/CONCEPTUAL DESIGN: Detailed evaluation intended to assess technical, economic, financial, and operational viability and to narrow focus of final design and construction. This category also includes resource assessment and monitoring.

FINAL DESIGN AND PERMITTING: Project configuration and specifications that guide construction. Includes land use and resource permits and leases required for construction.

CONSTRUCTION: Completion of project construction, commissioning, and beginning of operations. This category also includes follow-up operations and maintenance reporting requirements.

DIESEL EQUIVALENT GALLON: Most REF communities are displacing diesel fuel (Diesel #2), however some projects displace natural gas, naphtha, propane or Diesel #1. In those instances the displaced fuel is converted to BTUs and then expressed as diesel equivalent gallons for reporting purposes.

B/C: The B/C, or benefit/cost ratio is the total net present value of savings over the life of a project divided by the net present value of a project's total cost. The assumed project life is 50 years for hydro and transmission, 30 years for solar PV and 20 years for all others. The B/C is one component of the overall project score; it is possible for a project to score high enough in other areas (e.g. being high cost of energy) to be recommended with a B/C of less than 1.

B/C ratios are calculated using best available data appropriate for the project's development phase. Early phase projects use assumptions based on prior similar experience, late phase projects use refined project models and are much more certain. AEA attempts to be as realistic as possible when using assumptions for early phase projects, while also attempting to avoid rejecting potentially good early-phase projects due to overly conservative assumptions.

TECHNICAL/ECONOMIC SCORE: This score is based on a project's technical and economic viability. The technical score considers resource availability, maturity of the proposed technology, the technical viability of the proposed project, and the qualifications and experience of the project team. The economic score is based on the projected costs and benefits associated with the project including consideration of the future price of fuel, current and future local demand for energy and the ability of the applicant to finance the project to completion.

ENERGY COST BURDEN: Household energy cost divided by household income.

ANSWERS TO COMMONLY ASKED QUESTIONS

WHAT IMPACT DO REF PROJECTS HAVE ON RATES?

It depends, some electrical projects will lower rates immediately and some may only stabilize rates and keep them from increasing over time due to inflation and changing fuel costs. Heating projects result in immediate and direct fuel savings costs to the building owners.

DO POWER COST EQUALIZATION (PCE) COMMUNITIES BENEFIT FROM THE REF?

Yes, in a number of ways:

1. Statewide, in PCE communities, about 30 percent of total kWhs sold are eligible for the PCE subsidy. That means that any savings from REF projects are passed directly to the other 70 percent of kWhs sold. Schools and privately owned businesses benefit greatly from reduced cost of electricity.

2. REF projects provide stability in the face of uncertain and often volatile fuel prices.

3. 100 percent of the value created by heat projects stays in the community.

4. REF projects create local employment opportunities and local energy independence.

WHAT PROJECT ARE THE BEST FIT FOR REF FUNDING?

- Technically strong
- Economically viable
- Located in high energy cost communities
- Provides public benefit
- Matching funds provided

HOW MUCH ARE REF PROJECTS REDUCING GREENHOUSE GAS (GHG) EMISSIONS?

2009-2016, an estimated 584,828 metric tons of CO_2.

Clockwise from top left:
Wood storage Prince of Wales Island, Chip auger Tok, Biomass boiler Mentasta and Heat recovery Hoonah

akenergyauthority.org

ALASKA ENERGY AUTHORITY
813 W Northern Lights Blvd
Anchorage, AK 99503
(907) 771-3000
www.akenergyauthority.org