

02/01/2013

**PRESENTA-  
TION:  
ALASKA  
ENERGY  
AUTHORITY**

<TARGET><BILL></BILL><SUBJECT>02-01-2013 PRESENTATION  
ALASKA ENERGY  
AUTHORITY</SUBJECT><COMM>SFIN28</COMM></TARGET>

# ALASKA STATE LEGISLATURE

## SENATE FINANCE COMMITTEE

Senator Pete Kelly, Co-Chair  
State Capitol, Room 516  
Juneau, AK 99801-1182  
(907) 465- 3709 - Phone  
(907) 465- 4714 - Fax  
Senator.Pete.Kelly@akleg.gov



Official Business

Senator Kevin Meyer, Co-Chair  
State Capitol, Room 518  
Juneau, AK 99801-1182  
Phone - (907) 465- 4945  
Fax - (907) 465- 3476  
Senator.Kevin.Meyer@akleg.gov

## AGENDA

Friday, February 1, 2013

Senate Finance Room 532 – 9:00 AM

Presentation: Alaska Energy Authority

- Sara Fisher-Goad, Executive Director, Alaska Energy Authority

Sfg Ms. Fisher - Goad  
SS Mr. Skaling

Bishop ✓  
Donlesky ✓

Sezn Skaling  
Dep Director  
- AIDEA  
DCEB

Remove  
woody salmon  
WS



# Alaska Energy Authority Overview and Renewable Energy Fund Update

Senate Finance Committee  
Feb. 1, 2013





# Reducing the Cost of Energy

- Energy Planning and Policy
- Technical and Community Assistance
- Investing in Alaska's Energy Infrastructure
- Diversifying Alaska's Energy Portfolio

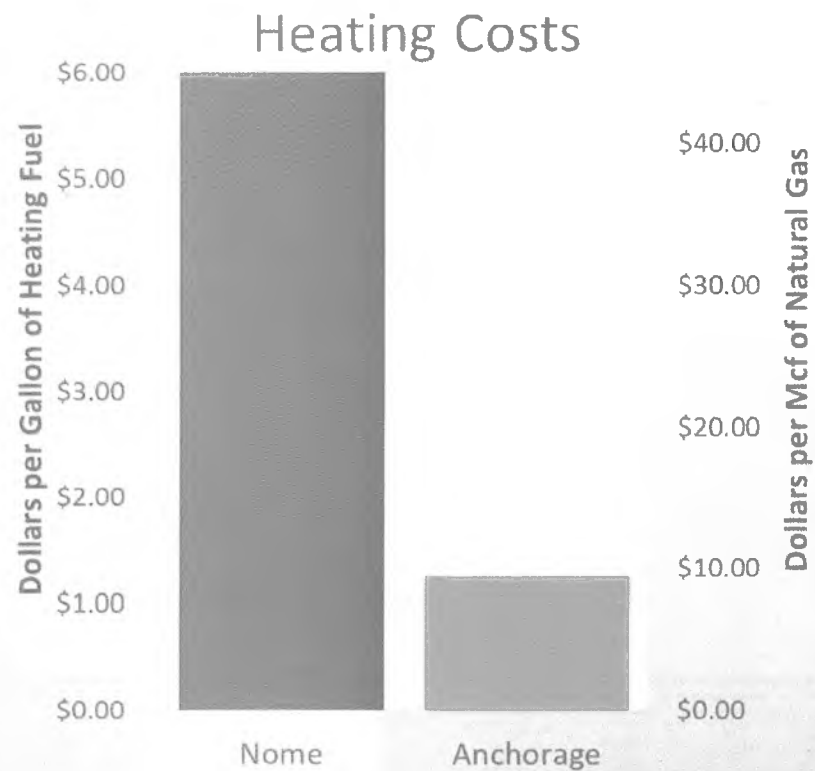
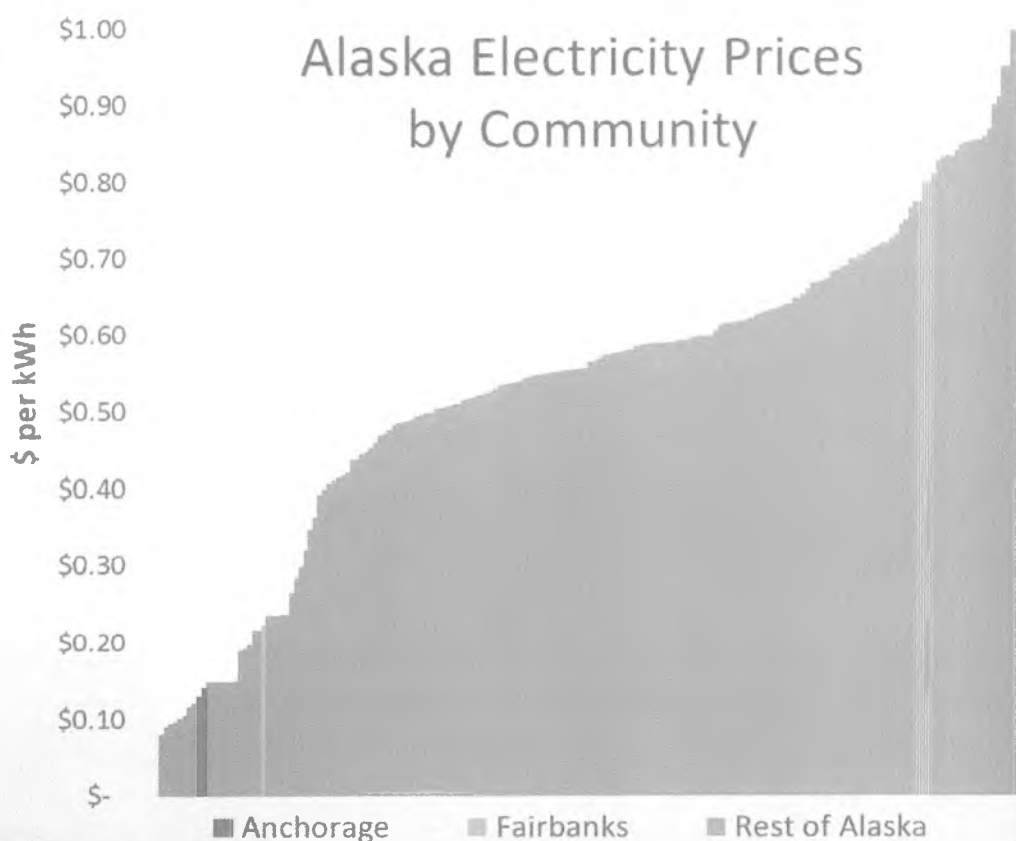
# Electricity Generation by Region

## Annual Electric Generation

AEA Energy Region	MWhs per Year	Percent of Total
Aleutians	65,340	1%
Bering Straits	55,362	1%
Bristol Bay	55,145	1%
Copper River/Chugach	116,700	2%
Kodiak	150,503	2%
Lower Yukon-Kuskokwim	96,625	1%
North Slope	82,544	1%
Northwest Arctic	35,549	1%
Railbelt	5,075,507	77%
Southeast	785,190	12%
Yukon-Koyukuk/Upper Tanan	31,175	0%
<b>Total</b>	<b>6,549,640</b>	<b>100%</b>

2011 Alaska Energy Statistics

# Energy Costs Vary



# Energy Policy Development and Coordination

- Deputy Director for Statewide Energy Policy Development
- Serve as lead on Alaska's energy policy development
- Coordination of energy plans on statewide level
- Coordinate multi-agency efforts
- Individual project analysis and vetting
- Transmission planning
- Working with AIDEA on LNG trucking





*Bradley Lake Hydroelectric Project*



*Alaska Intertie*

## Infrastructure and Large Projects

### Bradley Lake Hydro

- State capital contribution 50%
- Produces about 10% of Railbelt electricity
- AEA-owned asset
- Low-cost energy producer
- 120 megawatts, 4.5 cents/kWh

### Alaska Intertie

- AEA-owned with no outstanding debt
- Operated by AEA and Railbelt utilities

### Susitna-Watana Hydro

- Will provide about 50% Railbelt electricity
- SB 42 authorized AEA to pursue licensing
- Long-term, stable rates

# Rural Energy

## Bulk Fuel and Rural Power System Upgrades

- Help utilities improve efficiency, safety and reliability of power systems
- Completed \$304 million in rural bulk fuel and rural power system upgrade projects since 2000, in partnership with Denali Commission
- Thirteen projects under construction next year
- Circuit rider technical assistance in 53 communities (FY 12)

## Training and Technical Assistance

- Training for power plant operators, advance power plant, bulk fuel, electric utility manager, Power Cost Equalization
- Energy specialists assisted 40+ communities to advance to project-ready status



# Rural Energy

## Power Cost Equalization (PCE)

- Provide economic assistance in rural Alaska where electrical rates can be 3 to 4 times higher than in urban Alaska
- Available to community facilities and residential customers
- Regulatory Commission of Alaska (RCA) sets rates, calculations based on use, costs and efficiencies
- Approximately 77,341 people live in the 183 participating communities (FY 11)
- PCE payments at 100% totaling \$39.5 million (FY 12)
- \$788 million PCE Endowment

# AEA Programs

## Power Project Fund

- Low-interest loans to upgrade or develop small-scale electric power facilities
- Includes bulk fuel storage, transmission and distribution, waste energy, energy conservation, energy efficiency and alternative energy facilities and equipment
- State assistance for a project more than \$5 million requires Legislative approval
- \$35 million in Power Project Fund (~half in application process)
- 34 projects funded, \$31 million
- Pending applications: City of St. George, wind/diesel hybrid; Haida Energy Inc., hydroelectric project



*Prince of Wales: Run-of-River Hydro*



*Chena Hot Springs: Geothermal*

# AEA Programs

## Efficiency and Conservation

- State Goal: improve efficiency 15% by 2020
- AEA's focus is on commercial buildings, rural public buildings, industrial facilities and electrical efficiency
- Statewide outreach and education
- Support for multi-stakeholder group, Alaska Energy Efficiency Partnership [AKEnergyEfficiency.org](http://AKEnergyEfficiency.org)
- Coordination between State agencies
- Alaska Commercial Energy Audit Program
- Village Energy Efficiency Program



# Energy Efficiency and Conservation

## AEA Energy Efficiency and Conservation Programs: Results

- 132 participating Alaska communities, 419 buildings
- \$1,534,062 and 282,938 diesel equivalent gallons in projected savings
- Average immediate savings of implemented efficiency measures: \$0.29 cents/ \$1 invested, 300% ROI after 10 years
- Alaska Commercial Energy Audit Program measures produce 30% savings with 6.2 year simple payback

# Community Highlight: Emmonak

## Whole-Village Retrofit for Energy Efficiency

- AEA Programs: Village Energy Efficiency Program, Energy Efficiency and Conservation Block Grant Program
- Whole-village retrofit to reduce the cost of energy
  - Audits and efficiency retrofits in 8 community buildings
- Successes:
  - \$670,000 in efficiency and conservation investment projected to provide \$90,000 in annual savings
  - 27% of savings from efforts to reduce electricity consumption, remainder from reducing fuel consumption
  - Used local labor
  - Increased awareness



*Emmonak City Hall boiler before and after efficiency improvements*

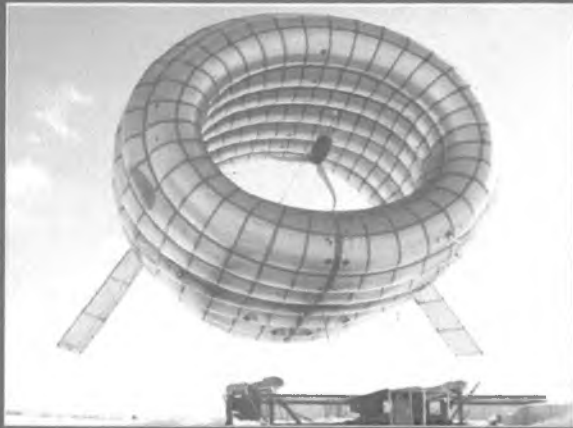
# AEA Programs

## Energy Statistics

- Summary and analysis of electricity generation and use across Alaska

## Emerging Energy Technology Fund

- SB 220 (2010) created fund
- Through Denali Commission matching grant, \$8.9 million available
- First round, 16 project selected for funding (2012)
- Projects must be commercially viable within 5 years
- Projects in Juneau, Fairbanks, Kodiak, Delta Junction, Nenana, Nikiski, Igiugig, Tuntutuliak, Kwiglingok and Kotzebue



*Altaeros Energies Helium Balloon Wind Turbine*

# AEA Programs

## Renewable Energy Fund

- HB 152 (2008) authorized AEA to manage program, reauthorized in 2012
- 227 projects approved totaling \$202.5 million
- More than 60 projects currently under construction
- By 2016, 12.3 million gallons of diesel and natural gas equivalent will be displaced annually.
- Results: \$45 million in annual savings



*Ruby: Hydrokinetic*



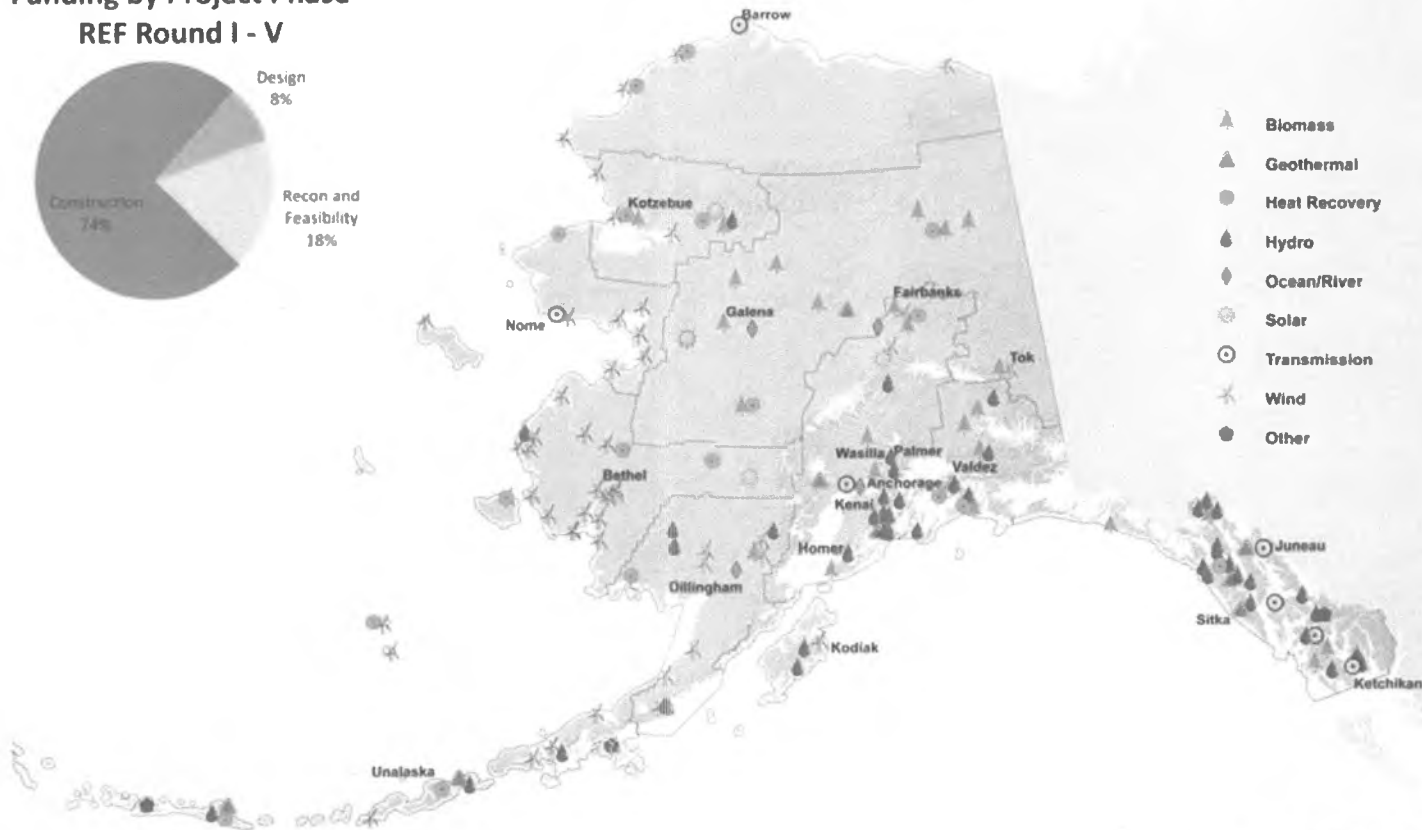
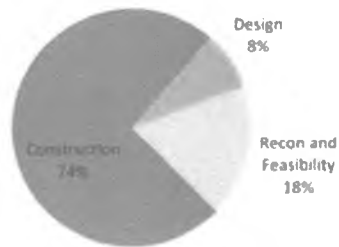
*Unalakleet: Wind*

# Renewable Energy Fund: Evaluation Process

- Applications solicited and received by AEA
- Technical and Economic Review
  - Stage 1 – Qualifying project
  - Stage 2 – Technical & Economic
  - Stage 3 – Scoring for Rank
  - Stage 4 – Regional Spreading
- Renewable Energy Fund Advisory Committee
- Recommendations to the Legislature

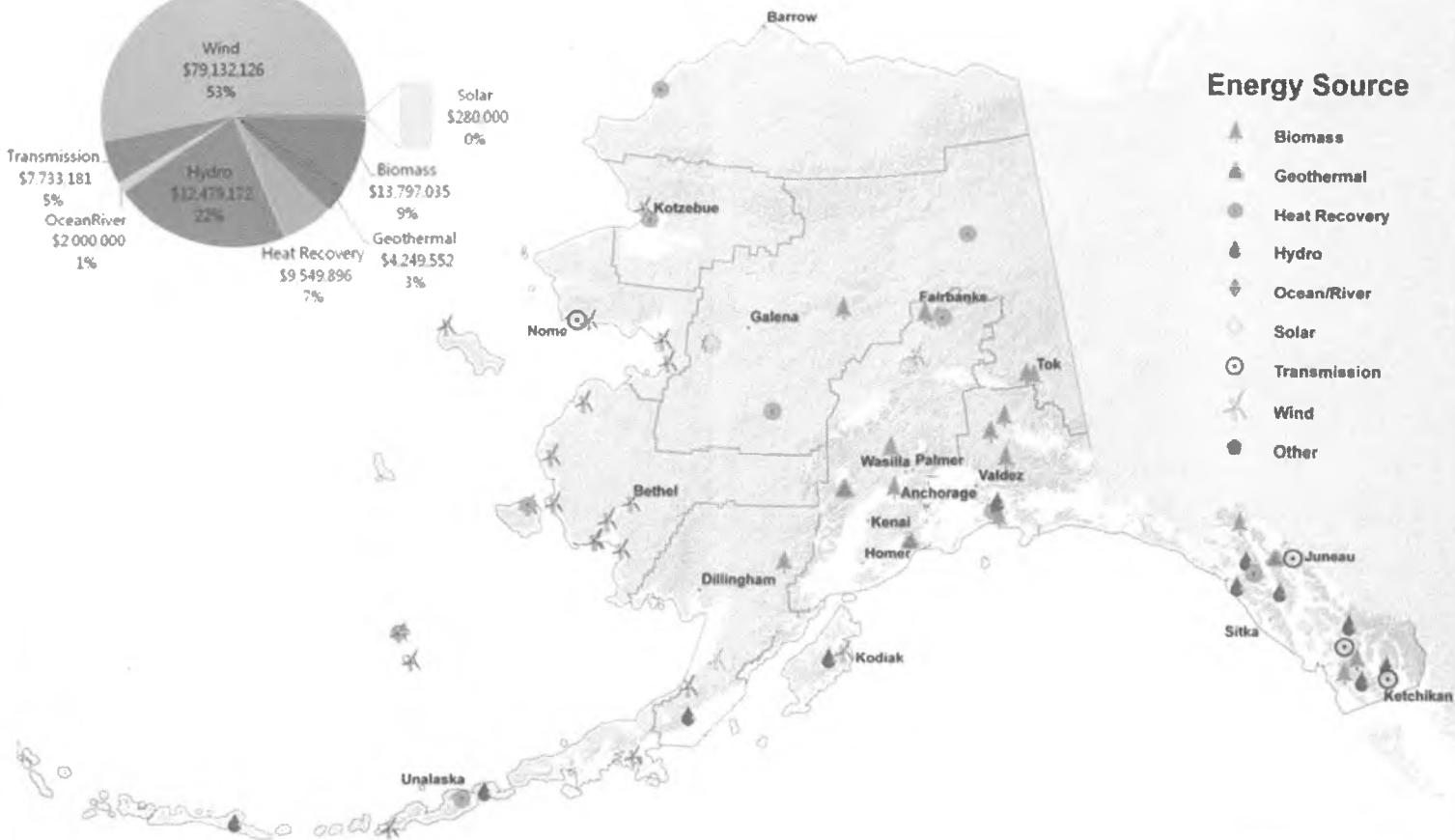
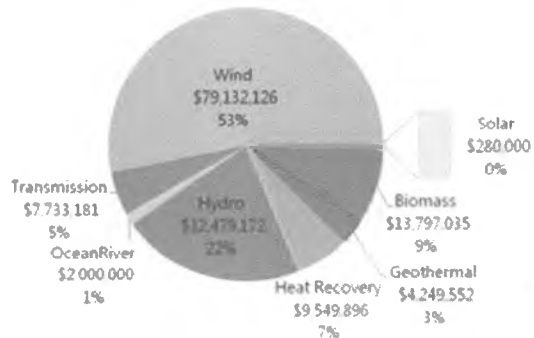
# Renewable Energy Fund Projects

Funding by Project Phase  
REF Round I - V



As of 4/17/12

# Construction Projects (R1-5)



As of 4/17/12

# Renewable Energy Fund: Benefits

- Supports Alaska's 50% Renewable Power goal
- Diversifies Alaska's energy supply
- Reduces energy costs by:
  - Providing low-cost renewable energy to displace fossil fuels
  - Reducing the cost of renewable energy
  - Keeping more dollars in local community
- Provides consistent and efficient evaluation of projects and prospective funding
- Leverages State dollars to produce energy
- Enhances regional planning efforts



Alaska Energy Authority  
Renewable Energy Grant Recommendation Program

Impact Evaluation Report

Volume 2

*Prepared by:*  
Vermont Energy Investment Corporation

*In Collaboration With:*  
Alaska Center for Energy and Power

January 22<sup>nd</sup>, 2013

Available at: [AKenergyauthority.org](http://AKenergyauthority.org)

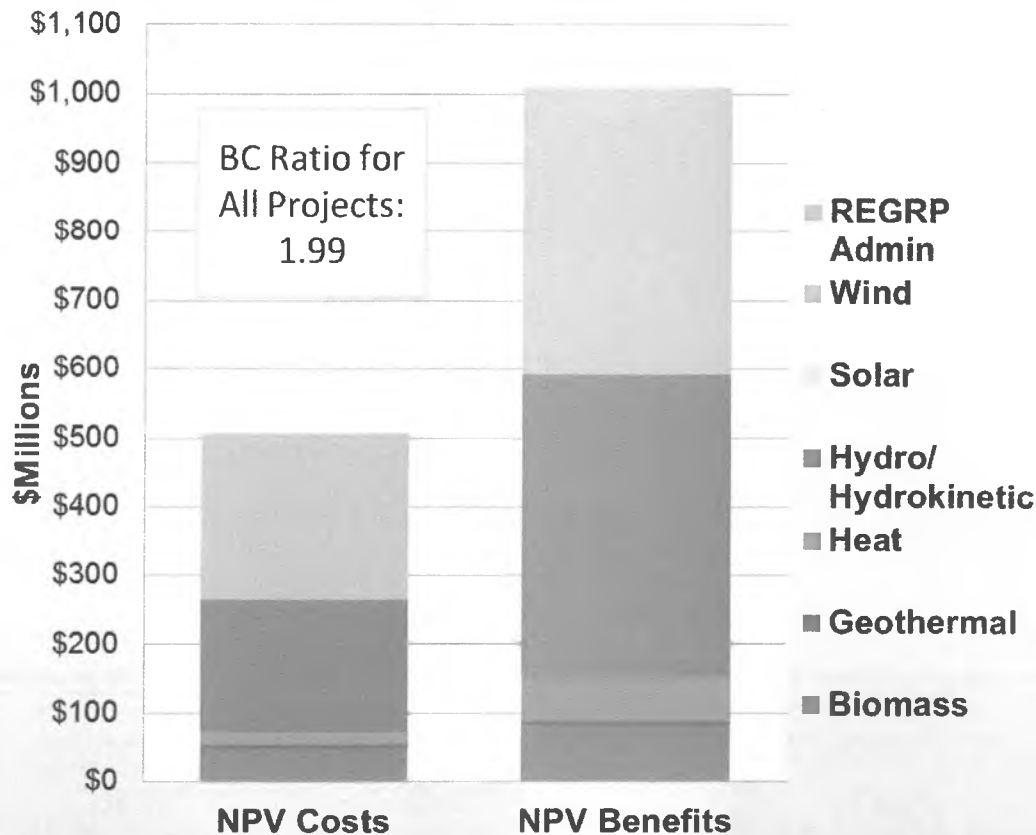
# Renewable Energy Fund

## Independent Program Review

- Vermont Energy Investment Corporation and the Alaska Center for Energy and Power
- Found energy savings, reduced emissions
- Renewable Energy Fund is cost effective
- Projects that have reached construction are projected to provide a positive net present value of more than \$500 million
- Increased knowledge base on renewable energy development in Alaska that will improve future projects
- Includes Renewable Energy Fund Rounds 1-4

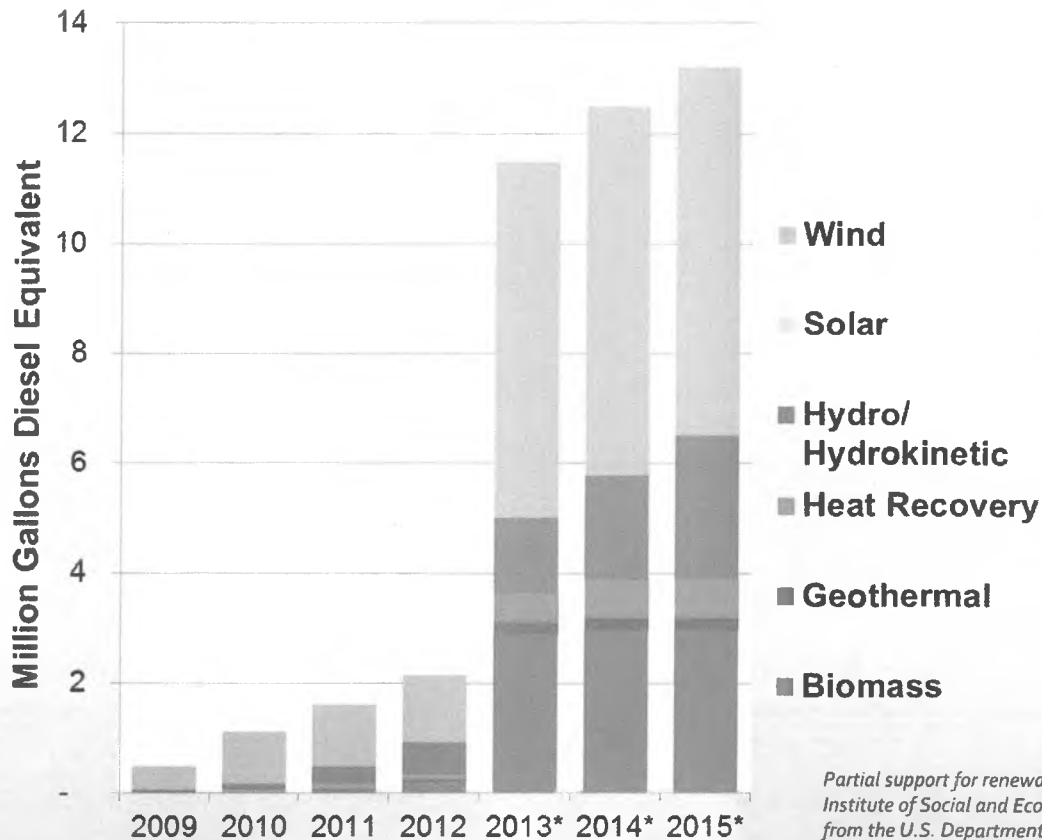


# Renewable Energy Fund: Economic Benefits



- \$500 million net present benefits from Renewable Energy Fund projects in construction is projected
- Integrates actual performance from completed projects
- AEA manages grants, not programs, making it difficult to precisely identify the beneficiaries of the \$500 million

# Renewable Energy Fund: Avoided Fuel



- Renewable Energy Fund projects offset a growing volume of fuel
- Large jump in 2013 is from Eva Creek Wind and ML&P Landfill Gas projects, both successful Railbelt projects
- Expect continued growth in avoided fuel as previously funded projects complete construction

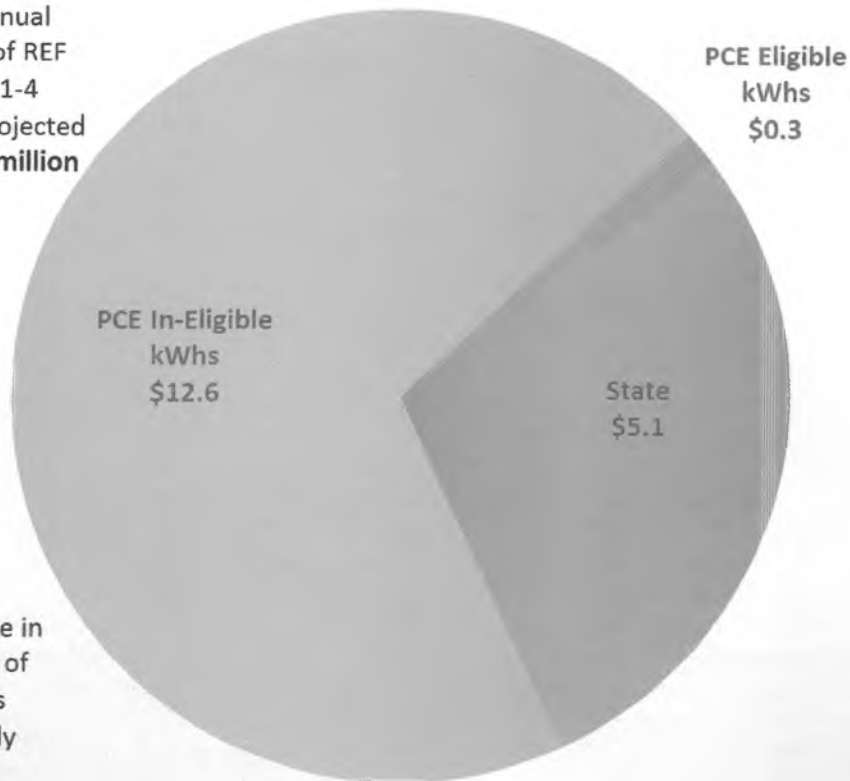
*Partial support for renewable energy fund project database developed by the Institute of Social and Economic Research, University of Alaska Anchorage from the U.S. Department of Energy, EPSCoR project DE-PS02-09ER09-12, Making Wind Work for Alaska: Supporting the Development of Sustainable, Resilient, Cost-Effective Wind-Diesel Systems for Isolated Communities*



# Renewable Energy Fund: PCE Communities

## Distribution of Project Benefits

Total annual benefits of REF Round 1-4 projects projected to be **\$18 million**

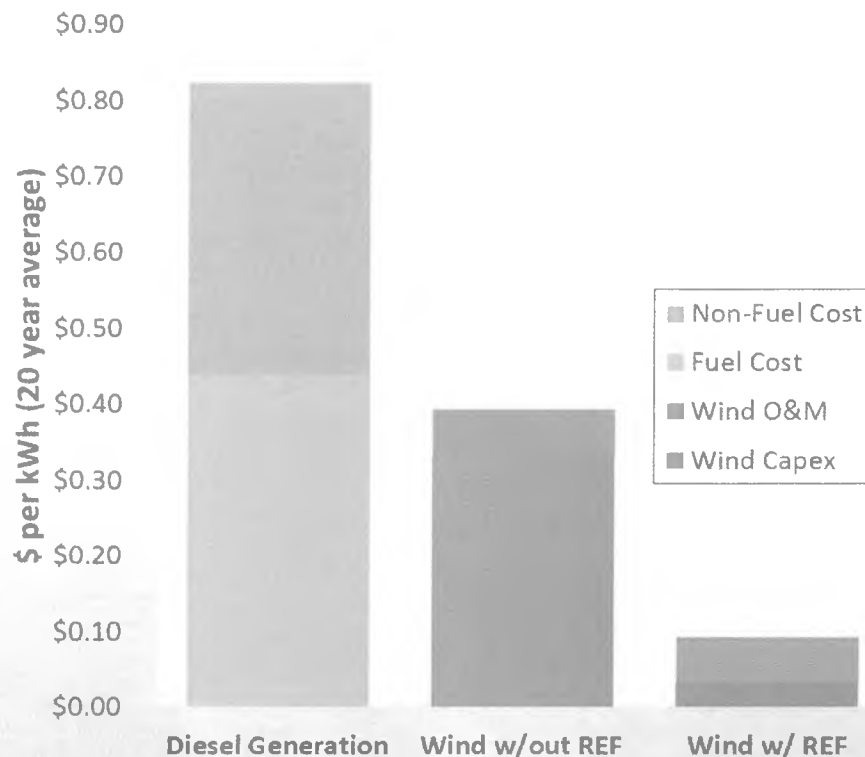


Values are in millions of dollars annually

- \$18 million annual benefits from Renewable Energy Fund projects (Rounds 1-4) projected
- Most benefit goes towards non PCE kWhs (e.g., business, households exceeding monthly limit)

# Renewable Energy Project: Lowering the Cost of Energy

Price Components: Rural Wind vs. Diesel



- We expect Renewable Energy Fund projects to lower power costs
  - Even without a REF grant
  - Achieving these economics are part of our scoring criteria
- Renewable Energy Fund grants help good projects get built
  - Provides needed capital
  - Decreases the payback period on good projects

# Community Highlight: JBER

## Landfill-Gas-To-Energy Project



*GE Jenbacher gas engines at Doyon Utility's JBER facility*

- Funding from AEA Renewable Energy Fund, Doyon Utilities and federal government
- Constructed in 2012
- Alaska's first landfill-gas-to-energy project
- Located on Joint Base Elmendorf-Richardson (JBER)
- Produce power from Anchorage Regional Landfill methane gas
- Expected results:
  - Will produce 56,000 megawatts annually, 26.2% of JBER's power use
  - Will produce more than \$50 million in savings over project life

# Community Highlight: Delta Junction

## Delta Junction School Biomass

- Completed in September 2011
- High-efficiency, low-emissions wood chip biomass heating system
- Wood chips come from Dry Creek Saw Mill waste product
- Funding \$2M grant/\$2.8M total
- Simple Pay Back: 13 years for Renewable Energy funds, 19 years on total cost
- Successes:
  - During the first winter, saved \$153,000 and 53,000 gallons in heating
  - Allowed the school to save 2 teacher positions, reopen music program and remodel the school kitchen
  - Potential to add additional facilities
  - Easy maintenance



*Heat Exchanger*





# Community Highlight: Atka

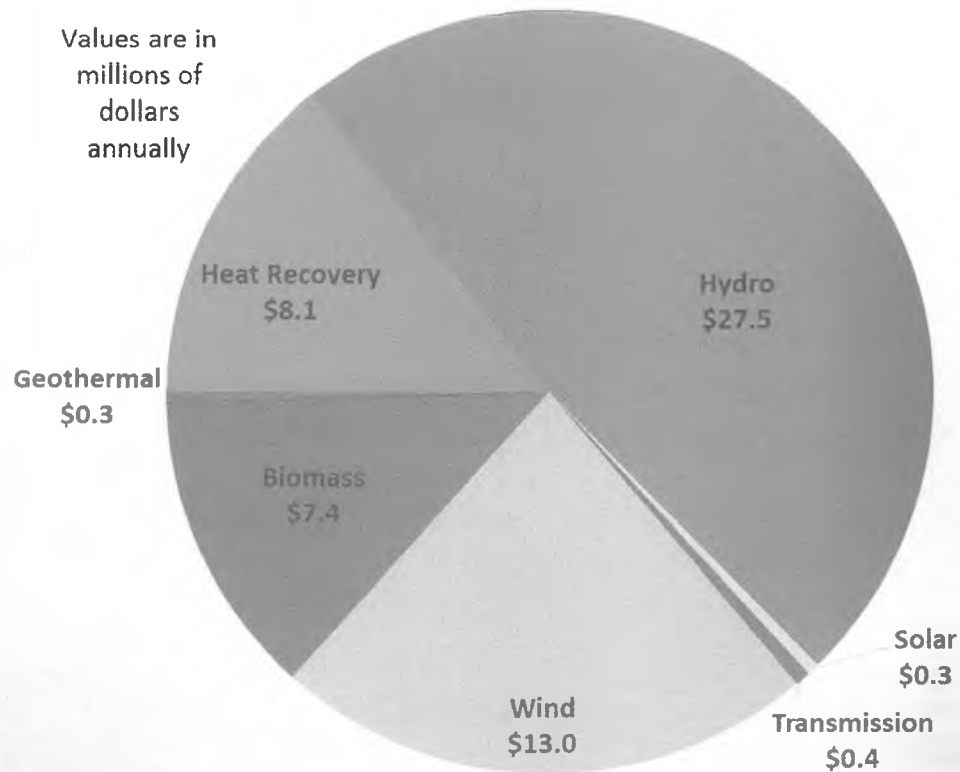
## Chuniisax Creek Hydroelectric Project

- Completed in 2012 (City of Atka has pursued since 1997)
- Capacity: 283 kilowatts
- Will provide nearly 100 % of Atka's power needs, including a portion of Atka Pride Seafoods' demand
- Capital Cost: \$5 million
- 261,000 fuel savings
- Simple payback 21 years
- ROI 139%
- Used local labor
- Expected Results:
  - \$180,000 annual savings in diesel fuel costs
  - Potential to use excess power for electric heat

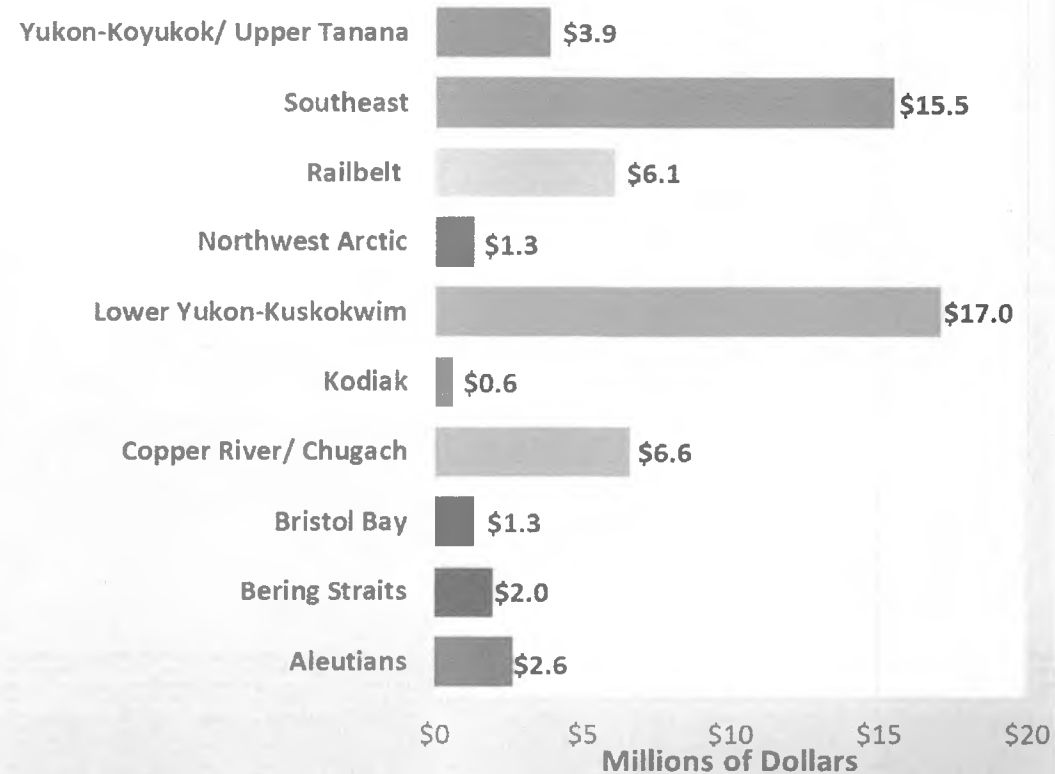
# Renewable Energy Fund : Round 6 Recommendations

## Recommendation by Type

Values are in millions of dollars annually



## Recommendations by Region



# AEA: Active Energy Projects

Active Energy Projects - January 2012 thru January 2013

Prepared: January 23, 2013

Program Type	No. of Active Projects	Renewable Energy Funds	Other State Funds	Federal Funds	Total Funding
<b>Renewable Energy Programs:</b>					
Biomass	24	7,440,548	1,305,858	1,192,036	<b>9,938,442</b>
Heat Recovery - Other Diesel	10	4,956,664	567,727	271,543	<b>5,795,934</b>
Energy Efficiency & Conservation	20	-	5,029,132	12,053,731	<b>17,082,864</b>
Geothermal	8	9,793,213	76,908	91,184	<b>9,961,305</b>
Hydropower	40	35,382,172	25,210,755	5,128,173	<b>65,721,101</b>
Ocean & River Energy	3	718,175	634,925	8,571	<b>1,361,671</b>
Energy Generation - Transmission	25	21,662,031	70,388,208	2,402,838	<b>94,453,077</b>
Wind Energy	36	39,287,809	11,660,500	2,890,817	<b>53,839,127</b>
Solar Power	1	90,000	-	-	<b>90,000</b>
Emerging Energy Technology	*	-	-	-	<b>-</b>
<b>Bulk Fuel Upgrades</b>	<b>11</b>	<b>-</b>	<b>8,827,551</b>	<b>13,828,679</b>	<b>22,656,230</b>
<b>Rural Power System Upgrades</b>	<b>27</b>	<b>-</b>	<b>25,997,441</b>	<b>26,345,943</b>	<b>52,343,384</b>
<b>Large Energy Development Projects:</b>					
Susitna-Watana Hydro	1	-	76,000,000	-	<b>76,000,000</b>
Fire Island Wind Farm T-Lines	1	-	25,000,000	-	<b>25,000,000</b>
<b>Totals:</b>	<b>207</b>	<b>119,330,612</b>	<b>250,699,007</b>	<b>64,213,516</b>	<b>434,243,135</b>

\* 16 projects in process of being awarded. Not active in calendar year 2012

**Renewable Energy Fund**

- Biomass or Biofuels
- Hydro
- Transmission
- Wind
- Heat Recovery

**Systems Upgrades**

- ◇ Rural Power System Upgrade
- ◇ Bulk Fuel Upgrade

**Energy Efficiency**

- Commercial Energy Audit
- Seafood Processing Plant Audit
- Whole Village Retrofit
- EECBG Grants
- VEEP Grants

0 50 100 200 Miles



**Alaska Energy Authority  
Projects Under Construction  
Summer 2012**

ID	Renewable Energy Fund Projects
22	Cordova Heat Recovery Construction
23	North Prince of Wales Island Intertie Project
58	Chuniska Cr Hydroelectric Construction
68	Anchorage Landfill Gas Electricity Construction
469	Akulak Hydroelectric System Repair and Upgrade
486	Plot Point Wind Power & Heat
503	St. Paul Wind Diesel Project
616	EVA Creek Wind Turbine Purchase
620	Whitman Lake Hydroelectric Project
636	Thorne Bay School Wood Fired Boiler
653	Terror Lake Hydroelectric Project
672	Snethlam Transmission Ln Avalanche Mitigation
681	Lake & Peninsula Borough Wood Boilers
687	Mooshan Heat Recovery Project
688	Peckah Hydroelectric Upgrade Project
803	Pillar Mtn High Penetration Wind Project
836	Packer's Creek Hydroelectric Project
104, 629	Reynolds Creek Hydroelectric Project
85, 518	High Penetration Wind Battery Diesel Hybrid



# AEA: By the Numbers

FY14 Budget Summary  
Prepared: January 13, 2013

## Governor's FY14 Budget (in thousands)

OPERATING:	Allocations	Appropriation	General Funds (UGF & DGF)	Other Funds	
<b>Alaska Energy Authority</b>		<b>14,362</b>	<b>5,627</b>	<b>8,735</b>	
AEA Owned Facilities	1,067			1,067	
AEA Rural Energy Operations	6,144		2,188	3,957	
AEA Technical Assistance	577		407	170	
Statewide Project Development, Alternative Energy & Energy Efficiency	6,574		3,032	3,541	
<b>Language Section:</b>					
Power Cost Equalization (estimated)		40,351	7,260		
			33,091	Endowment Fund AS 42.45.070(a)	

CAPITAL:	Allocations	Appropriation	General Funds	Other Funds	Federal Funds
AEA Susitna-Watana Hydro		95,200	95,200		
AEA Bradley Lake Transmission Upgrade		13,700	13,700		
AEA Rural Power Systems Upgrade		12,600	9,600		3,000
AEA Renewable Energy Projects Round Six		25,000	25,000		
AEA Bulk Fuel Upgrades		8,500	6,500		2,000
AEA - Alternative Energy & Energy Efficiency Programs		2,000	2,000		
AEA - Energy Plan Implementation		1,000	1,000		
AEA - Electrical Emergencies Program		330	330		
AIDEA - Natural Gas Treatment & Distribution		50,000	50,000		

### Language Sections:

Fund Capitalization - Emerging Energy Technology Fund	2,000	GF Appropriation to EETF AS 42.45.375
Fund Transfers - Renewable Energy Fund	25,000	GF Appropriation to REGF AS 42.45.045(a)
Reappropriation - Akiak to Atmautluak for Rural Power System Upgrades	1,750	Reappropriation of GF

AKEnergyAuthority.org







Renewable Energy Fund Round VII - Statewide Recommendations and Funding for Heat and Standard Applications

Count	Energy Region	ID	Project Name	Applicant	Applicant Type	Energy Source	Ren / Cost			Stage 3 Review Scores (max)													Project Cost			Recommendation			
							Total Stage 2 Score	AEK	APL	1. Tech	2. Econ	3. Env	4. Social	5. Legal	6. Policy	7. Feasibility	8. Total	9. Statewide Rank	Project Cost	Grant Requested	Match Offered	Phase	AEA Recomed	Priority	Recommended Funding	Cumulative Funding			
1	H	Aleutians	1026	Atka Dispatchable Heat	City of Atka	Local Government	Hydro to Heat	82.83	3.18	6.90	\$0.70	\$7.65	33.47	11.00	16.57	5.00	12.00	3.00	4.00	85.04	1	\$135,254	\$114,965	\$20,289	Construction	FULL		\$114,965	\$114,965
2	S	Bristol Bay	1036	Packers Creek Hydroelectric Project Phase II	Chignik Lagoon Village Council	Government Entity	Hydro	86.33	1.66	3.85	\$0.89		30.26	11.00	17.27	5.00	11.00	5.00	3.83	83.36	2	\$5,389,149	\$2,352,653	\$3,036,496	Construction	FULL		\$2,352,653	\$2,666,092
3	H	Yukon-Koyukok/Upper Tar	1044	Venetie Clinic Heat Recovery	Village of Venetie	Government Entity	Heat Recovery	85.17	1.68	2.45	\$0.90	\$8.50	35.00	6.00	17.03	4.00	11.25	4.00	3.33	80.62	3	\$204,428	\$198,474	\$11,908	DesignConstruction	FULL		\$198,474	\$313,438
4	H	Yukon-Koyukok/Upper Tar	1047	Galena Community Wood Heat Project	City of Galena	Local Government	Biomass	88.00	4.31	3.96	\$0.56	\$6.02	26.34	6.00	17.60	3.83	14.13	5.00	4.50	77.40	4	\$3,144,200	\$3,096,898	\$47,302	Construction	FULL SP		\$3,096,898	\$5,762,990
5	H	Lower Yukon-Kuskokwim	1052	Nunam Iqaa Heat Recovery Project	City of Nunam Iqaa	Local Government	Heat Recovery	87.67	2.20	2.33	\$0.53	\$4.38	19.16	13.00	17.53	3.00	12.50	5.00	3.50	73.69	5	\$603,000	\$450,000	\$153,000	Construction	FULL		\$450,000	\$6,212,990
6	H	Southeast	1011	Sitka Centennial Hall Air Source Heat Pump	City and Borough of Sitka	Local Government	Heat Pumps	80.50	1.69	3.58	\$0.09	\$3.59	15.71	15.00	16.10	5.00	10.75	5.00	4.83	72.39	6	\$232,620	\$232,620	\$1,021,383	DesignConstruction	FULL		\$232,620	\$6,445,610
7	S	Bering Straits	1066	Stebbins St Michael Wind Energy Final Design and Permitting	Alaska Village Electric Cooperative, Inc.	Utility	Wind	83.33	1.80	2.74	\$0.56		24.42	7.00	16.67	3.00	11.63	5.00	4.50	72.21	7	\$3,946,050	\$342,000	\$18,000	Design	FULL		\$342,000	\$6,787,610
8	H	Lower Yukon-Kuskokwim	1085	Tuntulufiak Heat Recovery	Native Village of Tuntulufiak	Government Entity	Heat Recovery	81.33	1.54	2.32	\$0.65	\$6.80	29.75	6.00	16.27	3.83	10.13	3.00	3.00	71.98	8	\$469,311	\$455,642	\$13,669	DesignConstruction	FULL		\$455,642	\$7,243,252
9	H	Lower Yukon-Kuskokwim	1061	Emmonak Heat Recovery System	City of Emmonak	Government Entity	Heat Recovery	87.67	2.56	4.02	\$0.55	\$5.77	25.24	6.00	17.53	4.00	12.50	3.00	2.67	70.94	9	\$689,251	\$689,251	\$20,677	DesignConstruction	FULL SP		\$689,251	\$7,932,503
10	S	Yukon-Koyukok/Upper Tar	1027	Chisana Mountain Wind Feasibility Project	Alaska Power Company	Utility	Wind	85.00	2.55		\$0.49		21.46	11.00	17.00	2.50	12.50	2.00	4.17	70.63	10	\$148,800	\$119,000	\$29,800	Feasibility	FULL		\$119,000	\$8,051,503
11	S	Yukon-Koyukok/Upper Tar	1077	Yerrick Creek Hydroelectric Project	Native Village of Tanacross	Government Entity	Hydro	58.33	4.23	9.84	\$0.49		21.46	15.00	11.67	3.00	11.25	5.00	3.17	70.54	11	\$19,000,000	\$6,000,000	\$11,500,000	Construction	PARTIAL		\$75,000	\$8,126,503
12	S	Lower Yukon-Kuskokwim	1067	Mountain Village Wind Feasibility and Conceptual Design	Alaska Village Electric Cooperative, Inc.	Utility	Wind	79.17	1.70	1.23	\$0.54		23.80	7.00	15.83	2.50	11.63	5.00	4.50	70.26	12	\$4,833,000	\$123,500	\$6,500	Feasibility	FULL		\$123,500	\$8,250,003
13	H	Southeast	1087	Kake Community Energy	Organized Village of Kake	Government Entity	Biomass	73.83	1.62	1.18	\$0.62	\$5.85	25.59	7.00	14.77	2.00	12.00	4.00	4.00	69.36	13	\$1,423,292	\$206,073	\$20,000	Design	PARTIAL	Y	\$175,000	\$8,425,003
14	H	Southeast	1037	Ketchikan Gateway Borough Biomass Heating Project	Ketchikan Gateway Borough	Local Government	Biomass	84.33	2.15	0.24	\$0.10	\$3.59	15.71	11.00	16.27	3.67	13.00	5.00	3.50	68.74	14	\$1,957,261	\$1,412,889	\$535,222	Construction	PARTIAL SP		\$620,000	\$9,045,003
15	S	Railbelt	1082**	Stelson Creek Diversion Cooper Lake Dam Facilities Project	Chugach Electric Association, Inc.	Utility	Hydro	94.33	7.11	0.89	\$0.15		6.78	15.00	18.87	5.00	12.88	5.00	5.00	88.52	15	\$21,772,523	\$3,453,920	\$13,591,226	Construction	Partial-REFAC**		\$1,760,019	\$10,805,022
16	S	Copper River/Chugach	1015**	Allison Creek Hydroelectric Project Construction	Copper Valley Electric Association, Inc.	Utility	Hydro	89.33	3.96	3.66	\$0.28		12.44	15.00	17.67	4.00	12.13	2.00	5.00	66.43	16	\$49,000,000	\$5,914,491	\$5,914,491	Construction	Partial-REFAC**		\$4,764,652	\$15,569,674
17	S	Southeast	1025	Gunnuk Creek Hydroelectric Feasibility Study	Inside Passage Electric Cooperative	Utility	Hydro	73.00	4.28		\$0.62		27.14	7.00	14.60	2.00	11.63	2.00	3.83	68.20	17	\$300,000	\$275,000	\$25,000	Recon/Feasibility	PARTIAL SP		\$80,000	\$15,649,674
18	H	Bering Straits	1040	Brevig Mission Water System Heat Recovery	City of Brevig Mission	Government Entity	Heat Recovery	83.00	1.51	2.01	\$0.54	\$5.29	23.14	6.00	16.60	5.00	10.25	4.00	3.17	68.16	18	\$753,313	\$731,372	\$21,941	DesignConstruction	FULL		\$731,372	\$16,381,046
19	H	Railbelt	1031	Seldovia House Ground Source Heat Pump Project	Cook Inlet Housing Authority	Government Entity	Heat Pumps	58.17	1.12	0.94	\$0.20	\$5.19	22.71	15.00	11.63	4.50	5.25	5.00	3.83	67.93	19	\$362,805	\$318,289	\$441,835	DesignConstruction	FULL		\$318,289	\$16,699,335
20	H	Southeast	1021	Haines Borough Municipal Buildings Biomass Project	Haines Borough	Local Government	Biomass	88.50	1.72	1.79	\$0.22	\$4.09	17.89	9.00	17.70	3.83	12.83	2.00	4.50	67.55	20	\$1,374,892	\$1,237,403	\$137,448	DesignConstruction	FULL SP		\$1,374,892	\$17,936,738
21	H	Lower Yukon-Kuskokwim	1043	St. Mary's Heat Recovery System	City of St. Mary's	Government Entity	Heat Recovery	85.17	1.61	2.21	\$0.49	\$4.60	20.13	6.00	17.03	3.83	11.25	5.00	4.17	67.41	21	\$757,289	\$735,242	\$22,057	DesignConstruction	FULL		\$735,242	\$18,671,980
22	H	Yukon-Koyukok/Upper Tar	1032	Biomass Heat for Minto Community Buildings	Village of Minto	Government Entity	Biomass	69.33	1.02	1.37	\$0.59	\$5.00	21.88	15.00	13.87	3.00	5.38	5.00	3.17	67.28	22	\$403,550	\$274,750	\$278,800	DesignConstruction	FULL SP		\$274,750	\$18,946,730
23	H	Southeast	1053	Yakutat Biomass District Heating Loop	City and Borough of Yakutat	Local Government	Biomass	67.67	1.45	2.31	\$0.50	\$5.05	22.09	11.00	13.53	2.00	8.88	5.00	4.17	66.67	23	\$335,456	\$286,166	\$49,290	DesignConstruction	PARTIAL SP	Y	\$103,000	\$19,049,730
24	H	Lower Yukon-Kuskokwim	1073	Kongiganak Wind Heat Electrical Thermal Storage	Puvurnaq Power Company	Utility	Wind to Heat	74.17	1.70	2.55	\$0.56	\$6.21	27.17	6.00	14.83	2.83	12.38	0.00	3.00	66.21	24	\$320,456	\$311,456	\$9,000	Construction	FULL SP		\$311,456	\$19,361,186
25	S	Bristol Bay	1072	Igiugig Wind Resource Feasibility/Conceptual Design	Igiugig Village Council	Government Entity	Wind	47.00	0.86	1.40	\$0.80		35.00	13.00	9.40	2.50	0.00	3.00	3.17	66.07	25	\$110,000	\$80,000	\$30,000	Feasibility	FULL SP		\$80,000	\$19,441,186
26	H	Lower Yukon-Kuskokwim	1041	Chevak Water and Vacuum Plant Heat Recovery	City of Chevak	Government Entity	Heat Recovery	85.33	1.83	2.44	\$0.48	\$4.30	18.81	6.00	17.07	3.00	12.50	5.00	2.83	65.21	26	\$558,814	\$558,814	\$16,765	DesignConstruction	FULL SP		\$558,814	\$20,000,000
SubTotal - Top Ranking \$20 million post stage 4 regional spreading and REFAC committee recommendations																				\$118,224,724	\$29,972,868	\$36,760,109			\$20,000,000	SubTotal			
S	Railbelt	1082**	Stelson Creek Diversion Cooper Lake Dam Facilities Project	Chugach Electric Association, Inc.	Utility	Hydro														15				Construction	FULL**		\$1,693,901	\$21,693,901	
S	Copper River/Chugach	1015**	Allison Creek Hydroelectric Project Construction	Copper Valley Electric Association, Inc.	Utility	Hydro														16				Construction	FULL**		\$1,149,839	\$22,843,740	
27	H	Southeast	1017	Southeast Island School District Wood Boilers	Southeast Island School District	Government Entity	Biomass	76.67	1.47	2.32	\$0.41	\$3.80	16.63	11.00	15.33	3.00	9.75	5.00	4.00	64.71	27	\$1,058,775	\$940,950	\$177,825	Construction	FULL SP		\$940,950	\$23,784,690
28	H	Yukon-Koyukok/Upper Tar	1045	Grayling Heat Recovery System	City of Grayling	Government Entity	Heat Recovery	80.17	1.47	2.02	\$0.56	\$5.00	21.88	6.00	16.03	3.83	9.00	4.00	3.50	64.25	28	\$332,590	\$322,903	\$19,374	DesignConstruction	FULL		\$322,903	\$24,107,593
29	H	Southeast	1016	Hydaburg Schools Wood Fired Boiler Project	Hydaburg City School District	Government Entity	Biomass	77.83	1.91	2.45	\$0.24	\$4.20	18.38	7.00	15.57	3.00	13.50	3.00	3.50	63.95	29	\$627,900	\$583,900	\$44,000	DesignConstruction	PARTIAL SP	Y	\$125,000	\$24,232,593
30	S	Lower Yukon-Kuskokwim	1057	Merlavik Renewable Energy Feasibility and Conceptual Design	Ungusraq Power Company (UPC) / Newtok	IPP	Wind	53.00	1.14		\$0.80		35.00	7.00	10.60	2.00	4.50	2.00	1.67	62.77	30	\$8,000,000	\$375,000	\$25,000	Recon/Feasibility	PARTIAL		\$75,000	\$24,307,593
31	S	Lower Yukon-Kuskokwim	1069	St. Marys Pitkas Point Wind Energy Construction Project	Alaska Village Electric Cooperative, Inc.	Utility	Wind	65.00	1.19	1.47	\$0.49		21.80	9.00	13.00	5.00	4.50	5.00	4.33	62.43	31	\$4,782,528	\$4,274,575	\$507,953	Construction	FULL SP		\$4,274,575	\$28,582,168
32	H	Lower Yukon-Kuskokwim	1071	Kwigillingok Wind Heat Electrical Thermal Storage	Kwig Power Company	Utility	Wind to Heat	64.17	1.53	1.73	\$0.60	\$5.95	26.03	6.00	12.83	2.83	10.00	2.00	2.50	62.20	32	\$302,737	\$293,737	\$9,000	Construction	FULL SP		\$293,737	\$28,875,905
33	H	Northwest Arctic	1038	Kotzebue Paper and Wood Waste to Energy Project	City of Kotzebue	Local Government	Biomass	62.83	1.12	1.16	\$0.42	\$6.07	26.56	7.00	12.57	2.00	8.00	5.00	3.00	62.13	33	\$2,692,700	\$2,495,189	\$95,000	DesignConstruction	PARTIAL SP	Y	\$270,000	\$29,145,905
34	S	Aleutians	1083	Waterfall Creek Hydroelectric Project	City of King Cove	Local Government	Hydro	71.17	1.37	1.87	\$0.28		12.26	15.00	14.23	2.83	7.83	5.00	61.95	34	\$5,500,000	\$800,000	\$1,900,000	Construction	FULL SP		\$800,000	\$29,945,905	
35	H	Yukon-Koyukok/Upper Tar	1060	Holy Cross Water System Heat Recovery	City of Holy Cross	Government Entity	Heat Recovery	57.67	0.55	0.74	\$0.53	\$7.15	31.28	6.00	11.53	4.00	1.25	5.00	2.83	61.90	35	\$497,773	\$497,773	\$14,933	DesignConstruction	FULL		\$497,773	\$30,443,678
36	S	Kodiak	1065	Old Harbor Hydroelectric Project Final Design and Permitting	Alaska Village Electric Cooperative, Inc.	Utility	Hydro	58.33	1.11	1.79	\$0.58		25.21	7.00	11.27	2.00	5.38	5.00	4.50	60.35	36	\$8,155,000	\$1,092,500	\$57,500	Design	PARTIAL		\$400,000	\$30,843,678
37	S	Southeast	1023	Swan Lake Reservoir Expansion Project	The Southeast Alaska Power Agency	Government Entity	Hydro	81.17	4.07	4.07	\$0.10		4.47																



## Performance of Renewable Energy Fund Projects in Operation

Technology Type	Grantee	Project Name	Operation Start Date	Note: 9 months only for 2013																			
				2011				2012				Jan - Sep, 2013				Cumulative Total (2009-Sep,2013)							
				Energy Production		Fuel Displaced		Energy Production		Fuel Displaced		Energy Production		Fuel Displaced		Energy Production		Fuel Displaced					
Electrical (MWh)	Thermal (MMBtu)	Diesel (Galx1000)	Value (\$ x 1000)	Electrical (MWh)	Thermal (MMBtu)	Diesel (Galx1000)	Value (\$ x 1000)	Electrical (MWh)	Thermal (MMBtu)	Diesel (Galx1000)	Value (\$ x 1000)	Electrical (MWh)	Thermal (MMBtu)	Diesel (Galx1000)	Value (\$ x 1000)								
LANDFILL GAS	Municipality of Anchorage	Anchorage Landfill Gas Electricity	2012 Aug	-	-	-	\$ -	-	-	-	-	\$ -	33,834	-	3,224.0	\$ 1,602.0	33,834	-	3,224.0	\$ 1,079.0			
HYDRO	City of Alka	Chuniasax Creek Hydroelectric	2012 Dec	-	-	-	\$ -	-	-	-	-	\$ -	285	-	21.9	\$ 118.4	285	-	21.9	\$ 118.4			
HYDRO	Cordova Electric Cooperative	Humpback Creek Hydroelectric Project Rehabilitation	2011 Jul	1,563	-	114.9	\$ 410.3	3,510	-	270.0	\$ 1,050.6	2,933	-	225.6	\$ 809.6	8,006	-	610.5	\$ 2,270.5				
HYDRO	Gustavus Electric Company	Falls Creek Hydroelectric Construction	2009 Jul	1,933	-	138.1	\$ 483.3	1,956	-	150.4	\$ 645.3	1,490	-	114.6	\$ 481.1	8,044	-	583.8	\$ 2,143.7				
HYDRO	City of Pelican	Pelican Hydroelectric Upgrade Project	2013 Mar	-	-	-	\$ -	-	-	-	-	\$ -	711	-	57.8	\$ 257.6	711	-	57.8	\$ 257.6			
SOLAR	Alaska Village Electric Cooperative	Kaltag Solar Construction	2012 Oct	-	-	-	\$ -	-	-	-	-	\$ -	9	-	0.6	\$ 2.3	9	-	0.6	\$ 2.3			
TRANSMISSION	Alaska Power and Telephone	North Prince of Wales Island Intertie Project	2011 Sep	311	-	16.4	\$ 67.0	589	-	44.3	\$ 161.7	644	-	48.4	\$ 175.0	1,544	-	109.1	\$ 403.7				
TRANSMISSION	Nome Joint Utility System	Nome Banner Peak Wind Farm Transmission	2010 Oct	955	-	53.9	\$ 151.6	995	-	61.2	\$ 193.3	700	-	43.1	\$ 138.2	4,040	-	236.0	\$ 730.2				
WIND	Alaska Environmental Power	Delta Area Wind Turbines	2010 Sep	1,641	-	95.9	\$ 256.1	989	-	63.9	\$ 132.9	210	-	13.6	\$ 36.4	3,429	-	202.8	\$ 482.5				
WIND	Alaska Village Electric Cooperative	Toksook Wind Farm	2009 Aug	560	-	37.7	\$ 129.1	131	-	9.6	\$ 38.5	96	-	7.0	\$ 26.1	922	-	64.2	\$ 238.6				
WIND	Alaska Village Electric Cooperative	Mekoryuk Wind Farm	2010 Nov	239	-	13.7	\$ 49.5	147	-	10.4	\$ 41.1	123	-	8.7	\$ 32.5	513	-	33.2	\$ 123.9				
WIND	Alaska Village Electric Cooperative	Quinhagak Wind Farm	2010 Nov	409	-	28.9	\$ 105.6	500	-	38.1	\$ 161.4	391	-	29.8	\$ 116.7	1,372	-	101.9	\$ 398.0				
WIND	Alaska Village Electric Cooperative	Emmonak/Alakanuk Wind	2011 Sep	63	-	4.5	\$ 17.7	505	-	35.8	\$ 142.0	406	-	28.8	\$ 111.0	975	-	69.1	\$ 270.7				
WIND	Alaska Village Electric Cooperative	Shaktolik Wind Construction	2012 Apr	-	-	-	\$ -	116	-	8.9	\$ 35.7	119	-	9.2	\$ 35.1	235	-	18.1	\$ 70.8				
WIND	Golden Valley Electric Association	GVEA Eva Creek Wind Turbine Purchase	2012 Oct	-	-	-	\$ -	13,091	-	921.9	\$ 1,972.9	50,496	-	3,556.1	\$ 9,530.3	63,588	-	4,478.0	\$ 11,503.2				
WIND	Kodiak Electric Association, Inc.	Pillar Mountain Wind Project	2010 Sep	12,448	-	870.7	\$ 2,873.3	16,201	-	1,140.9	\$ 4,211.8	18,085	-	1,273.6	\$ 4,385.3	65,185	-	4,584.6	\$ 15,849.5				
WIND	Kotzebue Electric Association	Kotzebue High Penetration Wind-Battery-Diesel Hybrid	2012 May	-	-	-	\$ -	2,177	-	148.1	\$ 549.9	1,941	-	132.0	\$ 468.7	4,118	-	280.1	\$ 1,018.5				
WIND	Nome Joint Utility System	Banner Peak Wind Farm Expansion	2013 Jul	-	-	-	\$ -	-	-	-	-	\$ -	635	-	38.8	\$ 124.6	635	-	38.8	\$ 124.6			
<b>SubTotal</b>				20,122	-	1,375	\$ 4,543.5	40,908	-	2,904	\$ 9,337.1	113,106	-	8,834	\$ 18,450.9	197,443	-	14,715	\$ 37,085.7				
WIND	Aleutian Wind Energy	Sand Point Wind	2011 Aug	196	-	14.3	\$ 64.9	792	-	58.1	\$ 266.2	950	15	69.7	\$ 321.9	1,937	15	142.2	\$ 653.0				
WIND	Kwigillingok Power Company	Kwigillingok High Penetration Wind-Diesel Smart Grid	2012 Feb	-	-	-	\$ -	-	-	-	\$ -	46	66	4.1	\$ 19.4	46	66	4.1	\$ 19.4				
WIND	Puvurnaq Power Company	Kongiganak High Penetration Wind-Diesel Smart Grid	2010 Dec	88	-	6.6	\$ 30.1	185	-	14.0	\$ 63.4	232	454	21.9	\$ 105.0	504	454	42.5	\$ 198.5				
WIND	Tuntutuliak Comm Svcs Assoc	Tuntutuliak High Penetration Wind-Diesel Smart Grid	2013 Jan	-	-	-	\$ -	-	-	-	\$ -	136	221	10.4	\$ 47.4	136	221	10.4	\$ 47.4				
WIND	Unalakleet Valley Electric Co	Unalakleet Wind Farm	2009 Dec	958	-	58.2	\$ 211.2	938	-	67.8	\$ 247.6	626	204	47.2	\$ 179.8	3,250	204	226.4	\$ 777.2				
<b>SubTotal</b>				1,242	-	79	\$ 306.2	1,914	-	140	\$ 577.2	1,988	960	153	\$ 673.5	5,873	960	426	\$ 1,695.5				
BIOMASS	Alaska Gateway School District	Tok Wood Heating	2010 Oct	-	3,217	24.4	\$ 92.0	-	4,595	44.0	\$ 147.0	-	7,141	68.7	\$ 250.6	-	16,371	152.1	\$ 540.6				
BIOMASS	Chilkoot Indian Association	Haines (Chilkoot) Central Wood Heating System Construction	2011 Oct	-	-	-	\$ -	-	212	1.7	\$ 6.8	-	231	2.4	\$ 10.4	-	453	4.2	\$ 17.3				
BIOMASS	Delta/Greely School District	Delta Junction Wood Chip Heating	2011 Sep	-	-	-	\$ -	-	3,977	38.2	\$ 133.5	-	3,458	33.2	\$ 132.6	-	7,435	71.5	\$ 266.2				
BIOMASS	Gulkana Village Council	Gulkana Central Wood Heating	2010 Oct	-	780	5.9	\$ 23.5	-	780	7.0	\$ 28.9	-	-	-	\$ -	-	1,840	15.9	\$ 63.3				
BIOMASS	Native Village of Eyak	Cordova Wood Processing Plant	2011 Dec	-	1,500	11.4	\$ 42.0	-	600	5.4	\$ 25.3	-	-	-	\$ -	-	2,820	24.4	\$ 95.4				
HEAT PUMPS	City and Borough of Juneau	Juneau Airport Ground Source Heat Pump	2011 May	-	5,117	37.1	\$ 130.5	-	5,400	45.0	\$ 159.0	-	5,400	45.0	\$ 159.0	-	15,917	127.1	\$ 448.5				
HEAT PUMPS	City and Borough of Juneau	Juneau Aquatic Ctr. Ground Source Heat Pump	2011 Apr	-	-	-	\$ -	-	1,740	16.7	\$ 61.4	-	3,068	29.5	\$ 124.8	-	4,808	46.2	\$ 186.2				
HEAT PUMPS	City of Seward	Alaska Sealife Center Ph II Seawater Heat Pump Project	2011 Nov	-	-	-	\$ -	-	-	-	\$ -	-	2,892	27.8	\$ 106.2	-	2,892	27.8	\$ 106.2				
HEAT RECOVERY	Golden Valley Electric Association	North Pole Heat Recovery	2009 Nov	-	5,249	61.5	\$ 171.5	-	3,349	32.8	\$ 90.6	-	-	-	\$ -	-	9,595	106.0	\$ 285.2				
HEAT RECOVERY	Inside Passage Electric Cooperative	Hoonah Heat Recovery Project	2012 Aug	-	-	-	\$ -	-	-	-	\$ -	-	4,119	36.7	\$ 178.7	-	4,119	36.7	\$ 178.7				
HEAT RECOVERY	McGrath Light & Power Company	McGrath Heat Recovery	2010 May	-	2,896	23.0	\$ 156.7	-	2,617	25.2	\$ 97.1	-	1,681	16.2	\$ 120.1	-	8,356	76.6	\$ 419.5				
HEAT RECOVERY	City and Borough of Wrangell	Wrangell Hydro Based Electric Boilers	2011 Feb	-	6,889	66.0	\$ 230.3	-	7,711	79.4	\$ 134.5	-	4,998	51.5	\$ 82.6	-	19,597	196.9	\$ 447.4				
SOLAR	Golden Valley Electric Association	McKinley Village Solar Thermal	2010 Jun	-	134	1.8	\$ 7.1	-	130	1.9	\$ 7.6	-	108	0.8	\$ 6.8	-	433	5.0	\$ 23.0				
<b>SubTotal</b>					25,782	231	\$ 853.6		31,111	297	\$ 891.7		33,096	312	\$ 1,171.8		94,636	890	\$ 3,077.5				
<b>TOTAL</b>				21,364	25,782	1,684.9	\$ 5,703.3	42,821	31,111	3,341.0	\$ 10,806.1	115,095	34,056	9,299	\$ 20,296.2	203,316	95,596	16,030	\$ 41,858.7				
				<b>2013 Estimated Annualized Total</b>				<b>153,460</b>				<b>45,408</b>				<b>12,398.3</b>				<b>\$ 27,061.6</b>			

### Notes

The energy production data provided for years 2012 and 2013 is net renewable energy produced by Renewable Energy Fund projects. All previous years reflect gross renewable energy.

\*2013 data represents the first three quarters of the year. An updated report will be published in March 2014.

Data for wind turbines in Toksook Bay represent only the portion covered by the REF grant in years 2012 and 2013. In year 2011, the data represents production from all wind turbines; the REF program funded only one of the four wind turbines installed.

Some Delta Area Wind Turbines needed repairs in 2013 and were not in operation for a period of time, hence production in 2013 was significantly lower than in previous years.

Data for the City of Pelican was pulled directly from the SCADA system installed by the AEA Energy System Upgrade

Data for the following projects in operation is not reported:

- City of Akutan Town Creek Hydro Repairs and Upgrade did not report performance data in 2013.
- Cordova Electric Cooperative Cordova Heat Recovery was commercialized but shut down one week after it started-up. The Organic Rankine Cycle commenced the start-up process on June 1, 2012. Because Cordova Electric operates on hydroelectric power throughout the summer and fall, the ORC will not be fully commissioned until late fall 2013. Initial runs show that the system was operating as designed.
- Golden Valley Electric North Pole Heat Recovery did not report performance data for 2013.
- Gulkana Village Council Gulkana Central Wood Heating Construction started operation and was commissioned in the 4th quarter of 2010. However, due to repairs to the system in 2013, performance data was not submitted by the applicant. Data reported in this table represents operation information from 2010 to 2012.
- Lake and Peninsula Borough Lake and Peninsula Wood Boilers.
- Native Village of Eyak Cordova Wood Processing Plant provided 2013 data on January 28th, 2014. The information will be incorporated in the next report update.
- Southeast Island School District Thorne Bay School Wood Fired Boiler Project started generating energy 4th Quarter 2012 but the system was not in operation in 2013 due to wet wood conditions.

Source: Fay, G.; Villalobos Meléndez A.; and Saylor B. 2014. Institute of Social and Economic Research, University of Alaska Anchorage, prepared for the Alaska Energy Authority.

Partial support for this report and renewable energy fund project database developed by the Institute of Social and Economic Research, University of Alaska Anchorage is from a grant from the U.S. Department of Energy, EPSCoR project DE-PS02-09ER09-12, Making Wind Work for Alaska: Supporting the Development of Sustainable, Resilient, Cost-Effective Wind-Diesel Systems for Isolated Communities to the University of Alaska.

# Performance of Renewable Energy Fund Projects in Operation

			Note: 9 months only for 2013																
			2011				2012				Jan - Sep, 2013				Cumulative Total (2009-Sep,2013)				
Technology Type	Grantee	Project Name	Operation Start Date	Energy Production		Fuel Displaced		Energy Production		Fuel Displaced		Energy Production		Fuel Displaced		Energy Production		Fuel Displaced	
				Electrical (MWh)	Thermal (MMBtu)	Diesel (Galx1000)	Value (\$ x 1000)	Electrical (MWh)	Thermal (MMBtu)	Diesel (Galx1000)	Value (\$ x 1000)	Electrical (MWh)	Thermal (MMBtu)	Diesel (Galx1000)	Value (\$ x 1000)	Electrical (MWh)	Thermal (MMBtu)	Diesel (Galx1000)	Value (\$ x 1000)
LANDFILL GAS	Municipality of Anchorage	Anchorage Landfill Gas Electricity	2012 Aug	-	-	-	\$ -	-	-	-	-	33,834	-	3,224.0	\$ 1,602.0	33,834	-	3,224.0	\$ 1,079.0
HYDRO	City of Atka	Chuniisax Creek Hydroelectric	2012 Dec	-	-	-	\$ -	-	-	-	-	285	-	21.9	\$ 118.4	285	-	21.9	\$ 118.4
HYDRO	Cordova Electric Cooperative	Humpback Creek Hydroelectric Project Rehabilitation	2011 Jul	1,563	-	114.9	\$ 410.3	3,510	-	270.0	\$ 1,050.6	2,933	-	225.6	\$ 809.6	8,006	-	610.5	\$ 2,270.5
HYDRO	Gustavus Electric Company	Falls Creek Hydroelectric Construction	2009 Jul	1,933	-	138.1	\$ 483.3	1,956	-	150.4	\$ 645.3	1,490	-	114.6	\$ 481.1	8,044	-	583.8	\$ 2,143.7
HYDRO	City of Pelican	Pelican Hydroelectric Upgrade Project	2013 Mar	-	-	-	\$ -	-	-	-	-	711	-	57.8	\$ 257.6	711	-	57.8	\$ 257.6
SOLAR	Alaska Village Electric Cooperative	Kaltag Solar Construction	2012 Oct	-	-	-	\$ -	-	-	-	-	9	-	0.6	\$ 2.3	9	-	0.6	\$ 2.3
TRANSMISSION	Alaska Power and Telephone	North Prince of Wales Island Intertie Project	2011 Sep	311	-	16.4	\$ 67.0	589	-	44.3	\$ 161.7	644	-	48.4	\$ 175.0	1,544	-	109.1	\$ 403.7
TRANSMISSION	Nome Joint Utility System	Nome Banner Peak Wind Farm Transmission	2010 Oct	955	-	53.9	\$ 151.6	995	-	61.2	\$ 193.3	700	-	43.1	\$ 138.2	4,040	-	236.0	\$ 730.2
WIND	Alaska Environmental Power	Delta Area Wind Turbines	2010 Sep	1,641	-	95.9	\$ 256.1	989	-	63.9	\$ 132.9	210	-	13.6	\$ 36.4	3,429	-	202.8	\$ 482.5
WIND	Alaska Village Electric Cooperative	Toksook Wind Farm	2009 Aug	560	-	37.7	\$ 129.1	131	-	9.6	\$ 38.5	96	-	7.0	\$ 26.1	922	-	64.2	\$ 238.6
WIND	Alaska Village Electric Cooperative	Mekoryuk Wind Farm	2010 Nov	239	-	13.7	\$ 49.5	147	-	10.4	\$ 41.1	123	-	8.7	\$ 32.5	513	-	33.2	\$ 123.9
WIND	Alaska Village Electric Cooperative	Quinhagak Wind Farm	2010 Nov	409	-	28.9	\$ 105.6	500	-	38.1	\$ 161.4	391	-	29.8	\$ 116.7	1,372	-	101.9	\$ 398.0
WIND	Alaska Village Electric Cooperative	Emmonak/Alakanuk Wind	2011 Sep	63	-	4.5	\$ 17.7	505	-	35.8	\$ 142.0	406	-	28.8	\$ 111.0	975	-	69.1	\$ 270.7
WIND	Alaska Village Electric Cooperative	Shaktolik Wind Construction	2012 Apr	-	-	-	\$ -	116	-	8.9	\$ 35.7	119	-	9.2	\$ 35.1	235	-	18.1	\$ 70.8
WIND	Golden Valley Electric Association	GVEA Eva Creek Wind Turbine Purchase	2012 Oct	-	-	-	\$ -	13,091	-	921.9	\$ 1,972.9	50,496	-	3,556.1	\$ 9,530.3	63,588	-	4,478.0	\$ 11,503.2
WIND	Kodiak Electric Association, Inc.	Pillar Mountain Wind Project	2010 Sep	12,448	-	870.7	\$ 2,873.3	16,201	-	1,140.9	\$ 4,211.8	18,085	-	1,273.6	\$ 4,385.3	65,185	-	4,584.6	\$ 15,849.5
WIND	Kotzebue Electric Association	Kotzebue High Penetration Wind-Battery-Diesel Hybrid	2012 May	-	-	-	\$ -	2,177	-	148.1	\$ 549.9	1,941	-	132.0	\$ 468.7	4,118	-	280.1	\$ 1,018.5
WIND	Nome Joint Utility System	Banner Peak Wind Farm Expansion	2013 Jul	-	-	-	\$ -	-	-	-	-	635	-	38.8	\$ 124.6	635	-	38.8	\$ 124.6
<b>SubTotal</b>				20,122	-	1,375	\$ 4,543.5	40,908	-	2,904	\$ 9,337.1	113,106	-	8,834	\$ 18,450.9	197,443	-	14,715	\$ 37,085.7
WIND	Aleutian Wind Energy	Sand Point Wind	2011 Aug	196	-	14.3	\$ 64.9	792	-	58.1	\$ 266.2	950	15	69.7	\$ 321.9	1,937	15	142.2	\$ 653.0
WIND	Kwigillingok Power Company	Kwigillingok High Penetration Wind-Diesel Smart Grid	2012 Feb	-	-	-	\$ -	-	-	-	-	46	66	4.1	\$ 19.4	46	66	4.1	\$ 19.4
WIND	Puvurmag Power Company	Kongiganak High Penetration Wind-Diesel Smart Grid	2010 Dec	88	-	6.6	\$ 30.1	185	-	14.0	\$ 63.4	232	454	21.9	\$ 105.0	504	454	42.5	\$ 198.5
WIND	Tuntutuliak Comm Svcs Assoc	Tuntutuliak High Penetration Wind-Diesel Smart Grid	2013 Jan	-	-	-	\$ -	-	-	-	-	136	221	10.4	\$ 47.4	136	221	10.4	\$ 47.4
WIND	Unalakleet Valley Electric Co	Unalakleet Wind Farm	2009 Dec	958	-	58.2	\$ 211.2	938	-	67.8	\$ 247.6	626	204	47.2	\$ 179.8	3,250	204	226.4	\$ 777.2
<b>SubTotal</b>				1,242	-	79	\$ 306.2	1,914	-	140	\$ 577.2	1,988	960	153	\$ 673.5	5,873	960	426	\$ 1,695.5
BIOMASS	Alaska Gateway School District	Tok Wood Heating	2010 Oct	-	3,217	24.4	\$ 92.0	-	4,595	44.0	\$ 147.0	-	7,141	68.7	\$ 250.6	-	16,371	152.1	\$ 540.6
BIOMASS	Chilkoot Indian Association	Haines (Chilkoot) Central Wood Heating System Construction	2011 Oct	-	-	-	\$ -	-	212	1.7	\$ 6.8	-	231	2.4	\$ 10.4	-	453	4.2	\$ 17.3
BIOMASS	Delta/Greely School District	Delta Junction Wood Chip Heating	2011 Sep	-	-	-	\$ -	-	3,977	38.2	\$ 133.5	-	3,458	33.2	\$ 132.6	-	7,435	71.5	\$ 266.2
BIOMASS	Gulkana Village Council	Gulkana Central Wood Heating	2010 Oct	-	780	5.9	\$ 23.5	-	780	7.0	\$ 28.9	-	-	-	\$ -	-	1,840	15.9	\$ 63.3
BIOMASS	Native Village of Eyak	Cordova Wood Processing Plant	2011 Dec	-	1,500	11.4	\$ 42.0	-	600	5.4	\$ 25.3	-	-	-	\$ -	-	2,820	24.4	\$ 95.4
HEAT PUMPS	City and Borough of Juneau	Juneau Airport Ground Source Heat Pump	2011 May	-	5,117	37.1	\$ 130.5	-	5,400	45.0	\$ 159.0	-	5,400	45.0	\$ 159.0	-	15,917	127.1	\$ 448.5
HEAT PUMPS	City and Borough of Juneau	Juneau Aquatic Ctr. Ground Source Heat Pump	2011 Apr	-	-	-	\$ -	-	1,740	16.7	\$ 61.4	-	3,068	29.5	\$ 124.8	-	4,808	46.2	\$ 186.2
HEAT PUMPS	City of Seward	Alaska Sealife Center Ph II Seawater Heat Pump Project	2011 Nov	-	-	-	\$ -	-	-	-	\$ -	-	2,892	27.8	\$ 106.2	-	2,892	27.8	\$ 106.2
HEAT RECOVERY	Golden Valley Electric Association	North Pole Heat Recovery	2009 Nov	-	5,249	61.5	\$ 171.5	-	3,349	32.8	\$ 90.6	-	-	-	\$ -	-	9,595	106.0	\$ 285.2
HEAT RECOVERY	Inside Passage Electric Cooperative	Hoonah Heat Recovery Project	2012 Aug	-	-	-	\$ -	-	-	-	\$ -	-	4,119	36.7	\$ 178.7	-	4,119	36.7	\$ 178.7
HEAT RECOVERY	McGrath Light & Power Company	McGrath Heat Recovery	2010 May	-	2,896	23.0	\$ 156.7	-	2,617	25.2	\$ 97.1	-	1,681	16.2	\$ 120.1	-	8,356	76.6	\$ 419.5
HEAT RECOVERY	City and Borough of Wrangell	Wrangell Hydro Based Electric Boilers	2011 Feb	-	6,889	66.0	\$ 230.3	-	7,711	79.4	\$ 134.5	-	4,998	51.5	\$ 82.6	-	19,597	196.9	\$ 447.4
SOLAR	Golden Valley Electric Association	McKinley Village Solar Thermal	2010 Jun	-	134	1.8	\$ 7.1	-	130	1.9	\$ 7.6	-	108	0.8	\$ 6.8	-	433	5.0	\$ 23.0
<b>SubTotal</b>				-	25,782	231	\$ 853.6	-	31,111	297	\$ 891.7	-	33,096	312	\$ 1,171.8	-	94,636	890	\$ 3,077.5
<b>TOTAL</b>				21,364	25,782	1,684.9	\$ 5,703.3	42,821	31,111	3,341.0	\$ 10,806.1	115,095	34,056	9,299	\$ 20,296.2	203,316	95,596	16,030	\$ 41,858.7
											<b>2013 Estimated Annualized Total</b>								
															<b>153,460 45,408 12,398.3 \$ 27,061.6</b>				

## Notes

The energy production data provided for years 2012 and 2013 is net renewable energy produced by Renewable Energy Fund projects. All previous years reflect gross renewable energy.

\*2013 data represents the first three quarters of the year. An updated report will be published in March 2014.

Data for wind turbines in Toksook Bay represent only the portion covered by the REF grant in years 2012 and 2013. In year 2011, the data represents production from all wind turbines; the REF program funded only one of the four wind turbines installed.

Some Delta Area Wind Turbines needed repairs in 2013 and were not in operation for a period of time, hence production in 2013 was significantly lower than in previous years.

Data for the City of Pelican was pulled directly from the SCADA system installed by the AEA Energy System Upgrade

Data for the following projects in operation is not reported:

- City of Akutan Town Creek Hydro Repairs and Upgrade did not report performance data in 2013.

- Cordova Electric Cooperative Cordova Heat Recovery was commercialized but shut down one week after it started-up. The Organic Rankine Cycle commenced the start-up process on June 1, 2012.

Because Cordova Electric operates on hydroelectric power throughout the summer and fall, the ORC will not be fully commissioned until late fall 2013. Initial runs show that the system was operating as designed.

- Golden Valley Electric North Pole Heat Recovery did not report performance data for 2013.

- Gulkana Village Council Gulkana Central Wood Heating Construction started operation and was commissioned in the 4th quarter of 2010. However, due to repairs to the system in 2013, performance data was not submitted by the applicant. Data reported in this table represents operation information from 2010 to 2012.

- Lake and Peninsula Borough Lake and Peninsula Wood Boilers.

- Native Village of Eyak Cordova Wood Processing Plant provided 2013 data on January 28th, 2014. The information will be incorporated in the next report update.

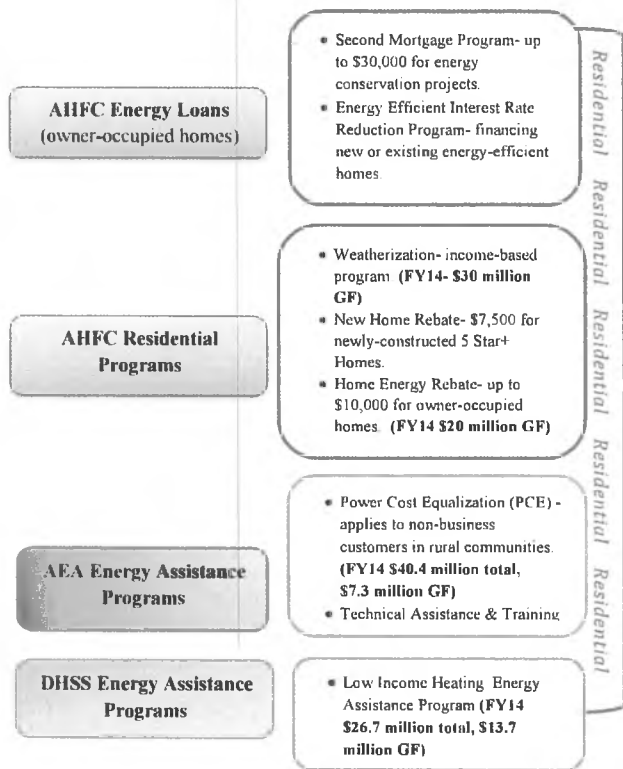
- Southeast Island School District Thorne Bay School Wood Fired Boiler Project started generating energy 4th Quarter 2012 but the system was not in operation in 2013 due to wet wood conditions.

Source: Fay, G., Villalobos Meléndez A., and Saylor B. 2014. Institute of Social and Economic Research, University of Alaska Anchorage, prepared for the Alaska Energy Authority.

Partial support for this report and renewable energy fund project database developed by the Institute of Social and Economic Research, University of Alaska Anchorage is from a grant from the U.S. Department of Energy, EPSCoR project DE-PS02-09ER09-12, Making Wind Work for Alaska: Supporting the Development of Sustainable, Resilient, Cost-Effective Wind-Diesel Systems for Isolated Communities to the University of Alaska.

# State of Alaska Energy Programs: Serving the needs of Alaska's residential and commercial energy users

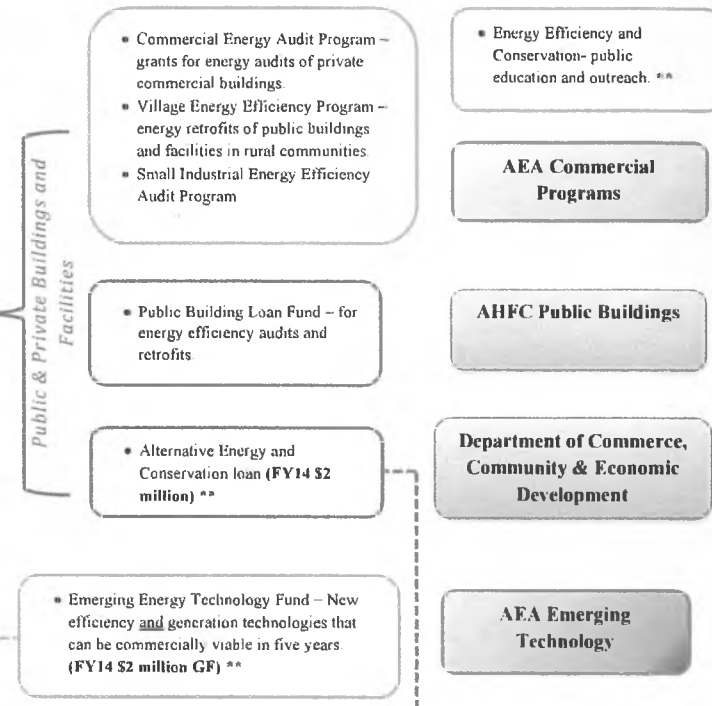
## Residential Programs



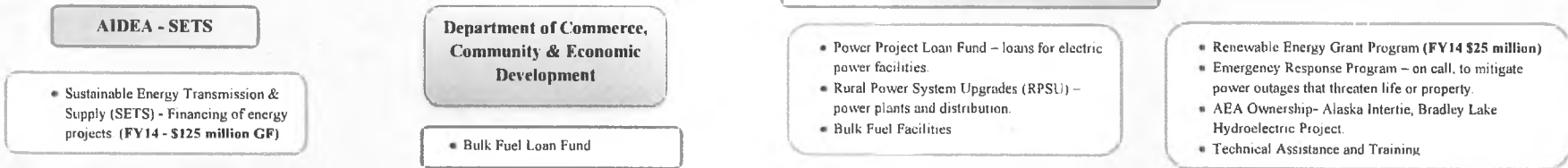
## In-State Energy Use



## Public and Private Sector Program



## SUPPLY – Energy Generation



Prepared by: Alaska Energy Authority and Office of Management and Budget (1/29/2013)

\* Source: Energy Information Authority

\*\* Note that some programs do not fall within specific categories - Public outreach and education serves both the commercial and residential markets and Emerging Technology and the Alternative Energy and Conservation loan serve both generation and efficiency

**Alaska Renewable Energy Fund**  
**Projected Energy Production and Cost Savings from Round 1-5 Projects**  
**February 1, 2013**



Resource	ID	Project Name	Community	Population	Energy and Fuel					Cost Savings										Project Life (Years)	In Operation 2012
					Energy Production		Fuel Displaced (x 1000)			Project Cost (\$ x 1000)		Savings (\$ x 1000/yr)				Cost / Savings Payback Time (Years)		Return on Investment (Lifetime Savings - Cost) / Cost			
					Electrical (MWh/yr)	Thermal (mmBtu/yr)	Diesel (gal/yr)	Natural Gas (MCF/yr)	Diesel Equivalent (gal/yr)	Total Cost	REF Funding	Fuel Savings	CBM Net Cost	Net Savings	Lifetime Savings	Total Cost	REF Funding	Total Cost	REF Funding		
BIOMASS	2	Gulkana Central Wood Heating Construction	Gulkana	139	2,031		15	0	15	\$500	\$500	\$28	\$5	\$23	\$458	22	22	-8%	-8%	20	x
	15	Chitochina Central Wood Heating Construction	Chitochina	93	1,832		13	0	13	\$512	\$500	\$26	\$9	\$35	\$709	14	14	38%	42%	20	
	26	Cordova Wood Processing Plant	Cordova	2,239	1,803		13	0	13	\$138	\$138	\$41	\$1	\$43	\$856	3	3	521%	521%	20	x
	33	Haines Central Wood Heating Construction	Haines	1,713	5,320		38	0	38	\$225	\$189	\$152	\$3	\$109	\$2,978	2	1	1223%	1479%	20	
	49	Tok Wood Heating Construction	Tok	1,258	6,990		50	0	50	\$3,260	\$3,245	\$175	\$8	\$183	\$3,653	18	18	12%	13%	20	x
	53	Biomass-fired Organic Rankine Cycle System	North Pole	2,117	3,098	1,035	201	0	201	\$4,613	\$2,000	\$520	\$0	\$520	\$10,400	9	4	125%	420%	20	
	68	Anchorage Landfill Gas Electricity Construction	Anchorage	291,826	24,183		0	311,378	2,301	\$7,395	\$2,000	\$1,714	\$495	\$1,219	\$24,371	6	2	730%	1119%	20	
	112	Delta Junction Wood Chip Heating	Delta Junction	958	7,282		53	0	53	\$2,858	\$2,000	\$152	\$3	\$151	\$3,017	19	13	5%	51%	20	x
	211,636	Thorne Bay Wood Boiler	Thorne Bay	471	2,427		18	0	18	\$580	\$478	\$36	\$4	\$32	\$645	18	15	11%	35%	20	
	445	District Wood Heating In Fort Yukon	Fort Yukon	583	19,040		137	0	137	\$3,605	\$2,318	\$985	\$51	\$538	\$10,768	7	4	199%	364%	20	
	476	City-Tribe Biomass Energy Conservation	Tanana	246	1,609		12	0	12	\$508	\$413	\$53	\$1	\$52	\$1,041	10	8	105%	152%	20	
	605	Biomass Fuel Dryer Project	Crain	1,201	6,621		48	0	48	\$900	\$350	\$150	\$21	\$129	\$2,579	5	3	330%	637%	20	
	623	Susitna Valley High School Wood Heat	Talkeetna	876	2,885		21	0	21	\$758	\$750	\$47	\$7	\$40	\$798	19	19	6%	6%	20	
	649	Kenny Lake School Wood Fired Boiler	Kenny Lake	355	2,774		20	0	20	\$565	\$565	\$42	\$4	\$46	\$912	12	12	61%	61%	20	
	681	Lake and Peninsula Wood Boilers	Bristol Bay Region	541	4		4	0	4	\$493	\$370	\$25	\$1	\$24	\$476	21	16	-4%	29%	20	
820	Design & Construction of Wood Heating in Interior Alaska	Interior Communities	151	15,562		20	0	20	\$1,215	\$1,215	\$129	\$80	\$50	\$994	24	24	-18%	-18%	20		
840	Kobuk Biomass Design & Construction Project	Kobuk	151	4,200		4	0	4	\$401	\$356	\$29	\$9	\$20	\$394	20	18	-2%	11%	20		
881	Tanacross Woody Biomass Community Space Heating Project	Tanacross	136	25,300		25	0	25	\$590	\$420	\$11	\$30	\$41	\$826	14	10	40%	97%	20		
GEO-THERMAL	111	Juneau Aquatic Ctr Ground Source Heat Pump Constr	Juneau	31,275	15,140		109	0	109	\$1,950	\$1,450	\$126	\$16	\$141	\$2,828	14	10	45%	95%	20	
	453	Alaska SeaLife Center Ph II Seawater Heat Pump	Seward	2,693	2,196		52	0	52	\$287	\$287	\$117	\$0	\$117	\$2,346	2	2	719%	719%	20	
	705	Japanski Island Boathouse Heat Pump	Sitka	8,881	374		3	0	3	\$165	\$125	\$9	\$0	\$9	\$182	18	14	16%	46%	20	
	999	Juneau Airport Ground Source Heat Pump	Juneau	31,275	5,143		37	0	37	\$1,026	\$513	\$140	\$7	\$148	\$2,957	7	3	188%	476%	20	x
	9	Wrangell Hydro Based Electric Boilers Construction	Wrangell	2,369	11,903		86	0	86	\$2,082	\$2,000	\$374	\$0	\$374	\$18,685	6	5	797%	834%	50	x
HEAT RECOVERY	22	Cordova Heat Recovery Construction	Cordova	2,239	7,874		57	0	57	\$3,770	\$1,780	\$255	\$1	\$256	\$5,113	15	7	36%	187%	20	
	61	McGrath Heat Recovery Construction	McGrath	346	4,438		32	0	32	\$954	\$712	\$196	\$0	\$196	\$3,921	5	4	311%	450%	20	x
	105	North Pole Heat Recovery Construction	North Pole	2,117	1,476		92	0	92	\$1,050	\$840	\$237	\$0	\$237	\$4,738	4	4	351%	464%	20	
	235	Kotzebue Electric Heat Recovery Construction	Kotzebue	3,201	1,213	12,649	185	0	185	\$1,216	\$916	\$978	\$0	\$978	\$19,562	1	1	1506%	2036%	20	
	244	Point Lay Heat Recovery Construction	Point Lay	189	15,199		110	0	110	\$4,257	\$396	\$702	\$8	\$694	\$13,876	6	1	226%	3405%	20	
	273	Unalaska Heat Recovery Construction	Unalaska	4,376	1,662		128	0	128	\$1,920	\$1,300	\$529	\$18	\$546	\$10,927	4	2	469%	741%	20	
	307	Ambler Heat Recovery Construction	Ambler	258	1,229		9	0	9	\$500	\$435	\$49	\$1	\$47	\$946	11	9	89%	117%	20	
	448	Saint Paul Fuel Economy Upgrade	Saint Paul	479	2,501		18	0	18	\$98	\$98	\$103	\$3	\$100	\$2,003	1	1	1941%	1941%	20	
	687	Hoonah Heat Recovery Project	Hoonah	760	7,905		57	0	57	\$1,005	\$475	\$220	\$0	\$220	\$4,402	5	2	338%	827%	20	
	823	Tatitlek Heat Recovery Project	Tatitlek	88	6,000		6	0	6	\$296	\$265	\$35	\$1	\$34	\$680	9	8	130%	157%	20	
	844	Russian Mission Heat Recovery System	Russian Mission	312	12,000		12	0	12	\$582	\$555	\$6	\$93	\$39	\$725	15	14	33%	40%	20	
	848	Sleetmute Heat Recover Power Plant to Water Plant	Sleetmute	86	1,779		2	0	2	\$133	\$127	\$11	\$0	\$11	\$220	12	12	65%	73%	20	
	856	Shishmaref Heat Recovery Project	Shishmaref	563	7,900		8	0	8	\$377	\$311	\$42	\$0	\$42	\$840	8	7	157%	170%	20	
	858	Togiak Waste Heat Recovery Project	Togiak	817	13,700		14	0	14	\$486	\$443	\$74	\$3	\$71	\$1,428	7	6	194%	222%	20	
	HYDRO	10	Falls Creek Hydroelectric Construction	Gustavus	442	1,766		118	0	118	\$8,400	\$750	\$540	\$0	\$540	\$26,998	16	11	221%	3500%	50
21, 407		Humbback Creek Hydroelectric Construction	Cordova	2,239	3,764		290	0	290	\$21,300	\$8,000	\$1,748	\$37	\$1,211	\$60,564	18	7	184%	657%	50	x
23		North Prince of Wales Island Intertie Project	Coffman Cove/Naukaai Bay	287	1,356		104	0	104	\$6,155	\$3,752	\$450	\$171	\$279	\$13,950	22	13	127%	273%	50	x
37, 620		Whitman Lake Project	Ketchikan	8,050	7,926		528	0	528	\$25,000	\$700	\$2,170	\$57	\$2,113	\$105,656	12	0	323%	14994%	50	
58		Chunisax Creek Hydroelectric Construction	Atka	61	568		44	0	44	\$5,500	\$996	\$261	\$22	\$239	\$11,971	23	4	118%	1102%	50	x
104, 629		Reynolds Creek Hydroelectric Project	Hydaburg	376	7,351		565	0	565	\$27,000	\$4,000	\$1,871	\$0	\$1,877	\$93,868	14	2	248%	2247%	50	
469		Akutan Hydroelectric System Repair and Upgrade	Akutan	1,027	420		32	0	32	\$1,491	\$1,391	\$125	\$12	\$113	\$5,634	13	12	278%	305%	50	x
653		Terror Lake Unit 3 Hydroelectric Project	Kodiak	6,130	6,456		455	0	455	\$15,908	\$3,752	\$2,089	\$92	\$1,997	\$99,864	8	2	528%	2562%	50	
672		Snettisham Transmission Avalanche Mitigation	Juneau	31,275	936		72	0	72	\$3,344	\$2,000	\$276	\$18	\$258	\$12,903	13	8	286%	545%	50	
688		Pelican Hydroelectric Upgrade Project	Pelican	88	1,000		72	0	72	\$5,521	\$1,897	\$283	\$14	\$270	\$13,482	20	7	147%	611%	50	
OCEAN/RIVER	836	Packer's Creek Hydroelectric Project	Chignik Lagoon	78	521		521	0	521	\$2,516	\$1,993	\$233	\$50	\$283	\$14,160	9	7	463%	610%	50	
	660	Cook Inlet TIDGen Project	Niiskiy/Railbelt	4,493	1,840		0	23,484	174	\$8,051	\$2,000	\$134	\$91	\$43	\$649	186	46	-92%	-68%	15	

Resource	ID	Project Name	Community	Population	Energy and Fuel					Cost Savings										In Operation 2012	
					Energy Production		Fuel Displaced (x 1000)			Project Cost (\$ x 1000)		Savings (\$ x 1000/yr)				Cost / Savings Payback Time (Years)		Return on Investment (Lifetime Savings - Cost) / Cost			Project Life (Years)
					Electrical (MWh/yr)	Thermal (mmBtu/yr)	Diesel (gal/yr)	Natural Gas (MCF/yr)	Diesel Equivalent (gal/yr)	Total Cost	REF Funding	Fuel Savings	O&M Net Cost	Net Savings	Lifetime Savings	Total Cost	REF Funding	Total Cost	REF Funding		
SOLAR	108	McKinley Village Solar Thermal Construction	McKinley Park	185	32		2	0	2	\$194	\$190	\$11	\$0	\$11	\$331	18	17	71%	74%	30	x
	641	Kaitag Solar Construction	Kaitag	190	7,351		1	0	1	\$100	\$90	\$3	\$0	\$3	\$103	29	26	3%	15%	30	
	47	Nome Banner Peak Wind Farm Transmission Constr	Nome	3,598	1,030		69	0	69	\$890	\$801	\$333	\$21	\$311	\$6,229	3	3	600%	678%	20	x
	50	Unalakleet Wind Farm Construction	Unalakleet	688	1,200		80	0	80	\$4,223	\$4,000	\$421	\$24	\$396	\$7,926	11	10	88%	98%	20	x
	52	Newton Peak Wind Farm	Nome	3,598	4,267		328	0	328	\$4,444	\$4,000	\$1,553	\$83	\$1,470	\$29,399	3	3	561%	635%	20	
	70	Quinhagak Wind Farm Construction	Quinhagak	669	649		50	0	50	\$4,839	\$3,882	\$251	\$13	\$237	\$4,747	20	16	-7%	22%	20	x
	71	Toksook Wind Farm Construction	Toksook	590	166		13	0	13	\$1,253	\$1,038	\$61	\$3	\$58	\$1,159	22	18	8%	12%	20	x
	72	Mekoryuk Wind Farm Construction	Mekoryuk	191	478		34	0	34	\$4,031	\$3,156	\$188	\$23	\$165	\$3,796	24	19	-18%	4%	20	x
	85, 518	High Penetration Wind-Battery-Diesel Hybrid	Kotzebue	3,201	4,267		328	0	328	\$10,809	\$8,000	\$1,710	\$83	\$1,627	\$32,547	7	5	201%	307%	20	x
	90	St. George Wind Farm Construction	Saint George	102	511		39	0	39	\$2,000	\$1,500	\$163	\$10	\$154	\$3,070	13	10	54%	105%	20	
	102	Delta Area Wind Turbines-Construction	Delta Junction/Railbelt	958	1,750		117	0	117	\$2,802	\$2,000	\$504	\$36	\$468	\$9,366	6	4	234%	368%	20	x
	103, 803	Pillar Mountain Wind Project - Construction	Kodiak	6,130	21,000		13,800	0	13,800	\$44,550	\$12,800	\$4,936	\$300	\$4,636	\$92,717	10	3	108%	624%	20	x
	107	Kwigillingok High Penetration Wind-Diesel	Kwigillingok	321	743		69	0	69	\$3,200	\$1,600	\$363	\$14	\$348	\$6,963	9	5	118%	335%	20	
	110	Kongganak High Penetration Wind-Diesel	Kongganak	439	1,167		90	0	90	\$3,300	\$1,700	\$515	\$23	\$493	\$9,851	7	3	199%	475%	20	x
	273	Tumutulak High Penetration Wind-Diesel	Tumutulak	408	518		63	0	63	\$3,360	\$1,760	\$203	\$10	\$193	\$3,860	17	9	15%	139%	20	
	302	Emmonak/Alakanuk Wind Design and Constr	Emmonak/Alakanuk	762	637		45	0	45	\$10,733	\$8,000	\$184	\$27	\$157	\$3,137	68	51	-71%	-61%	20	x
	303	Shaktolik Wind Construction	Shaktolik	251	360		33	0	33	\$2,728	\$2,466	\$160	\$7	\$153	\$3,053	18	16	12%	24%	20	
	317	Sand Point Wind Construction	Sand Point	976	1,855	2,122	158	0	158	\$1,078	\$640	\$922	\$38	\$884	\$12,688	1	1	1541%	2665%	20	x
	503	St. Paul Wind Diesel Project	Saint Paul	479	1,600		123	0	123	\$2,100	\$1,800	\$659	\$31	\$628	\$12,563	3	3	498%	561%	20	
	616	GVEA Eva Creek Wind Turbine Purchase	Healy, Fairbanks, Railbelt	31,535	55,510		3,469	0	3,469	\$93,300	\$1,463	\$8,770	\$1,880	\$6,890	\$137,804	14	0	48%	938%	20	
	839	Nome Renewable Energy Expansion/Optimization	Nome	3,598	1,899		237	0	237	\$6,737	\$4,069	\$921	\$40	\$881	\$17,627	8	5	162%	333%	20	
	870	Surplus Wind Energy Recovery for Mekoryuk Water System Heat	Mekoryuk	191		5,332	5	0	5	\$278	\$264	\$25	\$0	\$25	\$505	11	10	82%	91%	20	
	871	Shaktolik Surplus Wind Energy Recovery for Water System Heat	Shaktolik	251		10,171	10	0	10	\$253	\$240	\$52	\$0	\$52	\$1,043	5	5	312%	334%	20	
	875	Chevak Wind Energy Recovery -Chevak Water System Heat	Chevak	938		8,603	9	0	9	\$253	\$240	\$37	\$0	\$37	\$742	7	6	193%	209%	20	
	876	Gambell Wind Energy Recovery for Gambell Water System Heat	Gambell	681		7,376	10	0	10	\$253	\$240	\$43	\$0	\$43	\$859	6	6	239%	258%	20	
		<b>TOTAL</b>			<b>172,527</b>	<b>277,736</b>	<b>23,696</b>	<b>334,862</b>	<b>26,171</b>	<b>\$388,823</b>	<b>\$128,104</b>	<b>\$40,801</b>	<b>\$3,700</b>	<b>\$37,101</b>	<b>\$1,028,592</b>	<b>10</b>	<b>3</b>	<b>165%</b>	<b>703%</b>		

- Notes:
- Fuel savings and operation & maintenance (O&M) net cost figures are total present value over 20 years divided by 20. A real discount rate of 3% is assumed.
  - Estimated performance of projects is based on assumptions of round 1- economic analyses coordinated by ISER and modified by AEA given updated information.
  - Performance assumptions are subject to adjustment as new performance and actual price information becomes available.
  - Fuel prices are estimated based on updated Energy Information Administration Annual Energy Outlook 2012 Early Release. See [http://www.iser.uaa.alaska.edu/Publications/Fuel\\_price\\_projection\\_2011-2035\\_final.pdf](http://www.iser.uaa.alaska.edu/Publications/Fuel_price_projection_2011-2035_final.pdf) for methods