



# Renewable Energy Grant Fund and Emerging Energy Technology Fund

House Energy Committee

Feb. 26, 2014

# Renewable Energy Grant Fund

- Diversifies Alaska's energy portfolio and supports State renewable goals
- Displaces volatile-priced fossil fuels
- Provides a vetting mechanism for energy projects
- Capitalizes on local energy resources
- Expands Alaska's renewable energy knowledge base
- Provides local employment
- Benefits businesses not eligible for PCE



Coffman Cove School Garn boiler.

*Photo courtesy of Karen Petersen*

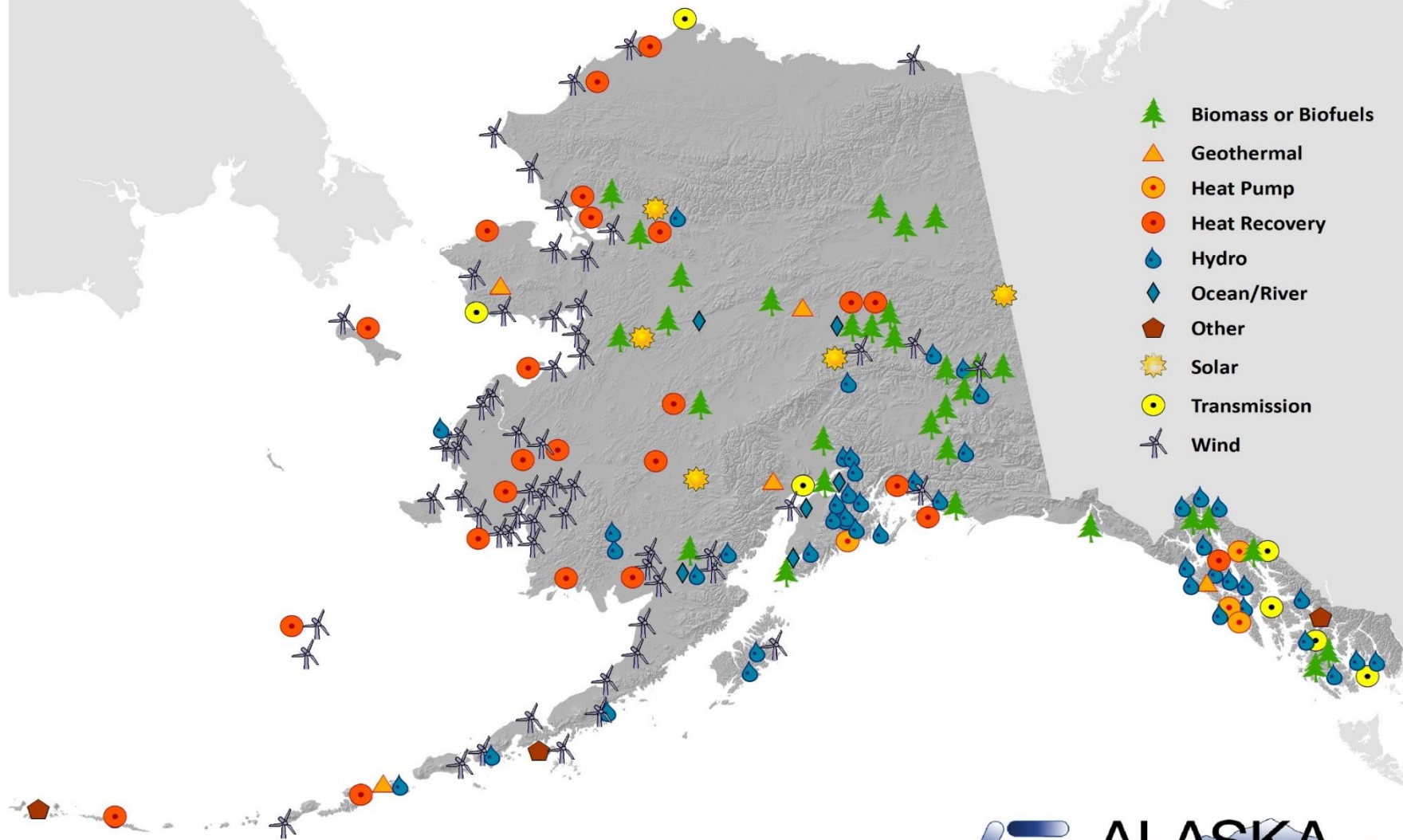


# Renewable Energy Fund Grant and Funding Summary

	Round I	Round II	Round III	Round IV	Round V	Round VI	Totals
Applications Received	115	118	123	108	97	85	646
Applications Funded	80 <sup>1</sup>	30	25	74	19	23	251
Grants Currently in Place	26	10	13	51	17	16	133
Grants Completed and Closed	49	18	7	12	1	0	87
Grants Cancelled or Combined	5	2	4	1	0	0	12
Grants Unissued to Date <sup>2</sup>	0	0	1	10	1	7	19
Amount Requested <sup>3</sup> (\$M)	\$ 453.8	\$ 293.4	\$ 223.5	\$ 123.1	\$ 132.9	\$ 122.6	\$ 1,349.3
AEA Recommended (\$M)	\$ 100.0	\$ 36.8	\$ 65.8	\$ 36.6	\$ 43.2	\$ 56.8	\$ 339.2
Appropriated (\$M)	\$ 100.0	\$ 25.0	\$ 25.0	\$ 26.6 <sup>6</sup>	\$ 25.9	\$ 25.0	\$ 227.5
Cash Disbursed (\$M)	\$ 72.3	\$ 19.2	\$ 14.0	\$ 18.3	\$ 8.2	\$ .3	\$ 132.3
Match Provided (\$M) <sup>4</sup>	\$ 20.7	\$ 22.6	\$ 10.5	\$ 34.6	\$ 8.2	\$ 6.0	\$ 102.6
Other Known Funding (\$M) <sup>4, 5</sup>	\$ 9.2	\$ 1.6	\$ 0.8	\$ 14.5	\$ 0	\$ 0	\$ 26.1

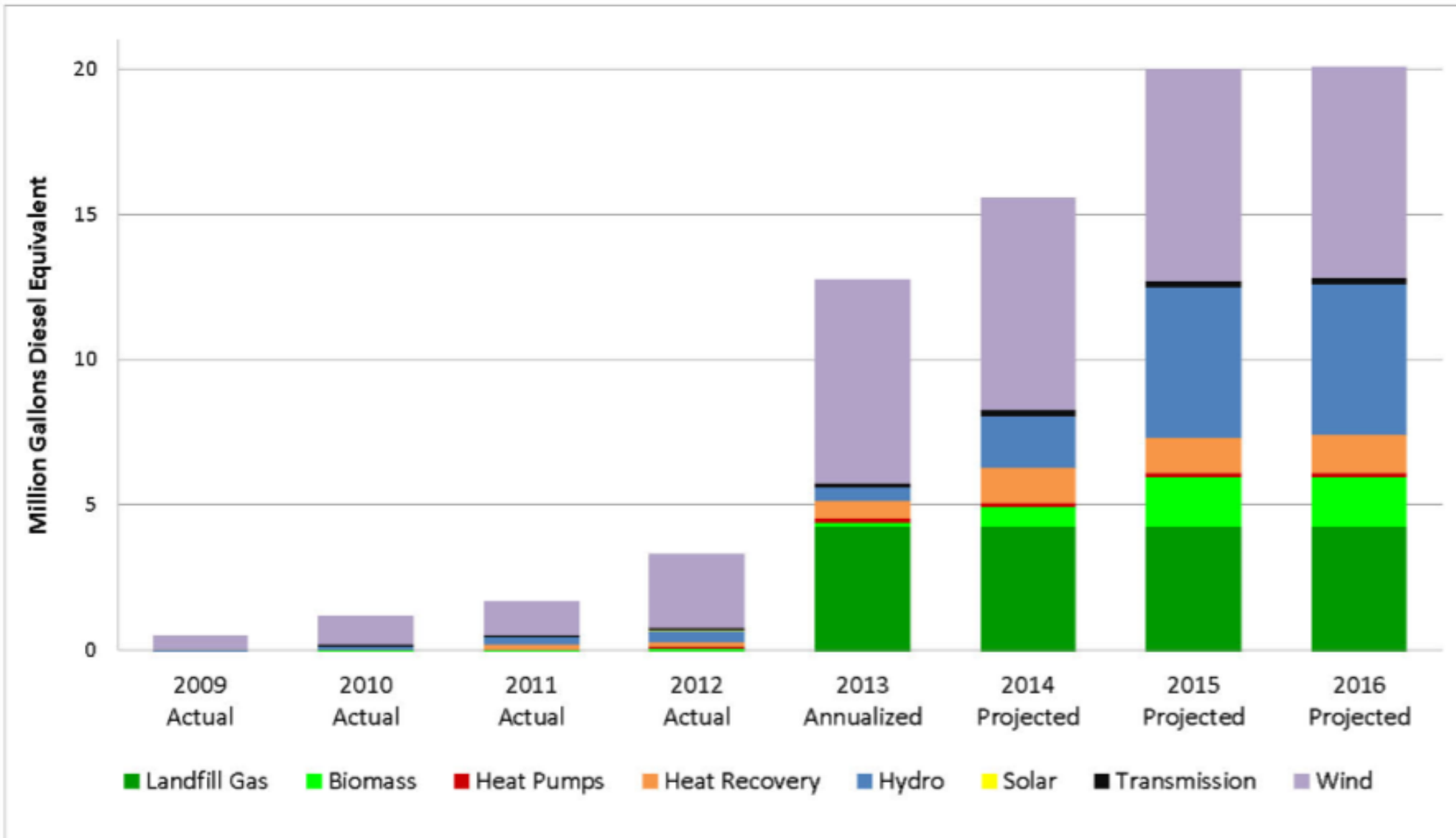
1. Includes seven projects from an earlier solicitation issued by AEA. The amount of funding budgeted for these seven project from sources other than the Renewable Energy Fund totals \$ 338,992.
2. Grants unissued are due mostly to grantee conditions that require earlier phases of work to be completed first or awaiting grantee action on the grant document.
3. Total grant amount requested by all applicants.
4. These totals are for awarded grants only.
5. \$26.6 Million was appropriated for Round IV, and additional \$10.0 million was re-appropriated from rounds I, II and III for use in Round IV.

## Renewable Energy Fund Projects, Rounds I - VI



## Statewide Impacts

# Renewable Energy Fund: Annual Fuel Savings



# Renewable Energy Fund: Project Performance

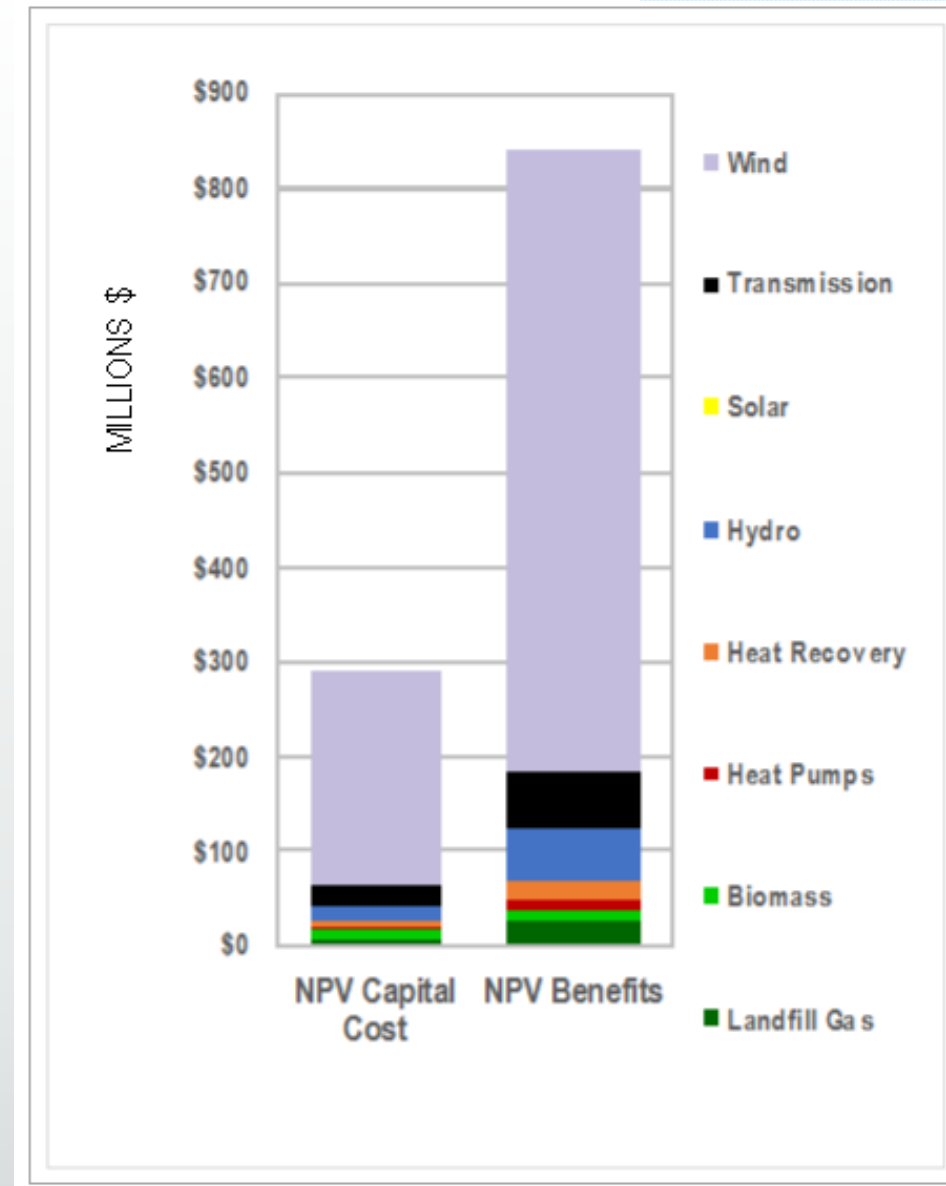
## Performance of Renewable Energy Fund Projects in Operation

Technology Type	Grantee	Project Name	Operation Start Date	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	-	-	-	\$ -	-	-	-	\$ -	-	-	-	\$ -	-	-	-	-
HYDRO	City of Alaska	Chumisa Creek Hydroelectric	2012 Dec	-	-	-	\$ -	-	-	-	\$ -	-	-	-	\$ -	-	-	-	-
HYDRO	Cordova Electric Cooperative	Humpback Creek Hydroelectric Project Rehabilitation	2011 Jul	1,563	-	114.9	\$ 410.3	3,510	-	270.0	\$ 1,050.6	-	-	-	-	-	-	-	-
HYDRO	Gustavus Electric Company	Falls Creek Hydroelectric Construction	2009 Jul	1,933	-	138.1	\$ 483.3	1,966	-	150.4	\$ 645.3	-	-	-	-	-	-	-	-
SOLAR	Alaska Village Electric Cooperative	Kaltag Solar Construction	2012 Oct	-	-	-	\$ -	-	-	-	\$ -	-	-	-	\$ -	-	-	-	-
TRANSMISSION	Alaska Power and Telephone	North Prince of Wales Island Interfe Project	2011 Sep	311	-	16.4	\$ 67.0	589	-	44.3	\$ 161.7	-	-	-	-	-	-	-	-
TRANSMISSION	Nome Joint Utility System	Nome Banner Peak Wind Farm Transmission	2010 Oct	955	-	53.9	\$ 151.6	995	-	61.2	\$ 193.3	-	-	-	-	-	-	-	-
WIND	Alaska Environmental Power	Delta Area Wind Turbines	2010 Sep	1,641	-	95.9	\$ 256.1	989	-	63.9	\$ 132.9	-	-	-	-	-	-	-	-
WIND	Alaska Village Electric Cooperative	Toksook Wind Farm	2009 Aug	560	-	37.7	\$ 129.1	131	-	9.6	\$ 38.5	-	-	-	-	-	-	-	-
WIND	Alaska Village Electric Cooperative	Mekoryuk Wind Farm	2010 Nov	239	-	13.7	\$ 49.5	147	-	10.4	\$ 41.1	-	-	-	-	-	-	-	-
WIND	Alaska Village Electric Cooperative	Quinhagak Wind Farm	2010 Nov	409	-	28.9	\$ 105.6	500	-	38.1	\$ 161.4	-	-	-	-	-	-	-	-
WIND	Alaska Village Electric Cooperative	Emmonak/Alakanuk Wind	2011 Sep	63	-	4.5	\$ 17.7	505	-	35.8	\$ 142.0	-	-	-	-	-	-	-	-
WIND	Alaska Village Electric Cooperative	Shaktolik Wind Construction	2012 Apr	-	-	-	\$ -	116	-	8.9	\$ 35.7	-	-	-	-	-	-	-	-
WIND	Golden Valley Electric Association	GVEA Eva Creek Wind Turbine Purchase	2012 Oct	-	-	-	\$ -	13,091	-	921.9	\$ 1,972.9	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-
WIND	Kotzebue Electric Association	Kotzebue High Penetration Wind-Battery-Diesel Hybrid	2012 May	-	-	-	\$ -	2,177	-	148.1	\$ 549.9	-	-	-	-	-	-	-	-
WIND	Nome Joint Utility System	Nome Banner Peak Wind Farm Expansion	2013 Jul	-	-	-	\$ -	-	-	-	\$ -	-	-	-	\$ -	-	-	-	-
<b>Sub Total Electric Only</b>				<b>20,122</b>	<b>-</b>	<b>1,375</b>	<b>\$ 4,543.5</b>	<b>40,908</b>	<b>-</b>	<b>2,904</b>	<b>\$ 9,337.1</b>	<b>114,394</b>	<b>71,126</b>	<b>9,571.1</b>	<b>\$ 21,646.6</b>	<b>202,605</b>	<b>95,596</b>	<b>15,972.7</b>	<b>\$ 41,601.1</b>
WIND	Aleutian Wind Energy	Sand Point Wind	2011 Aug	196	-	14.3	\$ 64.9	792	-	58.1	\$ 266.2	-	-	-	-	-	-	-	-
WIND	Kwigillingok Power Company	Kwigillingok High Penetration Wind-Diesel Smart Grid	2012 Feb	-	-	-	\$ -	-	-	-	\$ -	-	-	-	\$ -	-	-	-	-
WIND	Puvurnaq Power Company	Kongiganak High Penetration Wind-Diesel Smart Grid	2010 Dec	88	-	6.6	\$ 30.1	185	-	14.0	\$ 63.4	-	-	-	-	-	-	-	-
WIND	Tuntutuliak Comm Svcs Assoc	Tuntutuliak High Penetration Wind-Diesel Smart Grid	2013 Jan	-	-	-	\$ -	-	-	-	\$ -	-	-	-	\$ -	-	-	-	-
WIND	Unalakleet Valley Electric Co	Unalakleet Wind Farm	2009 Dec	958	-	58.2	\$ 211.2	938	-	67.8	\$ 247.6	-	-	-	-	-	-	-	-
<b>Sub Total Electric and Heat</b>				<b>1,242</b>	<b>-</b>	<b>79</b>	<b>\$ 306.2</b>	<b>1,914</b>	<b>-</b>	<b>140</b>	<b>\$ 577.2</b>	<b>210</b>	<b>13.6</b>	<b>\$ 36.4</b>	<b>\$ 116.7</b>	<b>210</b>	<b>13.6</b>	<b>\$ 36.4</b>	<b>\$ 116.7</b>
BIOMASS	Alaska Gateway School District	Tok Wood Heating	2010 Oct	-	3,217	24.4	\$ 92.0	-	4,595	44.0	\$ 147.0	-	-	-	\$ -	-	-	-	-
BIOMASS	Chilkoot Indian Association	Haines (Chilkoot) Central Wood Heating System Construction	2011 Oct	-	-	-	\$ -	-	212	1.7	\$ 6.8	-	-	-	\$ -	-	-	-	-
BIOMASS	Delta/Greely School District	Delta Junction Wood Chip Heating	2011 Sep	-	-	-	\$ -	-	3,977	38.2	\$ 133.5	-	-	-	\$ -	-	-	-	-
BIOMASS	Gulkana Village Council	Gulkana Central Wood Heating	2010 Oct	-	780	5.9	\$ 23.5	-	780	7.0	\$ 28.9	-	-	-	\$ -	-	-	-	-
BIOMASS	Native Village of Eyak	Cordova Wood Processing Plant	2011 Dec	-	1,500	11.4	\$ 42.0	-	600	5.4	\$ 25.3	-	-	-	\$ -	-	-	-	-
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	-	-	-	\$ -	-	-	-	-
HEAT PUMPS	City and Borough of Juneau	Juneau Aquatic Ctr. Ground Source Heat Pump	2011 Apr	-	-	-	\$ -	-	1,740	16.7	\$ 61.4	-	-	-	\$ -	-	-	-	-
HEAT PUMPS	City of Seward	Alaska Sealife Center Ph II Seawater Heat Pump Project	2011 Nov	-	-	-	\$ -	-	-	-	\$ -	-	-	-	\$ -	-	-	-	-
HEAT RECOVERY	Golden Valley Electric Association	North Pole Heat Recovery	2009 Nov	-	5,249	61.5	\$ 171.5	-	3,349	32.8	\$ 90.6	-	-	-	\$ -	-	-	-	-
HEAT RECOVERY	Inside Passage Electric Cooperative	Hoonah Heat Recovery Project	2012 Aug	-	-	-	\$ -	-	-	-	\$ -	-	-	-	\$ -	-	-	-	-
HEAT RECOVERY	McGrath Light & Power Company	McGrath Heat Recovery	2010 May	-	2,896	23.0	\$ 156.7	-	2,617	25.2	\$ 97.1	-	-	-	\$ -	-	-	-	-
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	-	-	-	\$ -	-	-	-	-
SOLAR	Golden Valley Electric Association	McKinley Village Solar Thermal	2010 Jun	-	134	1.8	\$ 7.1	-	130	1.9	\$ 7.6	-	-	-	\$ -	-	-	-	-
<b>Sub Total Heat Only</b>				<b>-</b>	<b>25,782</b>	<b>231</b>	<b>\$ 853.6</b>	<b>-</b>	<b>31,111</b>	<b>297</b>	<b>\$ 891.7</b>	<b>-</b>	<b>33,096</b>	<b>312</b>	<b>\$ 1,171.8</b>	<b>-</b>	<b>94,636</b>	<b>890</b>	<b>\$ 3,077.5</b>
<b>TOTAL</b>				<b>21,364</b>	<b>25,782</b>	<b>1,684.9</b>	<b>\$ 5,703.3</b>	<b>42,821</b>	<b>31,111</b>	<b>3,341.0</b>	<b>\$ 10,806.1</b>	<b>114,394</b>	<b>71,126</b>	<b>9,571.1</b>	<b>\$ 21,646.6</b>	<b>202,605</b>	<b>95,596</b>	<b>15,972.7</b>	<b>\$ 41,601.1</b>
<b>2013 Estimated Annualized Total</b>				<b>-</b>	<b>-</b>	<b>-</b>	<b>\$ -</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>\$ -</b>	<b>152,512</b>	<b>94,835</b>	<b>12,761.5</b>	<b>\$ 28,862.1</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

# Renewable Energy Fund: Value Generated

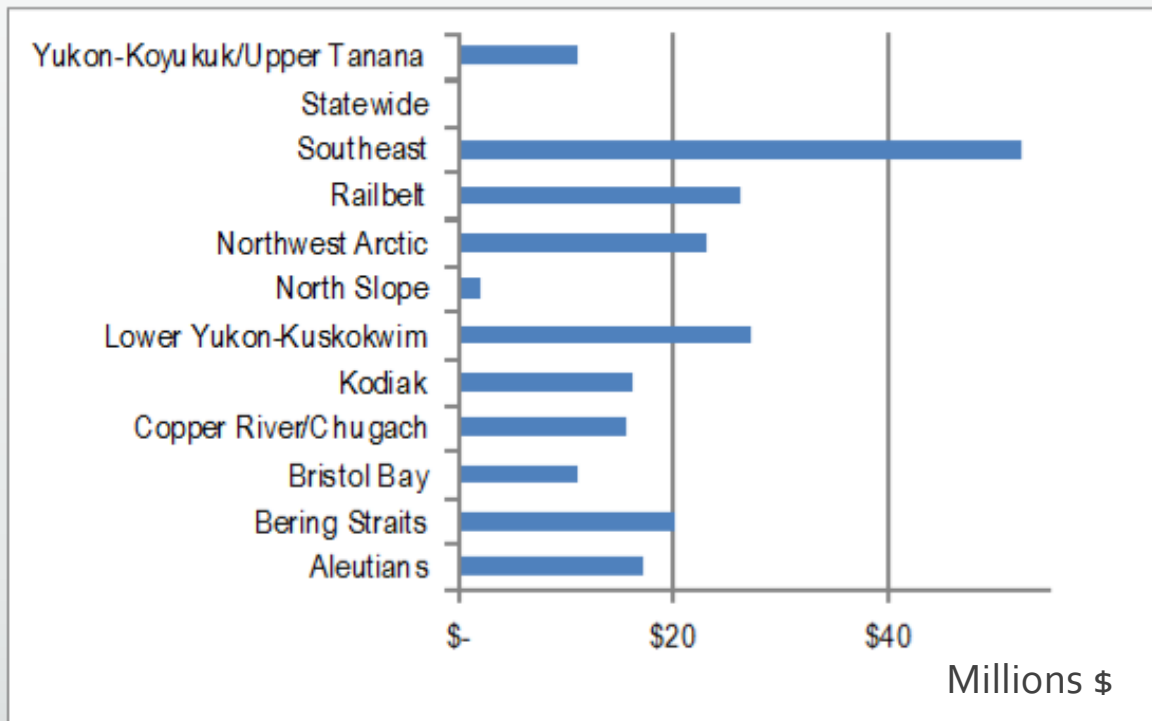
- For first 36 projects in operation
- Fund Investment of \$82 million
- Total NPV cost of \$290 million
- NPV Benefits: \$840 million

NPV Benefits/ NPV Costs  
2.9

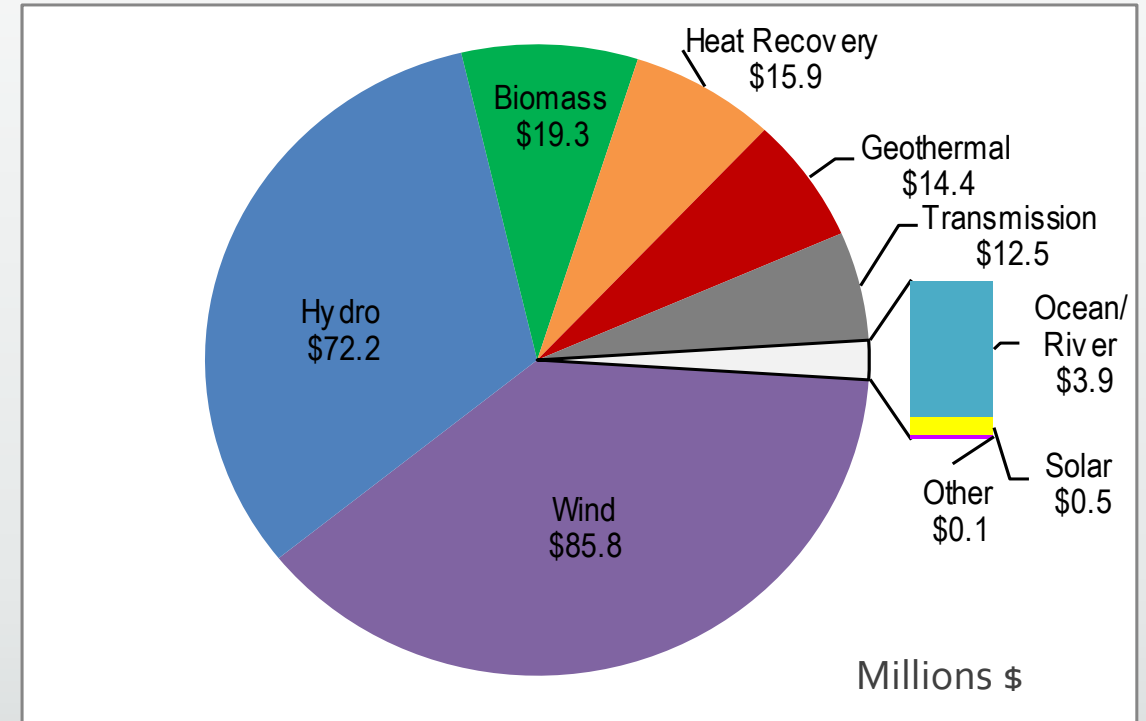


# Appropriated Renewable Energy Fund Grants Rounds I-VI

## By Energy Region

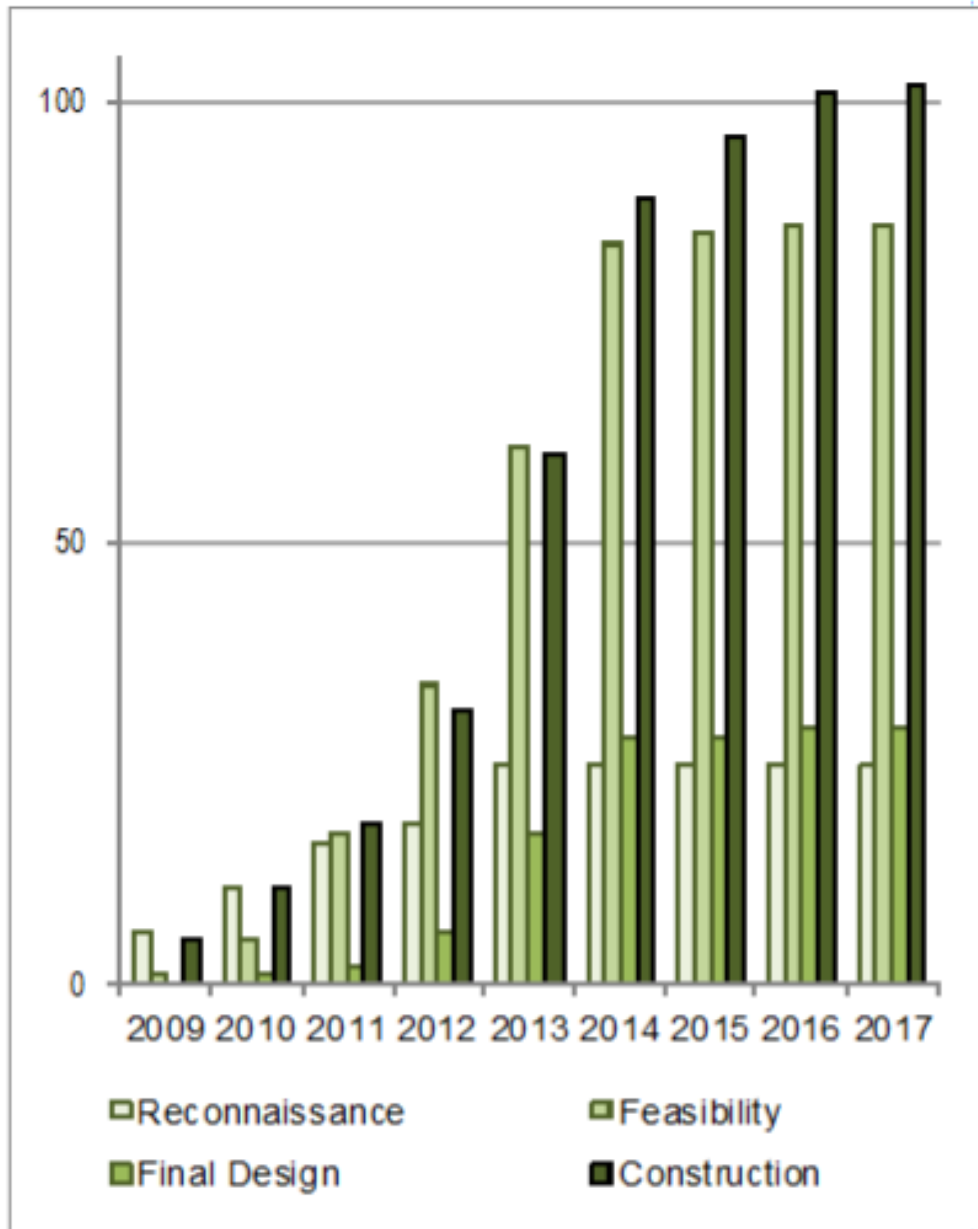


## By Resource Type





## Scheduled Grant Completion

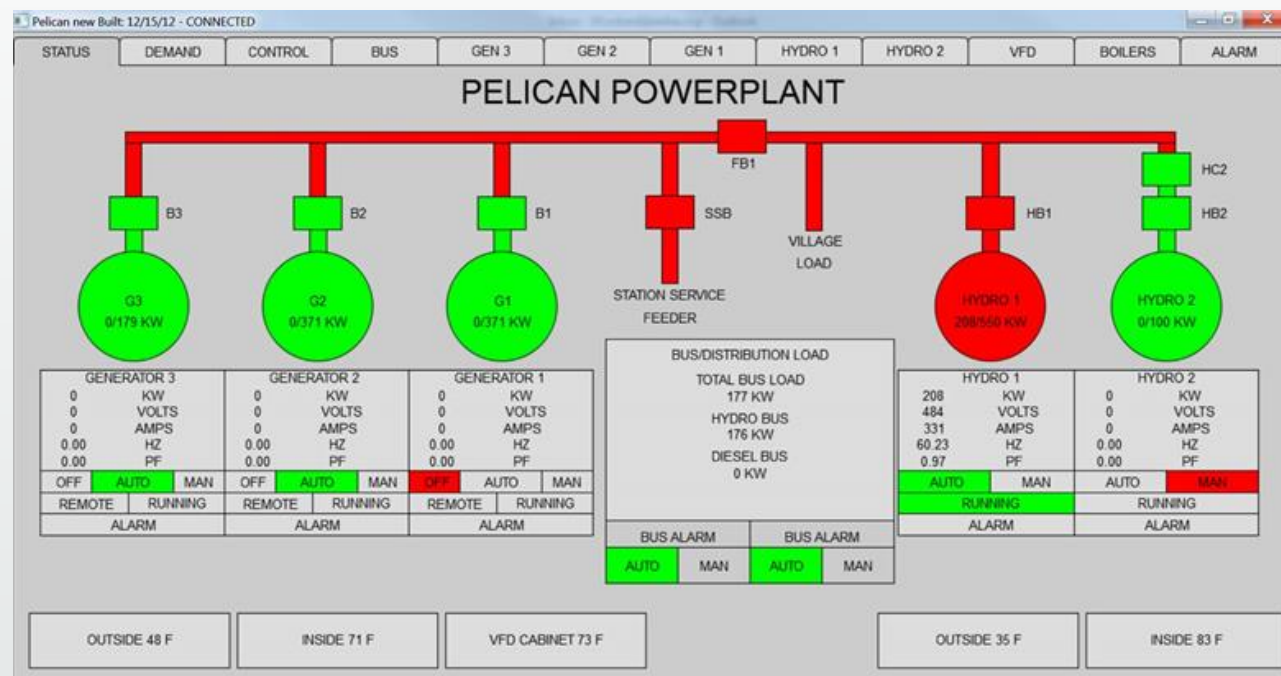


## Grant Completion Schedule

- Grants issued in phases to ensure quality projects
- This year, completed construction grants will exceed completed feasibility grants
- Large increases in completed construction

# Project Highlight: Pelican Hydro

- REF Funding: \$1.95 million
- Total Cost: \$5.8 million
- kWh/year: 948,522
- Gallons of diesel saved: 70,000
- First year savings: \$312,000



# Pelican Hydro, Before, During and After

- Wood stave and blue tarp penstock before
- Aerial view of site during construction
- AEA project manager with new surge tank





# Project Highlight: Delta Junction School Biomass



*Heat Exchanger*



- Completed in September 2011
- High-efficiency, low-emissions wood chip biomass heating system
- Wood chips come from Dry Creek Saw Mill waste product
- Funding \$2 million grant/\$2.8 million 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

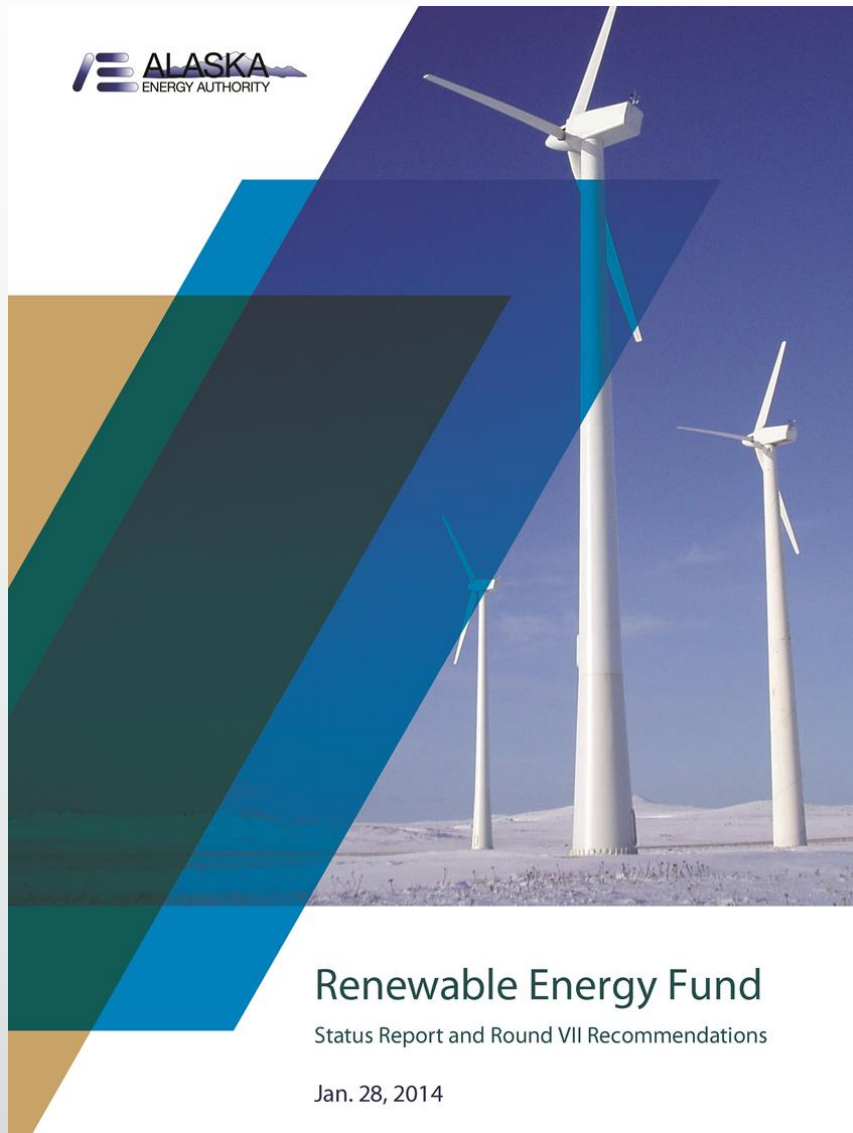




# Project Highlight: Kodiak Renewables

- More than 95 percent of electricity from renewables
  - Hydro, wind, battery
- Less than 5 percent of electricity from diesel
- Pillar Mountain wind saved 1.8 million gallons of diesel in 2013 (\$6.1 million savings)
  - Renewable Energy Fund Grants for wind and battery: \$11.9 million
- Renewable energy grant to upgrade Terror Lake Hydro underway
  - Renewable Energy Fund Grant for Terror Lake: \$4.5 million





# Renewable Energy Fund: Round VII Recommendations

# Renewable Energy Fund: Round VII

- Technical and economic analysis
  - Priority given to regions with high energy costs
- Capital Budget request includes \$20 million
  - Can fund 26 projects: 17 heating and 9 electric or other projects
- Advisory committee recommended partial funding for two large hydro projects to fund five additional heating projects and one regional priority
- Requested fully fund hydro if additional funds available

## Round VII Heat Applications

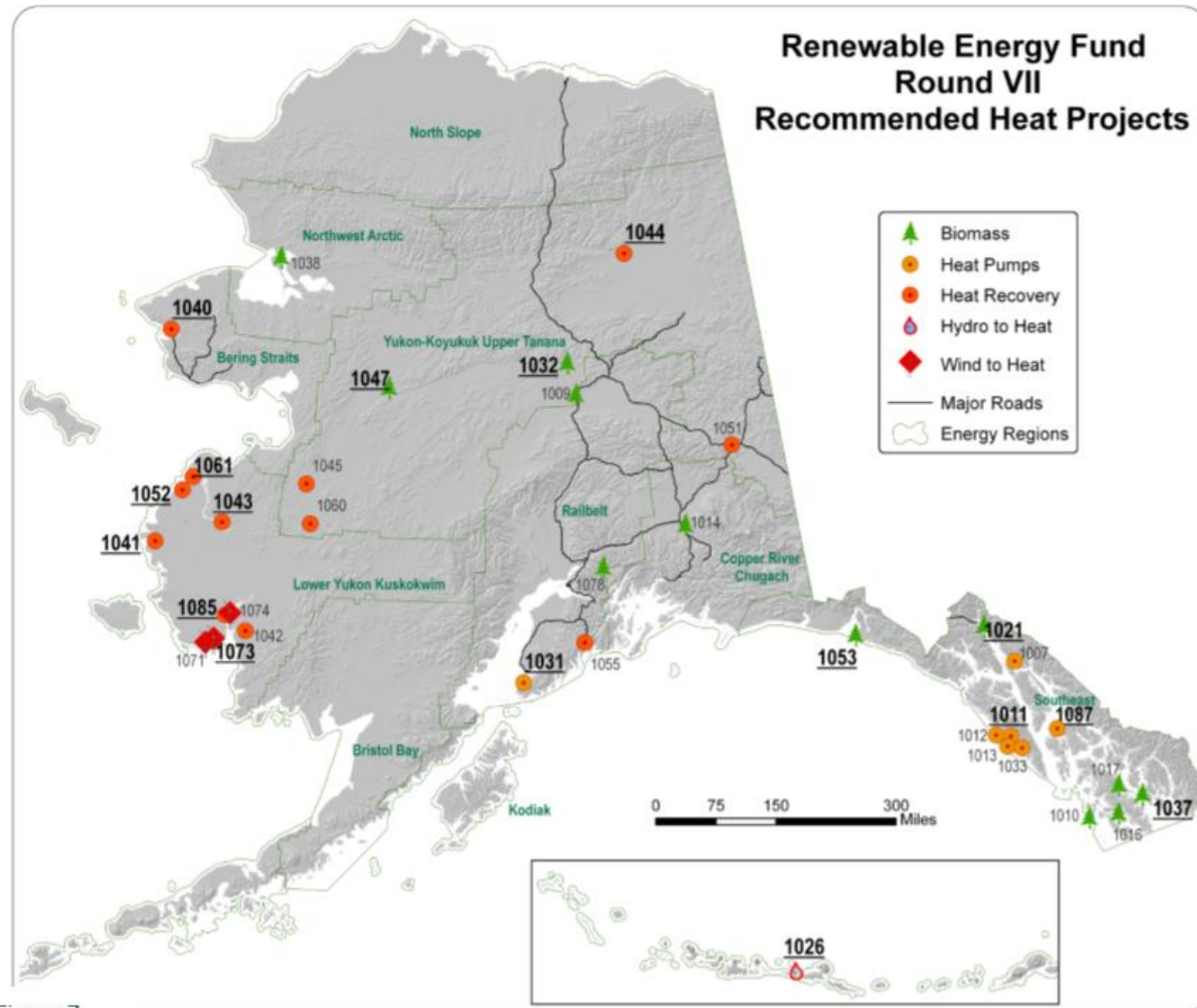


Figure 7.



## Round VII Standard Applications

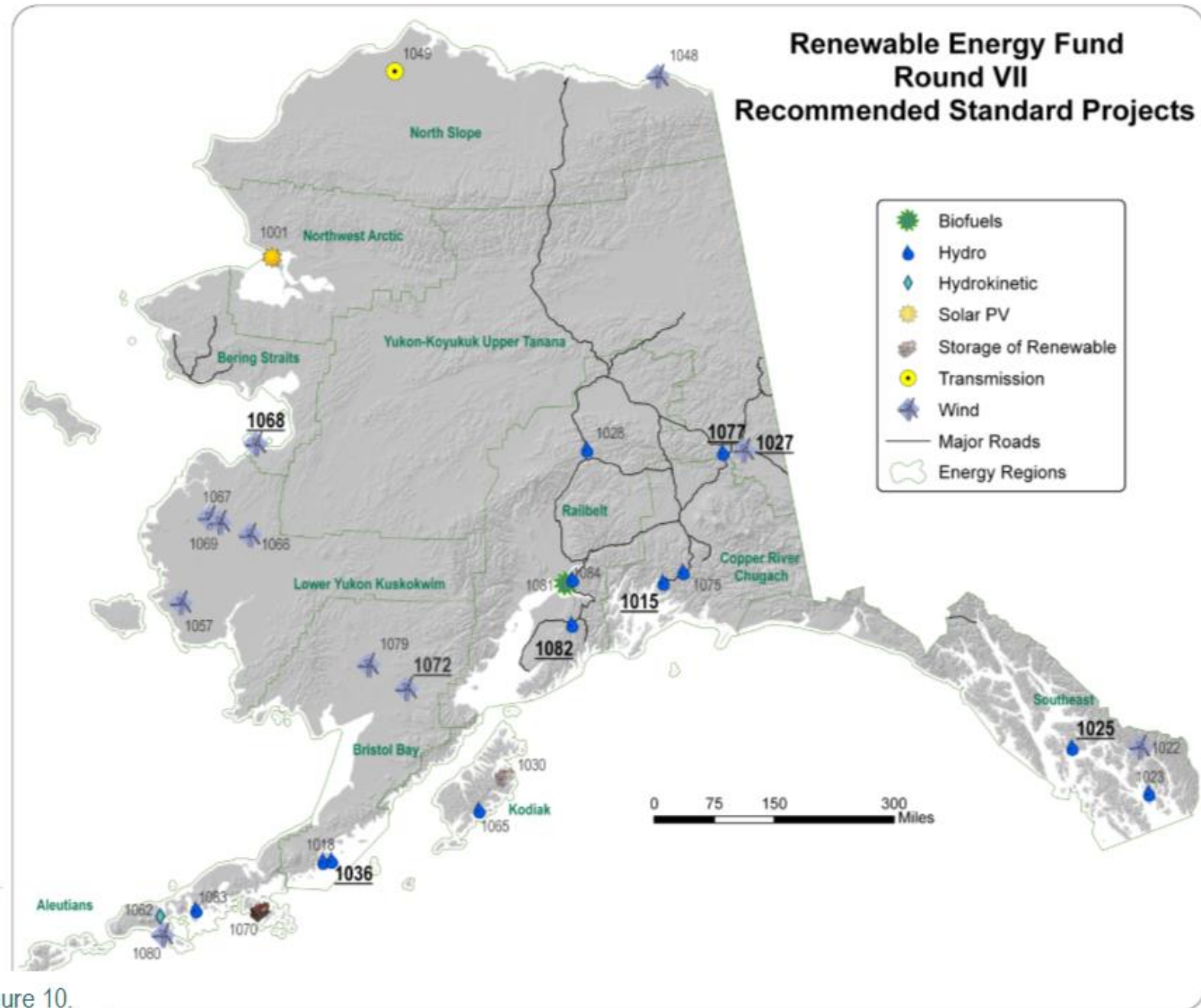


Figure 10.

# Renewable Energy Fund Round VII: Recommended Heat Applications

**Recommended funding by type**

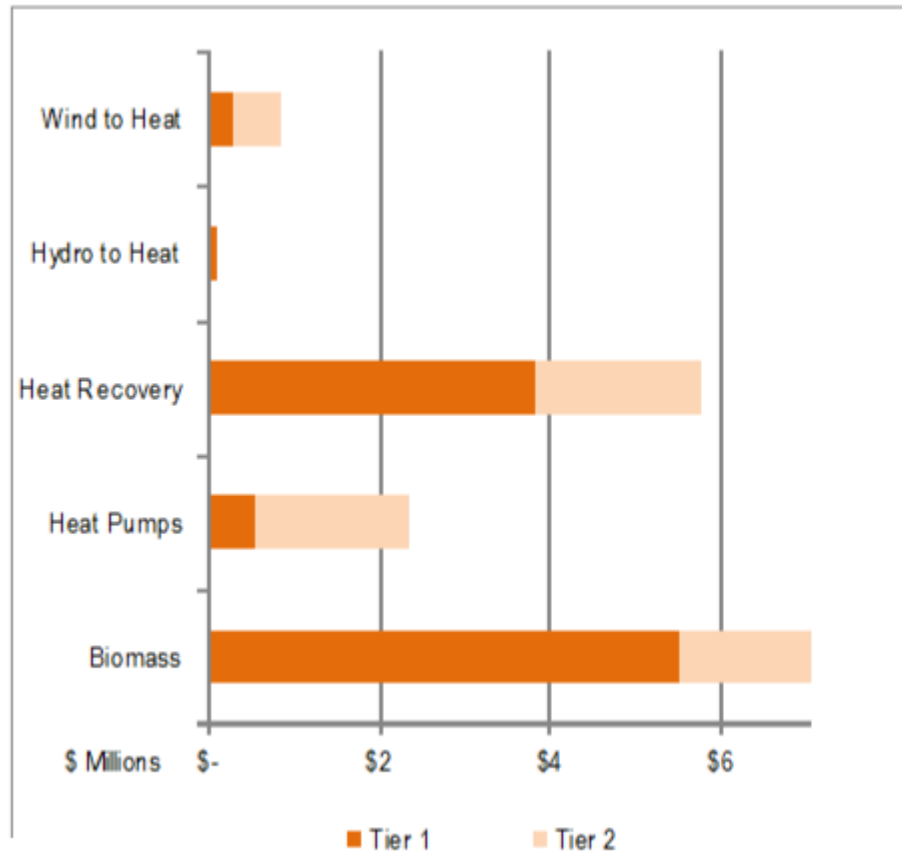


Figure 8.

**Recommended funding by region**

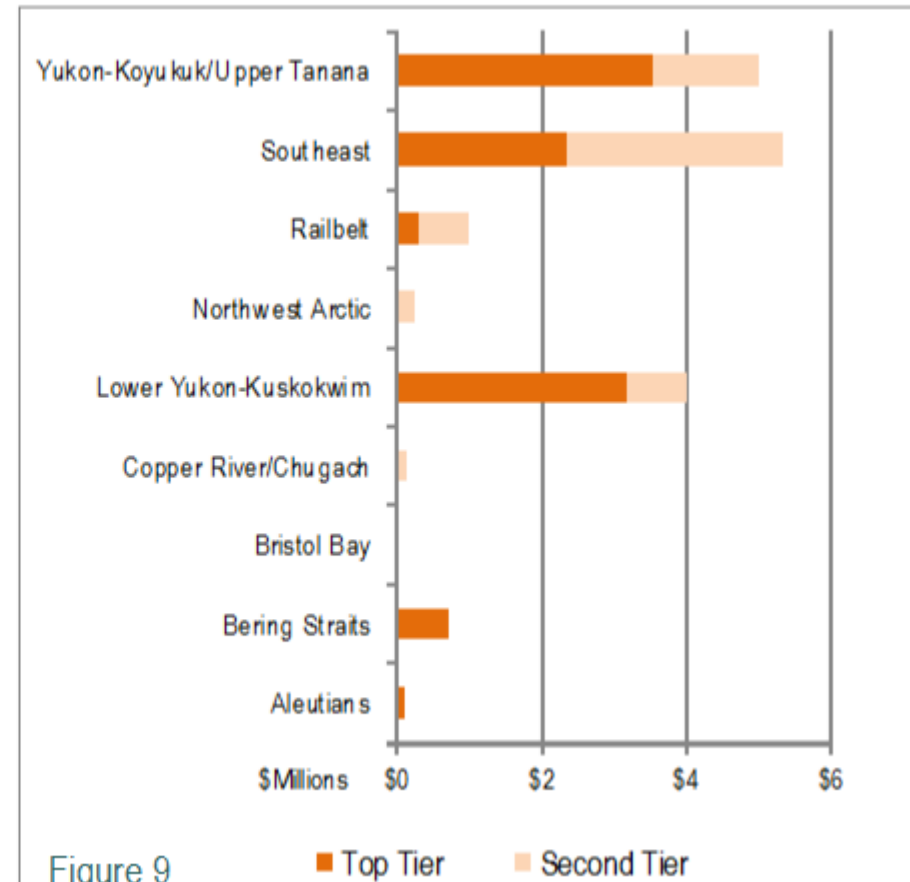
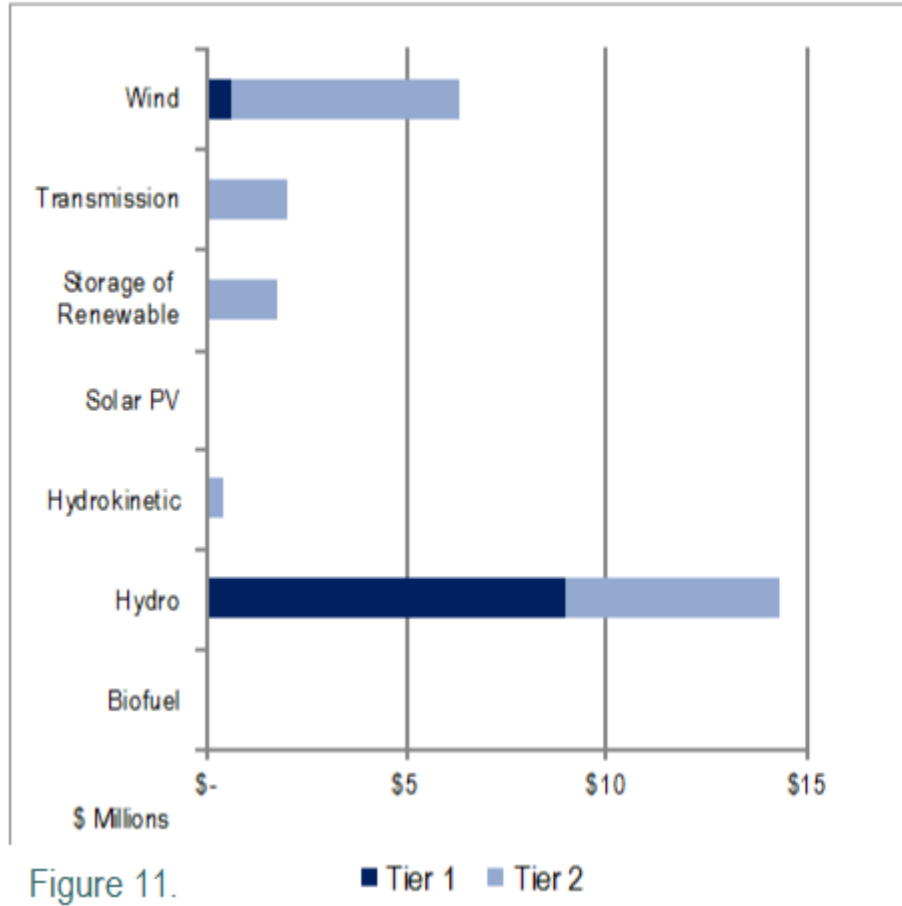


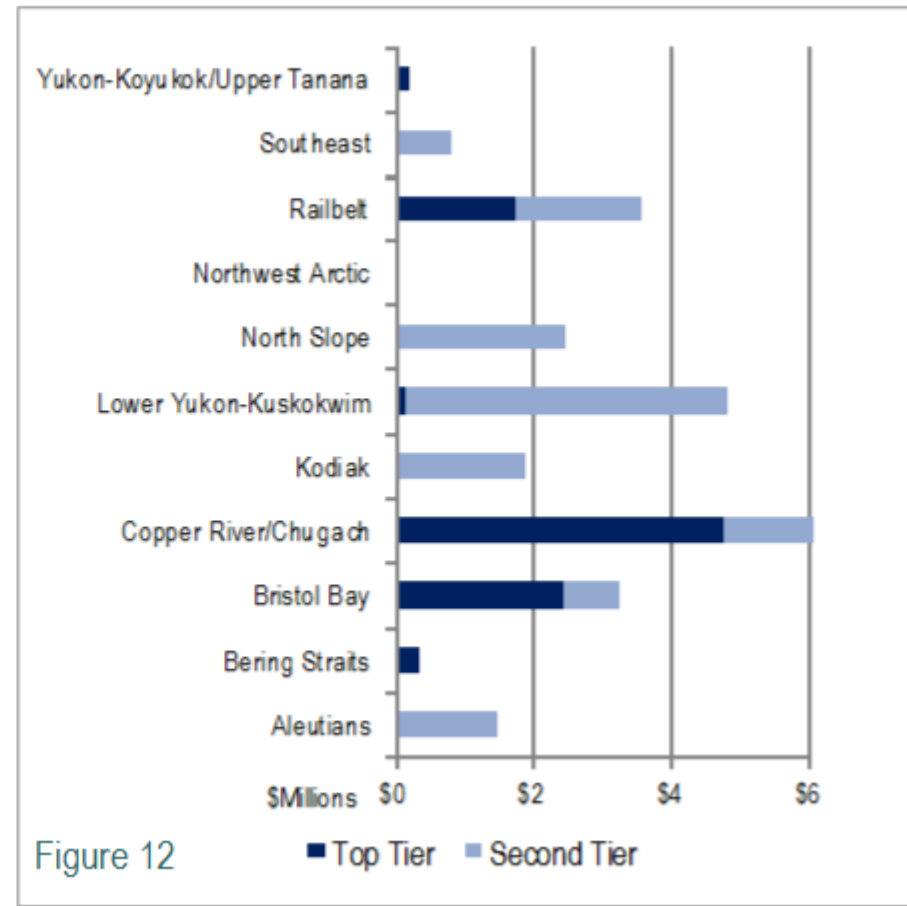
Figure 9

# Renewable Energy Fund Round VII: Electrical Applications Recommended

**Recommended funding by type**



**Recommended funding by region**





# Emerging Energy Technology Fund





*Testing Safe and Efficient Exhaust Thimble*



# Emerging Energy Technology Fund

“...make grants to eligible applicants for demonstration projects of technologies that have a reasonable expectation to be commercially viable within five years that are designed to:

- test emerging energy technologies or methods of conserving energy;
- improve an existing energy technology; or
- deploy an existing technology that has not previously been demonstrated in Alaska. “



*Arctic Field Testing of Eocycle Wind Turbine*



*Wind-Diesel Battery Hybrid for Kwigillingok*

# Emerging Energy Technology Fund

Energy Technology includes renewables, energy conservation and efficiency, hydrocarbons, enabling technologies and integrated systems.

- (2010) Program Legislation: AS 42.45.375
- Program Regulations: 3 AAC 107.700-799

# EETF: Process

- Two-step review process
  - Project abstracts and full applications
- Project abstracts reviewed by AEA staff and a seven-member advisory committee
  - Evaluated on technical merit
- Priority given to:
  - Alaska entities
  - Projects demonstrating post-secondary partnerships
  - Matching funds or in-kind commitments
  - Demonstration of potential for widespread deployment
- Top-ranking projects invited to submit detailed project applications and deliver presentations to AEA staff and the advisory committee

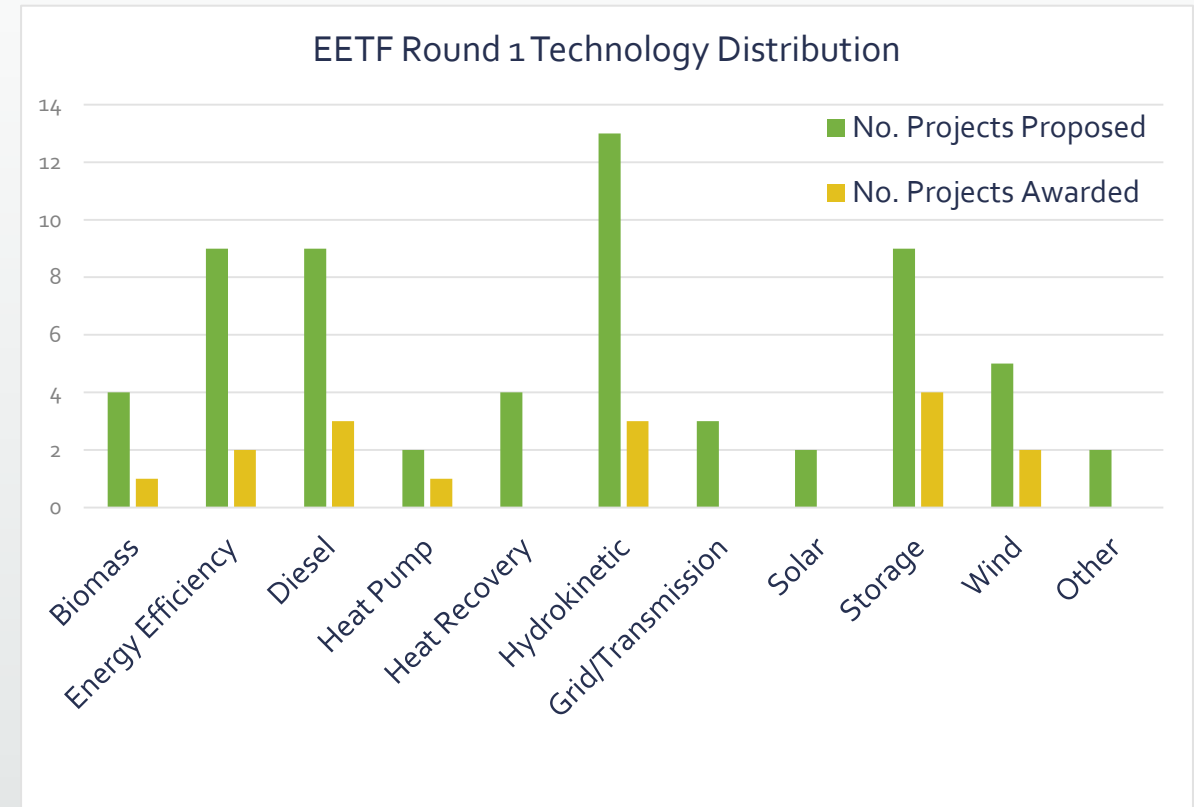
# EETF: Project Awards

## 2012: First round of projects selected and funded

- Funds available: \$8.9 million (through Denali Commission matching grant)
- Projects selected: 16 (15 awarded funding)
- Juneau, Fairbanks, Kodiak, Delta Junction, Nenana, Nikiski, Igiugig, Tuntutuliak, Kwiglingok and Kotzebue

## 2014: Second round of projects selected

- Funds available \$2.3 million
- Projects recommended: six, pending funding
- Expecting award announcement within the month







*Modified '97 Eagle Talon EV Test bed*



*Modified 15 kW Genset*

# EETF: Project Highlight

## Ultra-Efficient Generators and Diesel Electric Propulsion (Kodiak)

- Technology aims to provide more efficient diesel power generation
- Can be used in marine propulsion and stationary powerhouses
- Power dense motor and inverter/controller invented by operators of a machining and fabricating shop in Kodiak
- Commercial availability anticipated at project's end



*Installation of Slinky Loop*



*Installed 3-ton Heat Pump*

# EETF: Project Highlight

## Cold Climate Heat Pump Demonstration (Fairbanks)

- Cold Climate Housing Research Center demonstrating the potential for ground source heat pumps as an efficient and economic heat source in colder climates
- Different ground surface treatments are applied to compare effects on the loop field
- Next phase is data collection

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