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AkAES Advisory Group: Meeting #5

Preliminary Results from Research

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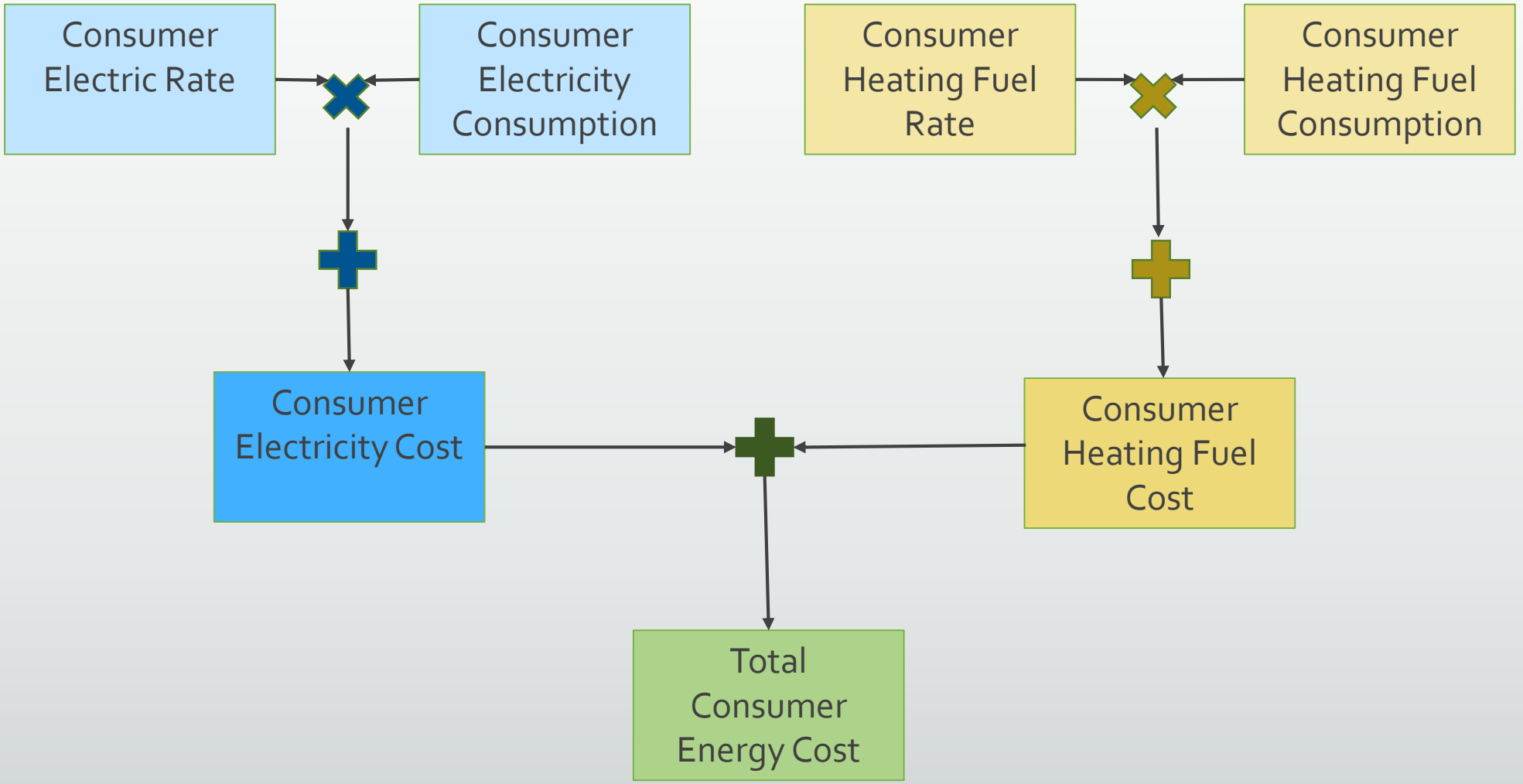
AkAES Report Outline

- ✓ What is the Alaska Affordable Energy Strategy?
- ✓ What does the energy and demographic profile of the AkAES region look like?
- ✓ What is Affordable Energy?
- ✓ What Drives the Cost of Energy?
- What is needed to maintain the status quo?
- What strategies can be used to make energy more affordable?
- What revenue sources are available?
- What Legislation is being proposed?
- Appendices

Factors That Lead to Consumer Energy Costs



Areas of Study for Affordable Energy

Infrastructure

- Energy Efficiency
- Diesel Efficiency
- Renewable Energy
- Transmission & Interties
- Fuel Delivery Improvements
- Fuel Switching

Non-infrastructure

- Direct Underwriting (subsidies)
- Management Improvements
- Ownership & Project financing

Energy Efficiency Program Evaluation and Financing Needs Assessment Preliminary Results

- Study performed by Vermont Energy Investment Corp, with assistance from Cold Climate Housing Research Center
- Expected completion by early July
- Study area included all AkAES communities
- Included residential and nonresidential

Preliminary Result:

- Significant opportunity for residential and nonresidential weatherization

EE Preliminary Recommendations

Direct state funding	Indirect state funding	Establishing / enhancing requirements
Sustained Weatherization Program support	Continue with technical services, training, and research	Establish an energy efficiency resource standard (EERS)
Market-based programs and incentives	Join and/or create regional coalition(s)	Expand building codes, support and enforcement statewide; identify and implement "stretch" code
Upstream product initiatives and incentives		Participate in and adopt minimum product standards
Support energy service contracts via public and private channels		Create targets or requirements for investment of a portion of assistance, endowment or public benefit corporate portfolios to support energy efficiency

EE Preliminary Recommendations

Annual costs	
Program: measure costs (direct incentives)	$45 million
Program: non-measure costs (non-incentive costs, market services, support, administration)	$16 million
Participant: leveraged customer investments in measures	$24 million
Total annual costs	$85 million
Annual benefits	
Residential buildings	$54 million
Non-residential buildings	$71 million
Total annual benefits	$125 million
Net benefits	
Estimated net benefits (total annual benefits – total annual costs)	$40 million
Total annual study area energy expenditures	$397 million
Savings as share of annual energy expenditures	31%

Transportation Study Preliminary Results

- Study performed by US Army Corps of Engineers
- Expected completion by mid-July
- Study area included western coastal and all riverine communities
- Project expected to be completed by mid-July

Preliminary Results:

- Potential efficiencies could be found in barge transportation system
  - New access to Yukon River on Dalton Hwy
  - New tanker accessible storage near Red Dog Mine to service coast and
  - Increased storage at upriver sites (Aniak, Kiana) to allow for early season deliveries

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Liquefied Natural Gas (LNG) Preliminary Results

- Study performed by Northern Economics with engineering input from Michael Baker Engineers
- Expected completion by mid-July
- Study area included all coastal and road accessible communities and Bethel and Nome
- Included use of LNG for electricity and heat

Preliminary Result:

- No communities have been shown to have B/C>1 for electricity, heat, or combined
- LNG does not appear to be a viable alternative fuel at this time
- Infrastructure and operational expenses are both high, cancel out the lower fuel costs

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Infrastructure Opportunities for Affordable Energy in Communities

Infrastructure opportunities modeled on best available:

- Community-level data
- Project-type costs
- Project-type performance
- Population forecasts
- Diesel price forecasts

Modeled opportunity for:

- Efficiency
  - Residential, Non-residential, water/wastewater
- Renewables
  - Wind, solar, hydro power
  - Heat Recovery
  - Biomass (cordwood, pellets)
  - Air source heat pumps
- Transmission
- Diesel efficiency

We will be able to compare the potential opportunities in a community to assist the communities in making sound investment decisions

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Alaska Affordable Energy Model Preliminary Results

- Model developed by AEA
- Model being programmed by GINA
- All model results expected to be completed by August
- Scenarios and stress testing to be added
- Community-level detail is available and will be available online
- Most benefits are optimistic
  - Based on EIA forecast for crude oil (higher than current prices)

- Incorporates best available data for:
  - Community housing
  - Community nonresidential buildings
  - Community electricity generation and consumption
  - Resource data
  - Project proposal data
  - Project performance and costs

Residential Energy Efficiency Preliminary Results

Almost all communities had B/C>1

Efficiency only includes reduction in heating oil

Region	Cost Effective Benefits	Cost Effective Costs	Cost Effective Net Benefit	Average of B/C Ratio
Aleutians	$ 10,964,334	$ 7,789,970	$ 3,174,363	1.4
Bering Straits	$ 60,327,223	$ 43,202,475	$ 17,124,748	1.8
Bristol Bay	$ 23,882,395	$ 15,286,590	$ 8,595,805	1.6
Copper River/Chugach	$ 66,200,363	$ 27,794,926	$ 38,405,437	2.6
Kodiak	$ 36,164,273	$ 23,061,893	$ 13,102,380	1.4
Lower Yukon-Kuskokwim	$ 101,877,976	$ 68,626,980	$ 33,250,996	1.7
North Slope	$ 32,019,201	$ 22,612,724	$ 9,406,477	1.4
Northwest Arctic	$ 35,353,589	$ 20,449,743	$ 14,903,846	2.2
Southeast	$ 249,667,676	$ 180,702,734	$ 68,964,942	1.3
Yukon-Koyukuk/Upper Tanana	$ 41,793,223	$ 20,256,399	$ 21,536,824	2.0
Grand Total	**$ 658,250,253**	**$ 429,784,434**	**$ 228,465,819**	**1.8**

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Non-residential Energy Efficiency Preliminary Results

Almost all communities had B/C>1

Benefits are higher than residential: 1) no Wx program for commercial buildings 2) includes saving for electricity

North Slope skewed due to subsidies—this will be addressed

Region	Cost Effective NPV Benefit	Cost Effective NPV Cost	Cost Effective NPV Net Benefit	Average of Cost Effective B/C Ratio
Aleutians	$ 91,339,103	$ 32,233,285	$ 59,105,818	2.70
Bering Straits	$ 106,675,734	$ 32,490,534	$ 74,185,200	3.29
Bristol Bay	$ 92,452,492	$ 24,847,234	$ 67,605,258	3.91
Copper River/Chugach	$ 95,469,526	$ 24,437,244	$ 71,032,283	3.92
Kodiak	$ 28,391,274	$ 12,203,605	$ 16,187,669	2.31
Lower Yukon-Kuskokwim	$ 247,996,704	$ 71,367,346	$ 176,629,358	3.28
North Slope	$ -	$ -	$ -	#DIV/0!
Northwest Arctic	$ 94,383,286	$ 22,192,247	$ 72,191,038	4.58
Southeast	$ 366,204,612	$ 150,038,829	$ 216,165,783	2.27
Yukon-Koyukuk/Upper Tanana	$ 97,781,449	$ 26,487,103	$ 71,294,345	3.74
Grand Total	**$ 1,220,694,180**	**$ 396,297,428**	**$ 824,396,752**	**3.33**

Biomass Cordwood for Nonresidential Preliminary Results

Approximately half of communities had an identified resource

B/C ratios are suspiciously high. Further work is needed to QA/QC results

Region	Cost Effective NPV benefits	Cost Effective NPV Costs	Cost Effective NPV Net benefit	Average of Benefit Cost Ratio
Aleutians	$ 2,327,788	$ 670,007	$ 1,657,781	3.5
Bering Straits	$ 4,076,716	$ 1,675,017	$ 2,401,699	2.5
Bristol Bay	$ 4,631,517	$ 2,847,529	$ 1,783,988	1.6
Copper River/Chugach	$ 30,978,298	$ 18,760,190	$ 12,218,107	1.8
Kodiak	$ 15,729,265	$ 4,522,546	$ 11,206,719	3.1
Lower Yukon-Kuskokwim	$ 9,495,629	$ 6,867,570	$ 2,628,059	1.6
North Slope	$ -	$ -	$ -	#DIV/0!
Northwest Arctic	$ 12,729,246	$ 5,360,054	$ 7,369,192	2.5
Southeast	$ 219,589,649	$ 118,088,698	$ 101,500,951	1.7
Yukon-Koyukuk/Upper Tanana	$ 45,351,914	$ 23,952,743	$ 21,399,171	1.9
Grand Total	**$ 344,910,022**	**$ 182,744,354**	**$ 162,165,669**	**1.9**

Biomass Pellets
Preliminary Results

Region	Cost Effective NPV benefits	Cost Effective NPV Costs	Cost Effective NPV Net benefit	Average of Benefit Cost Ratio
Aleutians	$ -	$ -	$ -	0.0
Bering Straits	$ -	$ -	$ -	0.0
Bristol Bay	$ -	$ -	$ -	0.0
Copper River/Chugach	$ 41,926,659	$ 12,289,466	$ 29,637,194	3.1
Kodiak	$ -	$ -	$ -	0.0
Lower Yukon-Kuskokwim	$ -	$ -	$ -	0.0
North Slope	$ -	$ -	$ -	0.0
Northwest Arctic	$ -	$ -	$ -	0.0
Southeast	$ 232,964,721	$ 53,531,834	$ 179,432,887	2.6
Yukon-Koyukuk/Upper Tanana	$ 15,199,028	$ 3,879,255	$ 11,319,773	1.0
Grand Total	**$ 290,090,409**	**$ 69,700,555**	**$ 220,389,854**	**0.9**

Only road accessible and SE communities are included

B/C ratios are suspiciously high. Further work is needed to QA/QC results

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Wind Power
Preliminary Results

Region	Cost Effective NPV benefits	Cost Effective NPV Costs	Cost Effective NPV Net benefit	Average of Benefit Cost Ratio
Aleutians	$ 36,522,437	$ 22,533,956	$ 13,988,480	1.4
Bering Straits	$ 5,611,422	$ 4,829,960	$ 781,463	1.2
Bristol Bay	$ 36,794,890	$ 15,510,073	$ 21,284,818	2.4
Copper River/Chugach	$ 61,717,173	$ 28,657,864	$ 33,059,309	1.9
Kodiak	$ -	$ -	$ -	#DIV/0!
Lower Yukon-Kuskokwim	$ 33,344,789	$ 18,284,511	$ 15,060,278	1.6
North Slope	$ -	$ -	$ -	#DIV/0!
Northwest Arctic	$ -	$ -	$ -	#DIV/0!
Southeast	$ 11,351,194	$ 7,832,566	$ 3,518,628	1.4
Yukon-Koyukuk/Upper Tanana	$ 6,273,307	$ 5,305,453	$ 967,855	1.2
Grand Total	**$ 191,615,212**	**$ 102,954,382**	**$ 88,660,830**	**1.6**

<20 projects identified

Dominated by multi-MW wind farms

Solar Power
Preliminary Results

<5 projects identified

Region	Cost Effective NPV benefits	Cost Effective NPV Costs	Cost Effective NPV Net benefit	Average of Benefit Cost Ratio
Aleutians	$ -	$ -	$ -	#DIV/0!
Bering Straits	$ -	$ -	$ -	#DIV/0!
Bristol Bay	$ 452,365	$ 352,012	$ 100,353	1.3
Copper River/Chugach	$ -	$ -	$ -	#DIV/0!
Kodiak	$ -	$ -	$ -	#DIV/0!
Lower Yukon-Kuskokwim	$ 371,971	$ 286,624	$ 85,347	1.4
North Slope	$ -	$ -	$ -	#DIV/0!
Northwest Arctic	$ -	$ -	$ -	#DIV/0!
Southeast	$ -	$ -	$ -	#DIV/0!
Yukon-Koyukuk/Upper Tanana	$ -	$ -	$ -	#DIV/0!
Grand Total	**$ 824,335**	**$ 638,636**	**$ 185,700**	**1.4**

Summary of Preliminary Results

Project Type	Cost Effective NPV benefits	Cost Effective NPV Costs	Cost Effective NPV Net benefit
Solar Power	$824,000	$638,000	$185,700
Wind Power	$191,000,000	$102,000,000	$88,000,000
Biomass (Cordwood)	$344,000,000	$182,000,000	$162,000,000
Biomass (Pellets)	$290,000,000	$69,700,000	$220,000,000
Residential Efficiency	$658,000,000	$429,000,000	$228,000,000
Non-residential Efficiency	$1,220,00,000	$396,000,000	$824,000,000
Interties			
Hydropower			
Heat Recovery		Still to come	
Diesel Efficiency			
Air-Source Heat Pumps			

Potential for more than $1 billion in investment needed to exploit cost effective projects with a net benefit of more than $1.5 billion

Project Development & Non-Infrastructure Opportunities Preliminary Results

Improvements possible across the entire project development cycle—for funding agencies, communities, and utilities

1. Initial project selection
2. Coordination between stakeholders
3. Access to financing
4. Project implementation: feasibility through design
    a) Find fatal flaws early, if possible
5. Utility management and project operation

Significant Opportunity = Significant Investment

- There is more need & more opportunity than can be accomplished through state funds alone
- The state will need to provide new types of assistance to communities to help them access existing state, federal, NGO, and private financing opportunities
- Careful coordination between stakeholders will be needed to deliver the current services with fewer state grant dollars
- Alignment of policy, regulations, and financing/incentives will be needed

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Opportunity Afforded by AkAES

- Provides a foundation and requirements to suggest statutory changes
- Improve operational efficiency for AEA, other governmental & non-governmental actors
  - Financial
  - Project evaluation
  - Project selection
- Improve coordination
  - Integration and sharing of data and information

<u>AEA will be able to serve communities better</u>

A Philosophical Question

What are the Most Appropriate Roles of Government in this Sector?

- Lower transaction costs for communities
  - Data collection, storage, and dissemination
  - Identify opportunities
  - Identify and remove barriers
  - Align policy, regulations, and financing
  - Coordinate interagency action
- Consumer protection
- Focus resources on sectors & places where current profit is insufficient for the market to respond to the existing opportunities and/or needs

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