



# *AkAES Advisory Group: Meeting #3*

## Socioeconomic Profile & “Affordable” Energy

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2/18/2016

# AkAES Report Outline

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

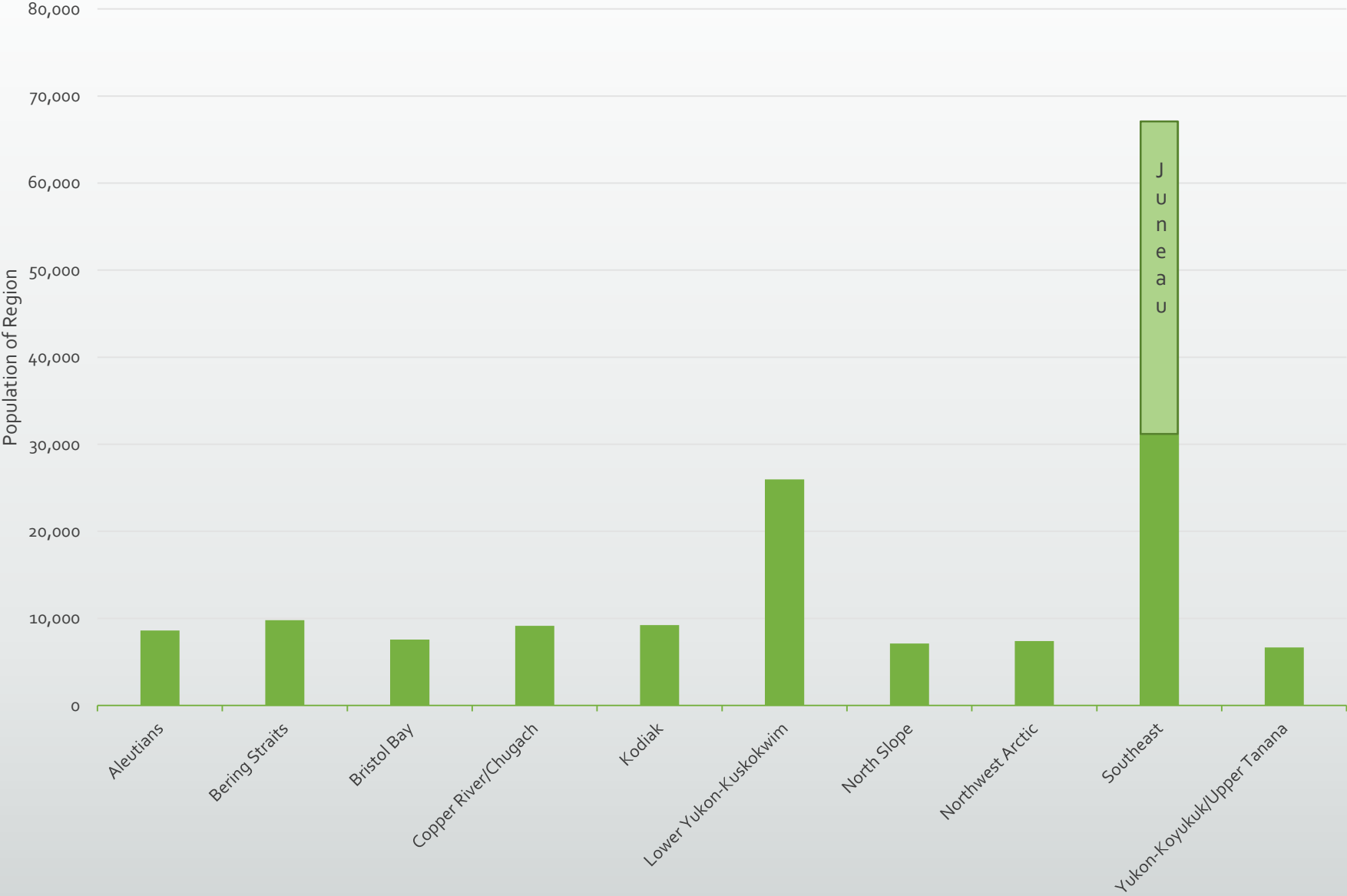
# Meeting Goals

- Receive feedback on the Advisory Committee on:
  - Socioeconomic conditions in regions
  - Potential definitions and impacts of affordable

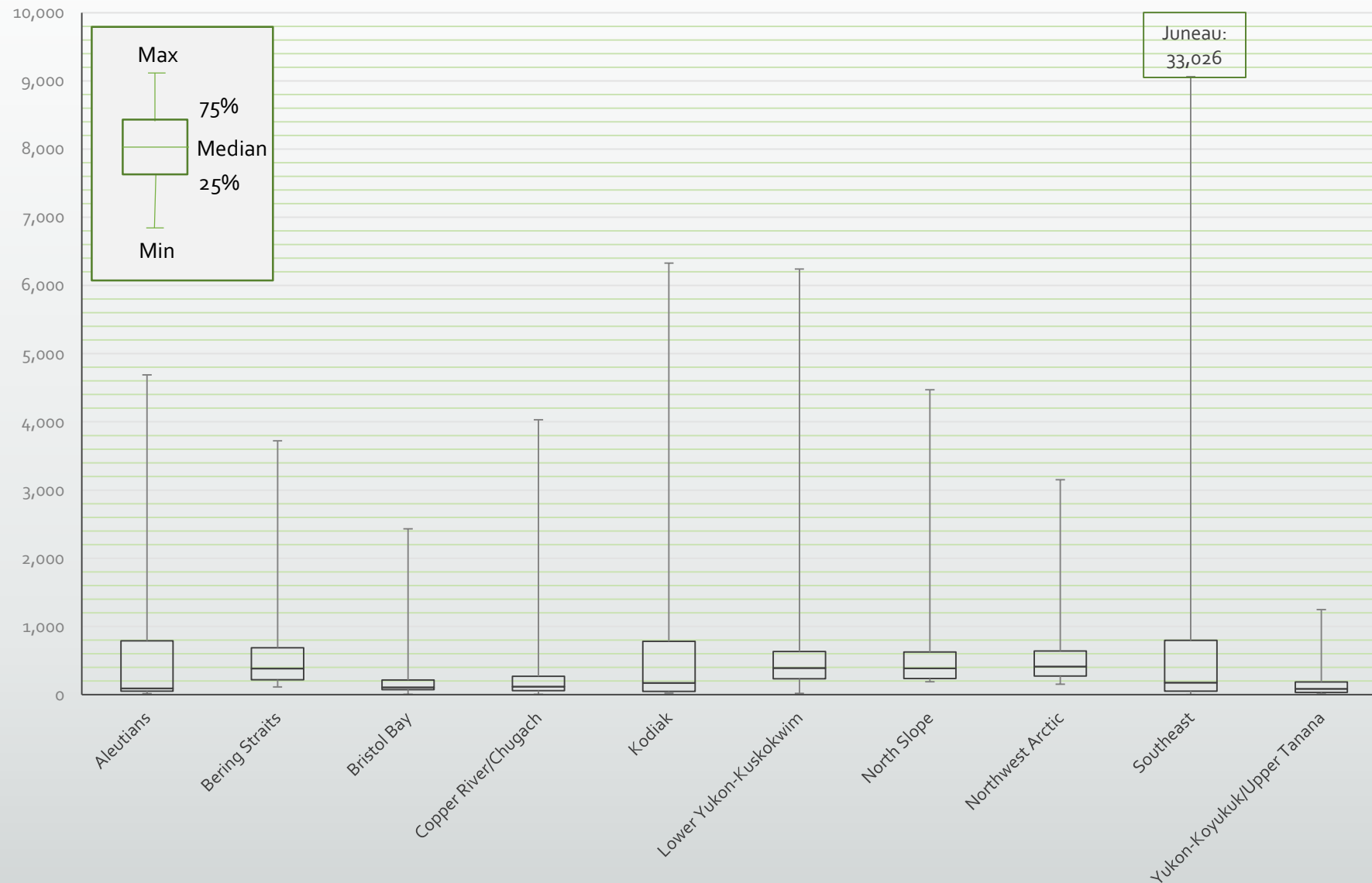
# What does the socioeconomic and demographic profile of the AkAES region look like now?

- Why do we care?
  - We can better understand who we are trying to assist
    - Differences & similarities across the state
  - And so we understand the boundaries of our studies
- What will we do with this information?
  - Estimate demand and needs
    - Modeling
  - Identify potential revenue sources and the ability to of community's to invest
  - Evaluate different definitions of affordability,
  - Propose different solutions for specific populations

Total Population by AEA Energy Region  
(2014 Alaska Dept. of Labor & Workforce Development Estimates)



## Range of Community Populations by AEA Energy Region (2014)

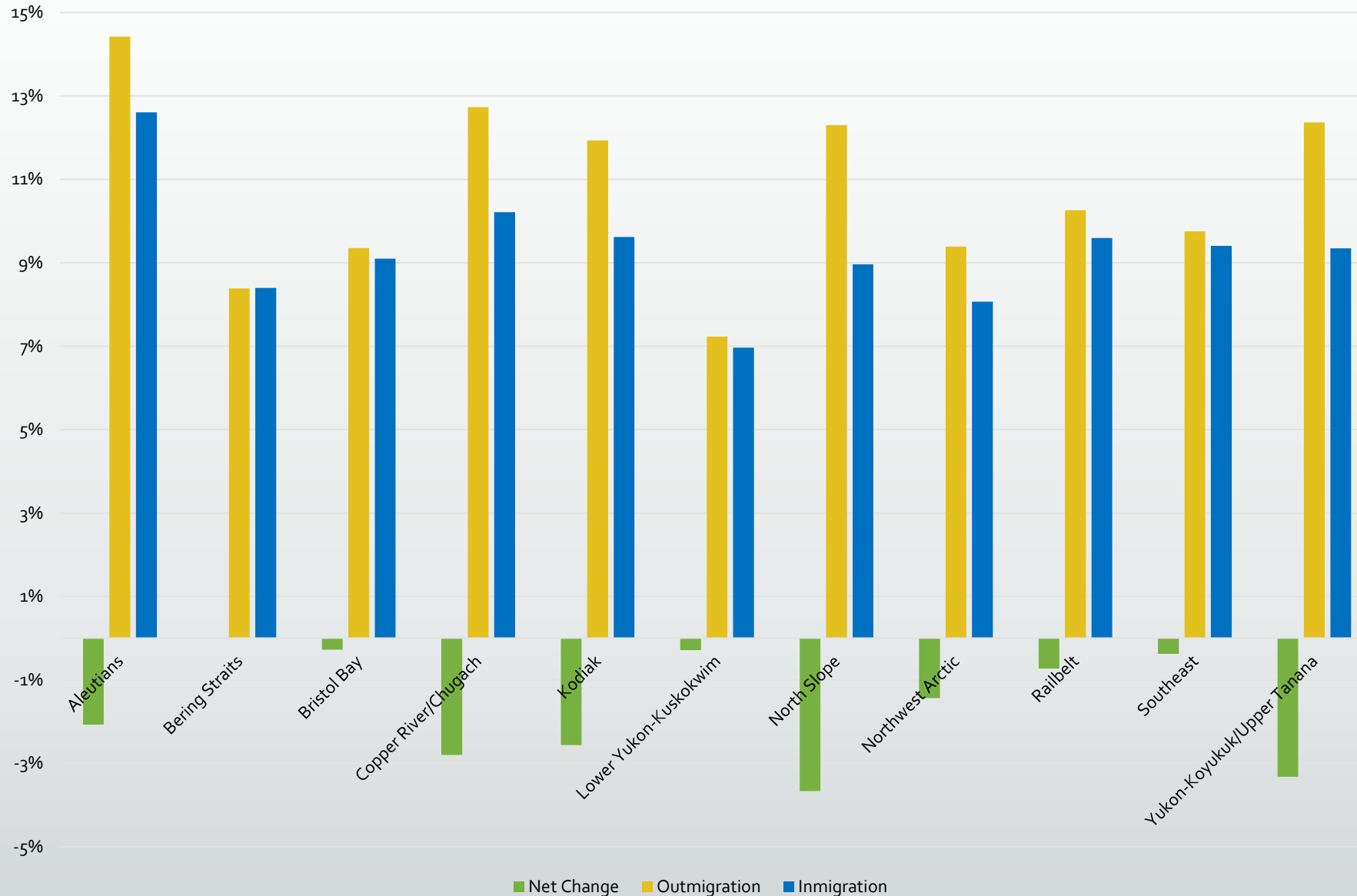


Juneau removed  
from Southeast  
because it skewed  
the chart too much

Most communities  
are very small—53%  
are less than 200  
people

Based on 2014  
Alaska DOL&WD  
population  
estimates

## Net Migration, Outmigration, and Immigration by AEA Energy Regions (2013-14 PFD Data)



Just a snapshot in time

All regions experienced net outmigration in 2013-14

Regional figures also includes intraregional migration

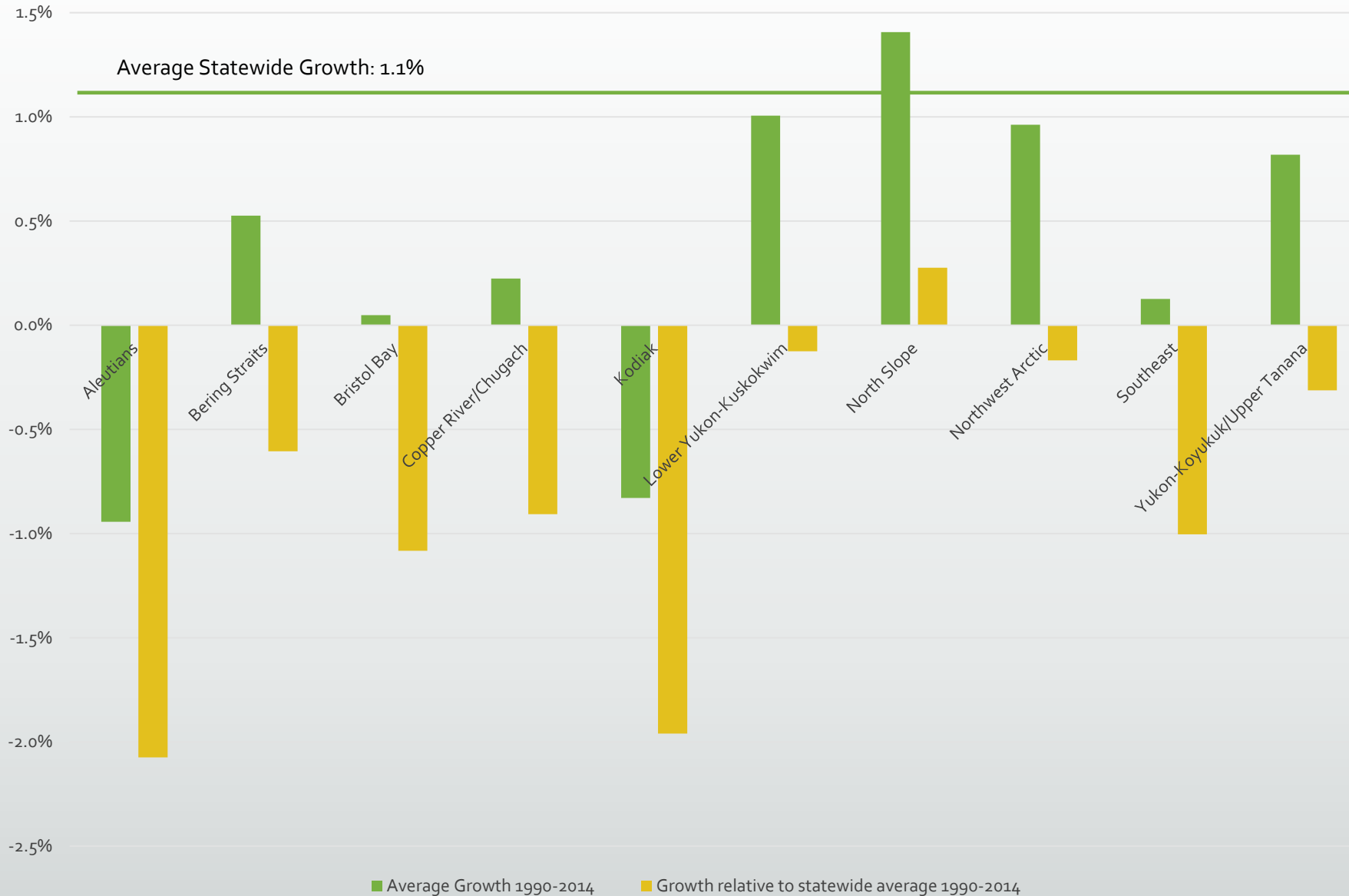
Reasons to care:

- Training
- Residential efficiency  
(multi-year investment)

Energy costs may contribute to intraregional migration but not interregional migration  
(preliminary results from ISER)



## Regional Average Population Change (US Census and ADOL&WD 1990-2014)



### Longer-term population trends

Only North Slope experienced growth greater than statewide average

Lower cost regions (Kodiak, Copper Valley, Southeast) do not exhibit higher growth

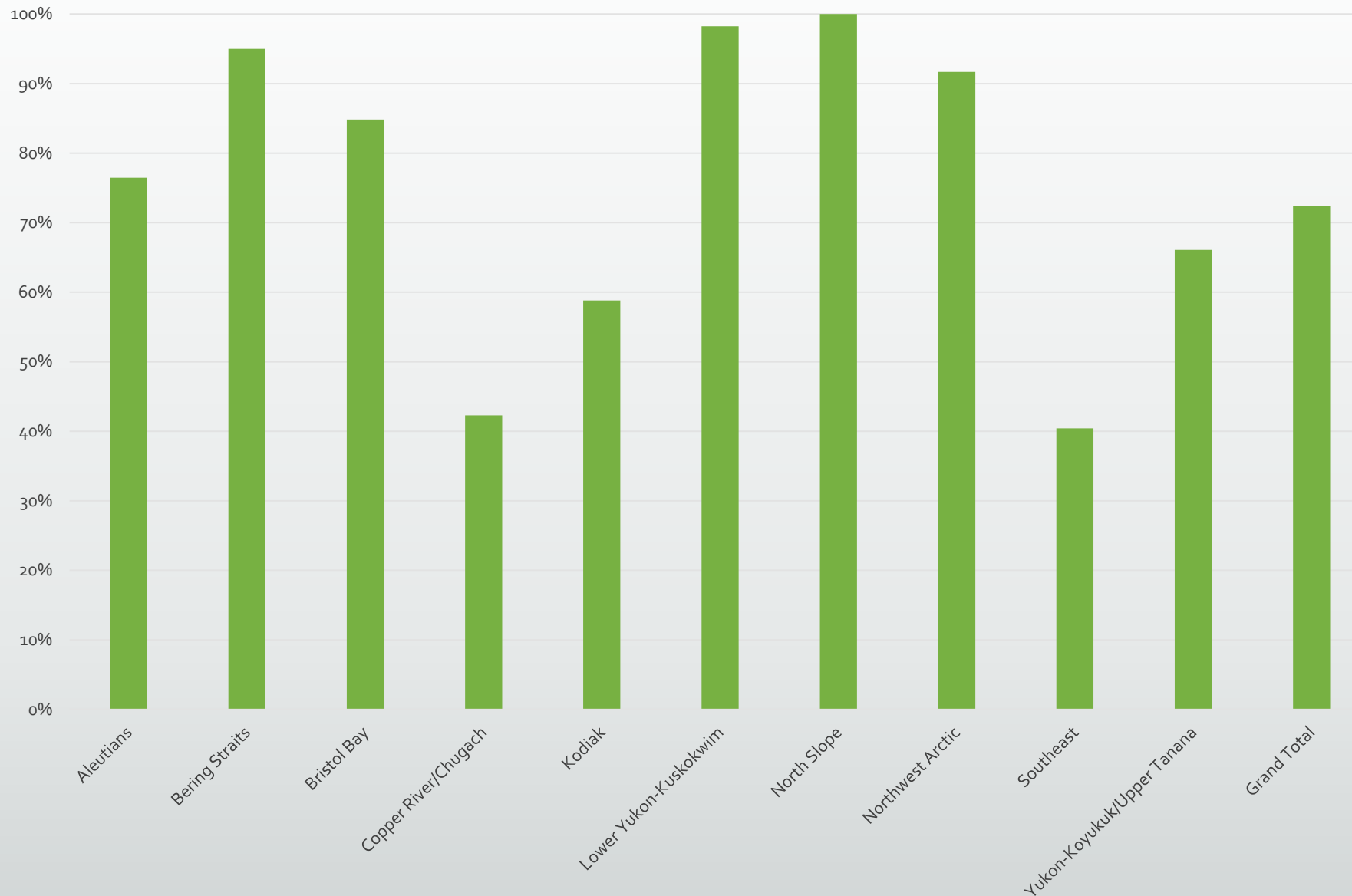
Higher cost areas (YK, BS, Lower YK) have relatively high growth

Reasons to care:

- Plan for demand
- Impact on investments



Percent of Communities with a Federally Recognized Tribe  
by AEA Energy Region

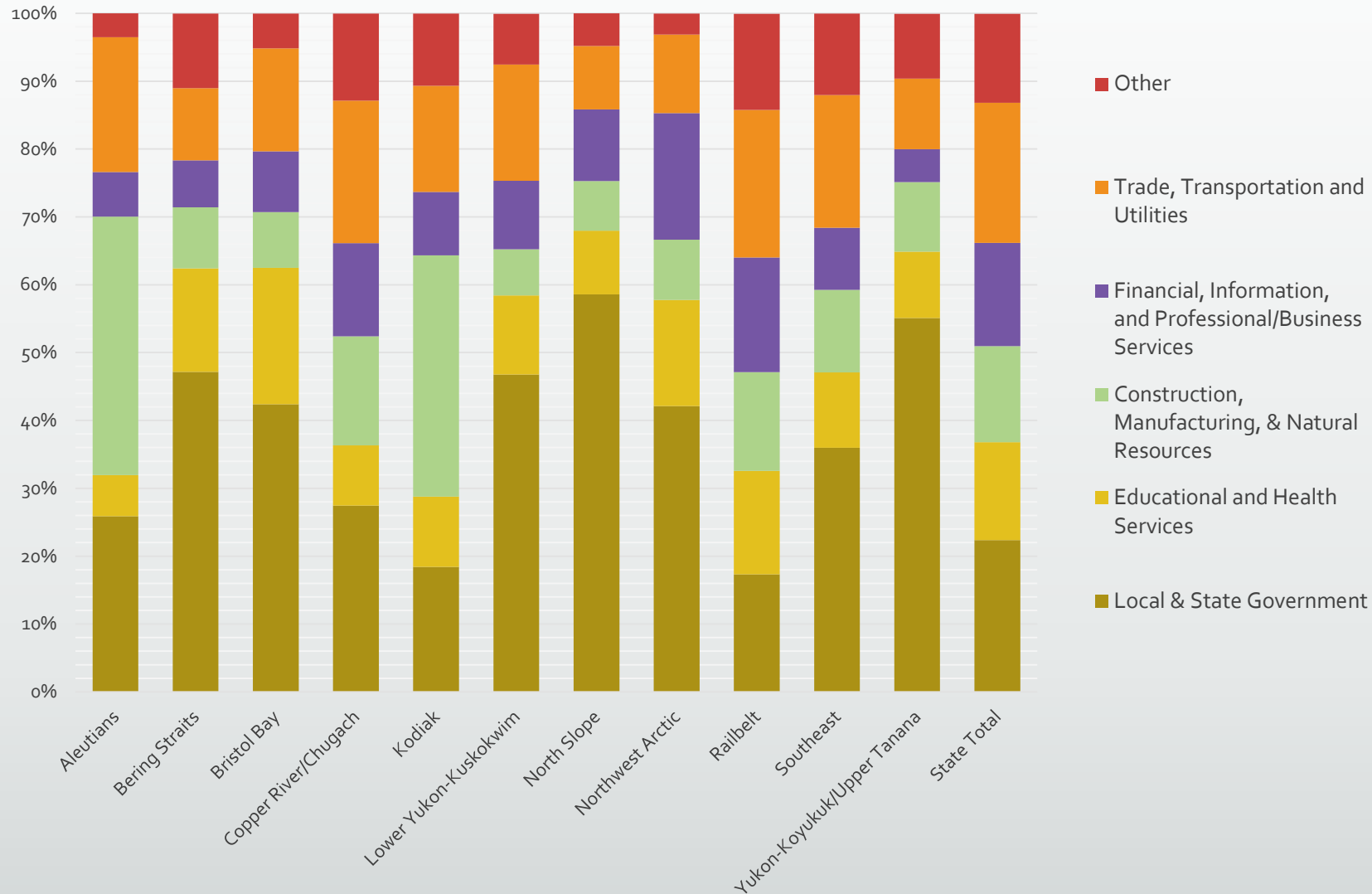


Federal support for tribes can be a potential source of funding for energy infrastructure projects.

Includes some communities that have a recognized tribe but no individuals living in the community

Data from DCRA  
Community  
Database

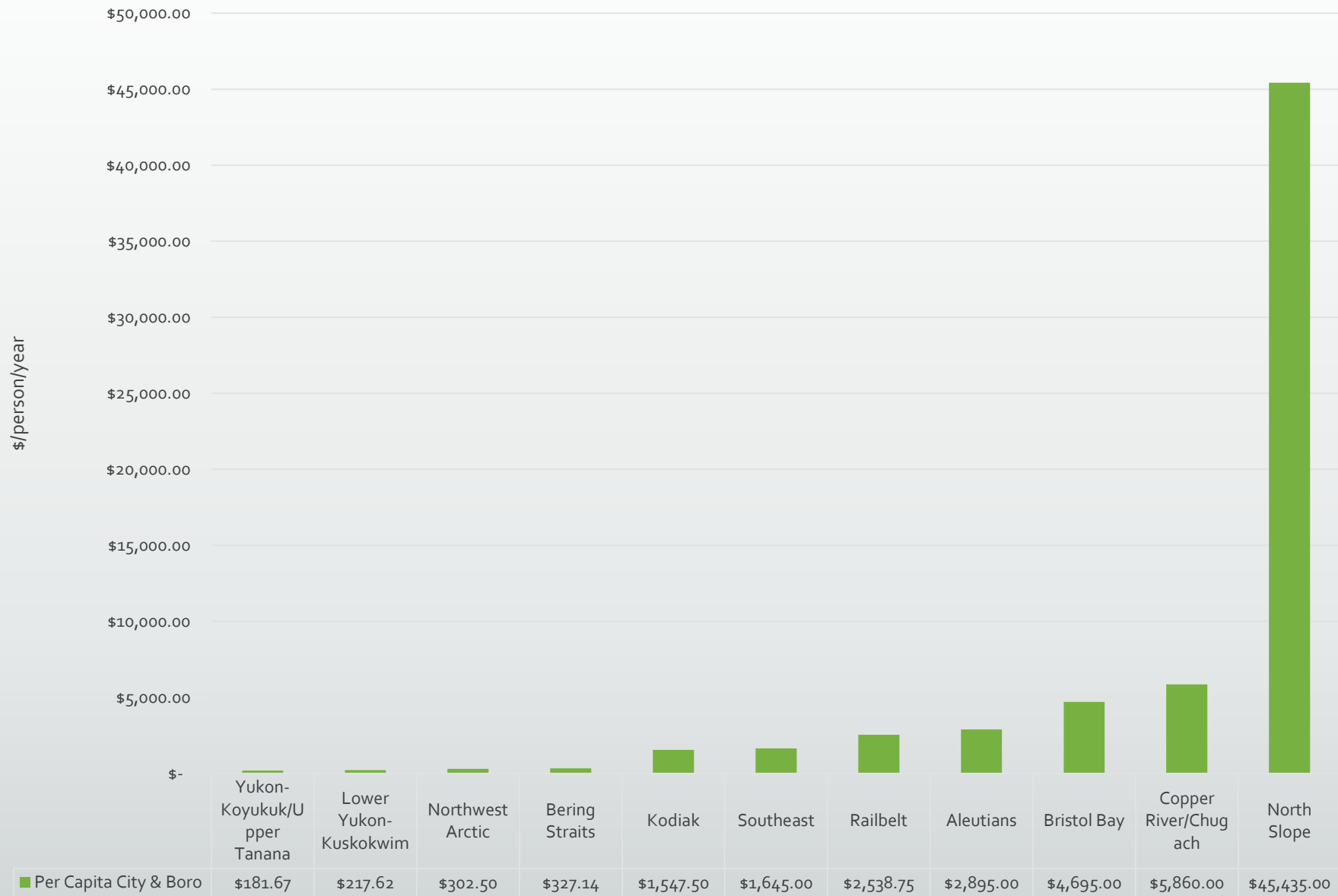
Regional Employment by Industry  
(Alaska DOL&WD 2014)



Manufacturing (fish processing, presumably) significant employer Aleutians and Kodiak

Local and state government is the majority industry in most of the AkAES region. Education and Health Services is also generally government funded

# Per Capita Tax Revenue (2013 Combined City & Borough)



Per capita tax revenue is an indicator of the region's local resource & tax base

Alaska per capita revenue ~\$12,000 including taxes, royalties, federal receipts, fees, and investments

North Slope: Property tax on oil industry

# “Affordable” Energy

# Questions on Affordability

- What is the purpose of the AkAES? What should we try to maximize?
  - Social services
  - Economic development
  - Redistribution of state wealth
  - Population stabilization
  - Return on investment

We will return to this near the end.....

# Possible Definitions of “Affordable”

No state definition—nothing in statute

Four primary options for using “Affordable” to allocate resources:

1. Need-based: “Affordable” includes the ability to pay
  - a. Some combination of energy unit prices and/or costs and median household income of the community
    - a. Legislation refers to both “areas of the state” and “citizens”
2. Need-blind: “Affordable” is a price or cost target
  - a. Unit price target for heat and/or electricity—based on natural gas cost
  - b. Total cost target
3. Price Stability
  1. Reduce amplitude of variability
4. Consumption Threshold

# Budgetary Implications of “Affordable”

- Total cost reduction requirements will be different based on how “affordable” is defined
  - Will place limitations on what is possible
  - Set expectations
- Regional distribution of required cost reductions per definition influenced by:
  - Total population
  - Local cost of energy—heating is the primary driver
  - Climate
  - Building stock
  - Other socioeconomic considerations



# Currently Used Need-based Definitions

- Heating Assistance Program Rules:
  - Eligibility is not solely based on income, must be below 225% of federal income poverty guidelines for Alaska. Benefits are calculated using a point system based on: the area of the state where you live, fuel type, dwelling type, household size and income. Each item has a point value. If you have low heating cost points after all factors are calculated, you may not qualify.
  - Pegged to ANS
- Alaska Water & Sewer Challenge
  - **Operation and maintenance cost:**
    - Projected monthly operating costs should not exceed \$135, which is 5% of the Median Household Income (MHI) of \$2,700 per month. This income level is less than or equal to the MHI of approximately 75% of rural Alaska communities, including larger hub communities.

# Affordability based on International Definitions

Maximum PCE reimbursement level. Average use in PCE is ~4,000 kWh/year

Approximately average household heating oil consumption across the AkaES region

		Alaska MHI (\$69,825)		Rural Alaska W&S MHI (\$32,400)	
	Percent of MHI	Electricity (6000 kWh/yr)	Heating (1400 gallons heating oi/year)	Electricity (6000 kWh/yr)	Heating (1400 gallons heating oi/year)
World Bank	10%	\$ 1.16		\$ 0.54	
WHO	10%	\$ 1.16		\$ 0.54	
IPA	20%		\$ 9.98		\$ 4.63
	10%	\$ 1.16		\$ 0.54	
UN/ECE	15%		\$ 7.48		\$ 3.47
UK government	10%		\$ 4.99		\$ 2.31
US Government	6%		\$ 2.99		\$ 1.39

Source: S. Fankhauser, S. Tepic. "Can poor consumers pay for energy and water? An affordability analysis for transition countries." European Bank for Reconstruction and Development, , working paper No. 92, May 2005.

# Impact of Need-based Definition on Two Communities

	Community 1		Community 2	
	Before	After	Before	After
Electricity				
\$/kWh	\$ 0.40		\$ 0.40	
Consumption (KWh/year)	6000		6000	
Heating fuel				
Price/gal	\$ 6.00		\$ 4.50	
Consumption (gal/year)	1517		1275	
Average HH Energy Cost				
MHI	\$ 27,000		\$ 100,000	
Cost Burden				
Households				
Total residential sector cost				
Total cost reduction needed				
Percent Cost Reduction				

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Price/gal	\$ 6.00		\$ 4.50	
Consumption (gal/year)	1517		1275	
Average HH Energy Cost	\$ 11,502			
MHI	\$ 27,000		\$ 100,000	
Cost Burden				
Households				
Total residential sector cost				
Total cost reduction needed				
Percent Cost Reduction				

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Average HH Energy Cost	\$ 11,502			
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Cost Burden	43%			
Households				
Total residential sector cost				
Total cost reduction needed				
Percent Cost Reduction				

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MHI	\$ 27,000		\$ 100,000	
Cost Burden	43%			
Households	60			
Total residential sector cost	\$ 690,120			
Total cost reduction needed				
Percent Cost Reduction				

# Impact of Need-based Definition on Two Communities

\$/kWh close to PCE base rate

Per gallon cost assuming constant consumption

	Community 1		Community 2	
	Before	After	Before	After
Electricity				
\$/kWh	\$ 0.40	\$ 0.14	\$ 0.40	
Consumption (KWh/year)	6000	6000	6000	
Heating fuel				
Price/gal	\$ 6.00	\$ 1.06	\$ 4.50	
Consumption (gal/year)	1517	1517	1275	
Average HH Energy Cost	\$ 11,502	\$ 2,430		
MHI	\$ 27,000	\$ 27,000	\$ 100,000	
Cost Burden	43%	9%		
Households	60			
Total residential sector cost	\$ 690,120			
Total cost reduction needed				
Percent Cost Reduction				

This scenario would require a nearly \$5/gal subsidy

Alternately the consumption could be reduce to ~270 gal/year and the price could remain \$6/gal



# Impact of Need-based Definition on Two Communities

	Community 1		Community 2	
	Before	After	Before	After
Electricity				
\$/kWh	\$ 0.40	\$ 0.14	\$ 0.40	
Consumption (KWh/year)	6000	6000	6000	
Heating fuel				
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MHI	\$ 27,000	\$ 27,000	\$ 100,000	
Cost Burden	43%	9%		
Households	60	60		
Total residential sector cost	\$ 690,120	\$145,800		
Total cost reduction needed		\$544,320		
Percent Cost Reduction		79%		

Cost reduction could be from cost-effective projects or through subsidy

# Impact of Need-based Definition on Two Communities

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\$/kWh	\$ 0.40	\$ 0.14	\$ 0.40	
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Cost Burden	43%	9%	8%	
Households	60	60	150	
Total residential sector cost	\$ 690,120	\$145,800	\$ 1,220,625	
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Cost Burden	43%	9%	8%	8%
Households	60	60	150	150
Total residential sector cost	\$ 690,120	\$145,800	\$ 1,220,625	\$ 1,350,000
Total cost reduction needed		\$544,320		
Percent Cost Reduction		79%		0%

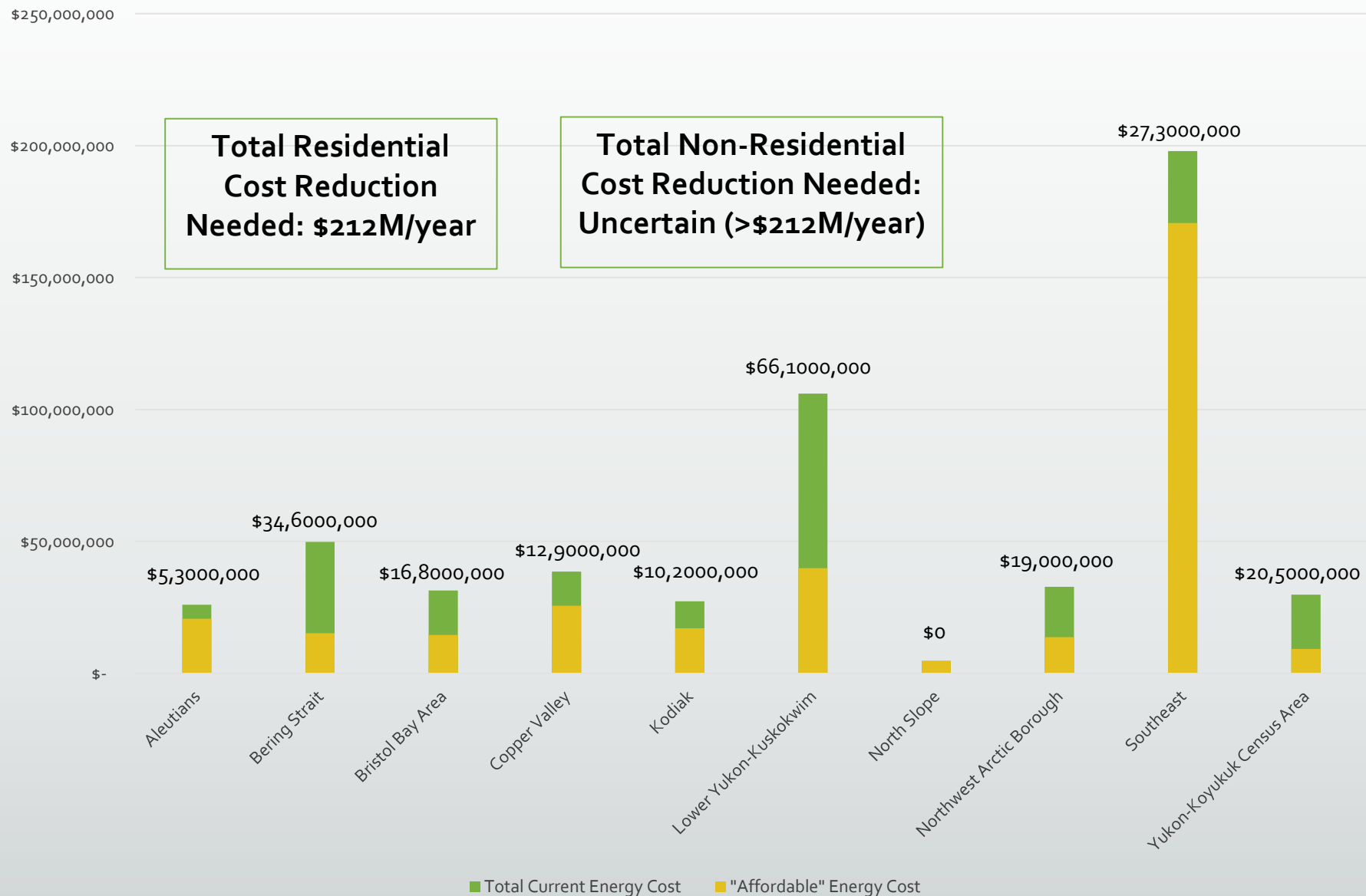
Large difference in electricity price needed

Large difference in total energy cost

Some communities already under 9% total

# Need-Based "Affordable" Energy

## Annual Household Energy Cost Reduction Required to Match 9% of MHI



- Heat and electricity
- Data from 2014 AHFC Housing Assessment
- Assumes 500 kWh/month
- No Railbelt communities are included in dataset.
- Only includes residential sector
- Uses MHI from ACS 2013 (high margin of error)
- Does not include PCE
- 6% for heating by US government, 3% for electricity (by analogy)
- Does not include subsidies (especially North Slope Borough)

# Investment Needed

Assume \$212 million per year cost reduction needed

Investment needed at:

- $B/C=0.5 \rightarrow \$424$  million/year
- $B/C=1 \rightarrow \$212$  million/year
  - (essentially equivalent to a direct subsidy)
- $B/C=2 \rightarrow \$106$  million/year



# Issues with Need-based

- Intent of legislation does not appear to be exclusionary
  - “areas of the state that do not have direct access to a North Slope natural gas pipeline”
  - “make their [the citizens] energy costs more affordable”
  - Areas without cost-effective infrastructure will receive “direct underwriting of energy costs”
- Aspirational, instead of prescriptive
  - Regional spreading is important for other state energy programs
- Data issues: Statistics for income not good at a community level (some cases +/- 1000%)

# Need-blind

- Affordability is determined as a price point (postage stamp rate)
  - Example 1: Set to an equivalent price for natural gas
    - Such as Cook Inlet or from the proposed pipeline
      - The most recent, optimistic delivered price ~\$8/Mcf to Cook Inlet
      - Fairbanks IEP target price \$15/Mcf, Juneau target price \$20/Mcf
  - Example 2: Set to an equivalent total cost of energy
    - Total household energy costs for heat and electricity
      - Difficult with different size houses, climates, etc.
      - Nuiqsut is a current example (\$25/HH flat rate)
- State government precedent:
  - Power Cost Equalization program
    - Provides a subsidy to utilities based on a formula including a weighted average cost of Anchorage, Fairbanks, and Juneau
  - Legislation specifically calls out for “direct underwriting” of energy costs

# Impact of Need-blind Definition on Two Communities

	Community 1		Community 2	
	Before	After	Before	After
Electricity				
\$/kWh	\$ 0.40		\$ 0.40	
Consumption (KWh/year)	6000		6000	
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MHI			\$ 100,000	
Cost Burden				
Households				
Total residential sector cost				
Total cost reduction needed				
Percent Cost Reduction				

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Households	60			
Total residential sector cost	\$ 690,120			
Total cost reduction needed				
Percent Cost Reduction				

# Impact of Need-blind Definition on Two Communities

	Community 1		Community 2	
	Before	After	Before	After
Electricity				
\$/kWh	\$ 0.40	\$ 0.21	\$ 0.40	
Consumption (KWh/year)	6000	6000	6000	
Heating fuel				
Price/gal	\$ 6.00	\$ 2.01	\$ 4.50	
Consumption (gal/year)	1517	1517	1275	
Average HH Energy Cost	\$ 11,502	\$ 4,309		
MHI	\$ 27,000		\$ 100,000	
Cost Burden	43%			
Households	60			
Total residential sector cost	\$ 690,120			
Total cost reduction needed				
Percent Cost Reduction				

Prices calculated such that the total electricity cost is 3% of total MHI and the total heating cost is 6% of MHI

# Impact of Need-blind Definition on Two Communities

	Community 1		Community 2	
	Before	After	Before	After
Electricity				
\$/kWh	\$ 0.40	\$ 0.21	\$ 0.40	
Consumption (KWh/year)	6000	6000	6000	
Heating fuel				
Price/gal	\$ 6.00	\$ 2.01	\$ 4.50	
Consumption (gal/year)	1517	1517	1275	
Average HH Energy Cost	\$ 11,502	\$ 4,309		
MHI	\$ 27,000	\$ 27,000	\$ 100,000	
Cost Burden	43%	16%		
Households	60	60		
Total residential sector cost	\$ 690,120	\$ 258,550		
Total cost reduction needed		\$ 431,570		
Percent Cost Reduction		63%		

# Impact of Need-blind Definition on Two Communities

	Community 1		Community 2	
	Before	After	Before	After
Electricity				
\$/kWh	\$ 0.40	\$ 0.21	\$ 0.40	
Consumption (KWh/year)	6000	6000	6000	
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Price/gal	\$ 6.00	\$ 2.01	\$ 4.50	
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# Impact of Need-blind Definition on Two Communities

	Community 1		Community 2	
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Electricity				
\$/kWh	\$ 0.40	\$ 0.21	\$ 0.40	\$ 0.21
Consumption (KWh/year)	6000	6000	6000	6000
Heating fuel				
Price/gal	\$ 6.00	\$ 2.01	\$ 4.50	\$ 2.01
Consumption (gal/year)	1517	1517	1275	1275
Average HH Energy Cost	\$ 11,502	\$ 4,309	\$ 8,138	\$ 3,823
MHI	\$ 27,000	\$ 27,000	\$ 100,000	\$ 100,000
Cost Burden	43%	16%	8%	4%
Households	60	60	150	150
Total residential sector cost	\$ 690,120	\$ 258,550	\$ 1,220,625	\$ 573,413
Total cost reduction needed		\$ 431,570		\$ 647,213
Percent Cost Reduction		63%		53%

"Before" of Community 2 has a lower cost burden than "After" Community 1

## Need-Blind "Affordable" Energy

Annual Household Energy Cost Reduction Required to equal \$0.21/kWh and \$15/mcf Natural Gas



- Heat and electricity
- Data from regional estimates from AHFC 2014 Housing Assessment
- Assumes 500 kwh/month
- No Railbelt communities are included in dataset.
- Only includes residential sector
- Uses MHI from 2013 ACS
- Does not include PCE
- \$15/mcf is equivalent to \$2/gallon heating oil
- For comparison: Anchorage= ~\$8.5/mcf (\$1.30/gallon heating oil)

# Issues with Need-blind

- Regressive benefit—larger consumers gain more benefit
- Delivered cost of natural gas difficult target
  - Many unknowns

# Questions on Affordability: The Return

- What is the purpose of the AkAES? What should we try to maximize?
  - Social services
  - Economic development
  - Redistribution of state wealth
  - Population stabilization
  - Return on investment

# Preliminary Takeaways

- Cost reduction needed:
  - Residential: ~\$210-300M/year
    - Heating
    - Electricity
  - Non-residential: Greater than residential (>60% of electricity demand in PCE communities)
    - Heating
    - Electricity
  - Total: >\$500M/year
  - Projects with B/C>1 are not common
- Potential Alaska Affordable Energy Fund: ~\$157M 2015\$
  - 2015 estimate of 20% of unrestricted royalty gas revenue is equivalent to per the terms of the Alaska Affordable Energy Fund
  - Assumes \$55B project cost, \$16/MMBtu gas price, does not include debt repayment in cashflow analysis (based on 2015 Lazar study)

# Recommendation

- Do not create a hard, quantitative definition of “Affordable”
- Limitations:
  - Do not assume that a new subsidy would be sustainable long-term
  - Cost effective projects may not be widespread
- Use current criteria when possible:
  - Electricity Generation & Distribution: Power Cost Equalization provides regulations
    - Competitive process with strong bias towards affordability (equity of distribution)
  - Efficiency:
    - Residential: Vast majority of housing stock in need of EE upgrades
      - Use Wx guidelines as baseline, extend applicability based on results of EE gap analysis
      - Underserved & unrecognized demand
    - Non-Residential—assistance, competitive process (such as by Village Energy Efficiency Program [VEEP] regulations)
      - Cost of energy
      - Benchmark consumption
      - Underserved & unrecognized demand

[AKEnergyAuthority.org](http://AKEnergyAuthority.org)

