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Energy Policy Recommendations
DRAFT FINAL REPORT

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and
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Energy Policy Recommendations

Pros and Cons of Policy Options to Reduce Fuel Costs for Alaskans and Lower the Price of Fuels in Alaska

The tables beginning on the next page explore a variety of strategies aimed at reducing the burden of costs for fuel in Alaska as well as lowering the price of fuels in Alaska. For each strategy, we briefly outline pros and cons for the strategy as well as potential barriers. Other elements considered, where known, include related job creation; costs or savings; and how quickly the strategy can be realized. As well, strategies that are specific to urban or rural Alaska are noted.

Recommendations are not prioritized in this table. Our top recommendations are listed in the Executive Summary of this report.

Table R-1. Reducing the Burden of Energy Costs for Alaskans

Alaskans pay high energy costs which strain household, business, and public budgets. The most effective and dependable way to reduce costs is to use less fuel, limiting exposure to high fuel prices. Public and private funds invested to increase energy efficiency and reduce use of fuels have shown a significant, quick return on the state's investment in terms of energy savings, household savings, jobs created, and money retained over the long term in the Alaska economy which, in turn, creates more jobs. Energy efficiency projects compare very favorably to other capital projects in terms of effectively creating both short term and permanent jobs in a relatively immediate time frame. Another approach for reducing costs is to provide state cash support for paying fuel bills.

Table R-1. Reducing the Burden of Energy Costs for Alaskans

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Energy Efficiency (EE): General Policy Considerations					
Investing in energy efficient buildings is a statewide capital project that uses Alaska's workforce, saves money, and creates jobs statewide.	EE projects create short-term construction jobs and ongoing jobs from respending of saved energy dollars. EE programs have statewide impacts and save citizens millions of dollars.		Per dollar invested, EE creates as many or more jobs than most capital projects. Energy retrofit construction was an important job source during the recent recession.	Per dollar invested, compares favorably with other strategies to reduce energy costs for Alaskans.	Efficiency can be implemented within months of funding. Savings and jobs are realized quickly. Payback on public money invested may be realized in just over five years.
			Money saved stays in Alaska, creating thousands of permanent jobs. Energy retrofits to date of just 10% of residential housing stock have created almost 4,000 construction jobs and over 300 ongoing jobs.	Spending on energy was reduced on average 26-28%. As much as 43% has been saved in areas with higher fuel costs such as northern and Interior AK . Few other projects or policies have demonstrated the capacity to reduce energy demands and associated costs to this degree.	

	Pros	Cons & Concerns	Jobs	Money	Timeliness
			Retrofit of the entire housing stock could create over 30,000 job-years plus over 2,500 permanent jobs. This does not include jobs and savings to be realized from retrofit of public and commercial buildings.		
Multi-year investments in EE are needed. Multi-year funding for energy efficiency programs was consistently found to be the most important factor in improving the results of these programs.	Multi-year funding creates a stable investment and business environment for construction industry to gear up for energy retrofit business. Reduce uncertainty for homeowners and building owners looking to improve energy efficiency.	May be hard to obligate money for several future years. Sporadic appropriations create uncertainty for Alaskans considering going through program process or gearing up to provide service.			Tens of thousands of near term energy retrofit jobs could be created and jobs related to savings could be realized sooner and predictably.

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Residential Energy Efficiency					
Double current pace of retrofitting Alaskan homes for energy efficiency with multi-year funding – Home Energy Rebate Program (AHFC).	Get more benefits sooner. To date, only about 10% of Alaskan homes have been retrofitted. At current rates, it would take over 30 years to retrofit 70%.	Demands on administration would increase, but doubling the current pace is reasonable.			EE related jobs and jobs related to spending of savings elsewhere in the Alaska economy would be realized sooner.
Consider adjusting $10,000 cap of Home Energy Rebate Program for inflation and/or geographic differential	Stimulate more homeowners to apply.	Requires more funding per house served.			
Expand HERP and WAP to include electric appliances	More effective to address all opportunities during one process	May require more funding; may require additional admin resources			addressing appliances at same time as thermal envelope yields faster cost reductions
Expand programs to better serve renters and landlords. (AHFC and weatherization agencies).	In Alaska, 37% of housing is occupied by renters. Not all rental situations are covered by current programs, so some potential savings are missed.	If landlords are assisted in saving energy costs, state should consider a mechanism to require that savings are shared with tenants.	Since rentals are a significant portion of the Alaska housing stock, there is the potential for significant short term and permanent job creation.	Since rentals are a significant portion of the Alaska housing stock, there are considerable savings to be realized.	

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Improve outreach to homeowners on sources of financing to complete retrofits (AHFC).	Access to financing has been identified as a barrier to some homeowners who have had audits, but have not made improvements.				Moving homeowners forward to complete retrofits will realize savings and jobs created sooner.
Adjust weatherization program guidelines for inflation.	Guidelines for spending per household were last set in 2008. AHFC plans a review of spending guidelines this coming spring.				
Public Agency Building Energy Efficiency					
Improve use and/or structure of Alaska Energy Efficiency Revolving Loan Fund (AHFC).	Enormous potential energy and funding savings – roughly $125 million per yr – could be realized from EE in public buildings.	Public agencies are not accustomed to working with loans. They are more familiar with applying for grants or capital funds.	Retrofit of public buildings will create significant jobs statewide.	Related savings on energy costs will reduce demands on the state budget.	Based on experience with residential buildings, investments can be recouped by savings within a few years.

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Consider providing energy audits to public agencies.	Removes identified barrier and provides incentive for agencies to undertake EE. Public agencies that were granted investment grade audits appear to be moving forward with energy efficiency retrofits.	Requires up-front spending by the state.	There is the potential to create a significant number of jobs through retrofit of public buildings.	There is the potential for significant savings of public money through retrofit of public buildings.	Jobs and savings will be realized sooner.
Educate agencies that loans can be structured like a performance contract.	Public agencies need to better understand that there is little risk in being able to pay off loan as savings will create funds for payment. Agencies do not have to create a new revenue stream to pay off loan.	Agencies are not familiar with loans or with performance contracting. This has also limited the use of private performance contract financing that may be available.			
Consider offering grants instead of loans	Research has shown that grants generated seven times the energy savings as loans, for an identical outlay of public funds.	May require more state funding than loans, per unit of saved energy.			

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Review state regulations that are barriers to energy efficiency.	Regulations may create unnecessary barriers to reducing energy costs. Examples include regulations that disallow newer technologies, for example DOT lighting regulations, or that discourage financing tools.				
Require new buildings that receive state funding to meet energy standards.	Reduced energy costs and reduced long term costs to the state. Provides guidance to private marketplace, which could simply adopt stds.	Standards may take time and effort to define.		Long term public savings over operating life of building.	
Adopt recommendations in AHFC White Paper on Energy Use In Alaska's Public Facilities	Provides detailed listing of ways to save energy and money through design, retrofit, and operation of public buildings.				
Require agencies to spend some of their deferred maintenance funding on energy efficiency.	Prioritize energy efficiency as part of maintenance for public buildings. Reduced public energy costs.			Significant savings in public budgets.	

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Require and fund operation and maintenance energy management training for public buildings funded by the state.	Significant energy efficiency can be gained by improving operation and maintenance.			Significant savings in public budgets.	Immediate returns.
Commercial Building Energy Efficiency					
Offer Investment Grade Audits for commercial buildings.	Removes identified barrier and provides incentive for agencies to undertake EE. AEA hopes to announce funding and regulations for commercial audits in late February or early March of 2013	Requires up front funding by the state.	Creates incentive to realize jobs associated with retrofits and savings realized sooner.	Makes it more economical for businesses to operate and remain in Alaskan communities by reducing energy costs. Creates incentive for commercial building owners to realize efficiency savings.	AEA has identified cost effective measures that could save buildings on average 31% of their energy bill with pay back of 6.25 years.
Consider a matching grant program to improve incentives for businesses to participate.	Creates incentive to businesses for energy efficiency, but still requires private investment	Public money spent on private business may be a concern to some policy makers.			
Offer rebates to small businesses in owner-occupied buildings.	Many small and rural businesses are in buildings similar in size to residences. HERP and AEA programs could be leveraged				

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Offer direct incentive payments to private sector Energy Service Companies (ESCOs) to serve smaller buildings with shared savings contracts.	Would attract private financing for smaller buildings. Currently, ESCOs are focused on clients with utility bills over $250,000/yr				
Offer attractive loan for **private commercial buildings** to implement energy efficiency measures.	Leverage state dollars with private investment to increase the reach and impact. Ties in smoothly with AEA commercial energy audit program.		More and faster retrofit activity creates more jobs		More and faster retrofit activity produces faster savings
Bundle Energy Efficiency with Renewable Energy Grants					
Allow energy efficiency projects to be bundled with renewable energy supply under the Renewable Energy Fund grant program (AEA)	Many REF projects could be more effective and/or cheaper overall if EE is included as a component. Also corrects a tendency to over-estimate benefits of renewable sources, based on inefficiently high demand		Jobs created by both retrofits and building of new power sources.	Additional funds saved by using less energy will circulate in local economies, creating permanent jobs.	Efficiency and related benefits can be realized quickly.

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Public Agency Energy Efficiency – Rural					
Create energy efficiency "help desk" resource for smaller communities and agencies.	Many smaller communities or agencies do not have the capacity to prioritize energy efficiency options or to access funding mechanisms such as the Alaska Energy Revolving Loan Fund.				
Revitalize whole village energy efficiency retrofits covering both heating and electricity.	EE is faster and cheaper when the entire village is addressed at once.				
Heating Assistance					
Raise cap and add state funding to allow households with higher incomes to receive heating assistance funds.	Only 19-20,000 Alaskan households are currently eligible; priority given to households with elderly, disabled or children under the age of six.	Expanding the number of qualifying households would reduce the amount of funding available to those most in need unless funding was expanded.			

	Pros	Cons & Concerns	Jobs	Money	Timeliness
		Federal LIHEAP funds (currently $10 million/year in federal funding which is supplemented by $20 million in state funding) could be reduced 8-9% per year if sequestering is put in place.			
Supplement and fund extended PCE program to include heating assistance based partly on cost.	Helps people in highest cost areas with burden of high fuel bills. PCE already targets high cost areas and already has an existing structure.	Would not include urban areas. PCE rules would need significant adjustment to account for heating needs. Would require additional funding.			

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Create voucher program to subsidize Alaskans' fuel bills.	Provides short term, immediate relief for fuel bills.	Needs low cost form of administration. Could create long term expectation of subsidy. Removes incentives to save energy and reduce costs – could encourage more not less use of scarce gas Could be subject to fraud. Challenging to make fair. Hard to agree on which factors should enter voucher calculation. Hard to implement for households which use wood or other non-oil and gas sources for fuel.			Temporary fix, but quickly implemented.

	Pros	Cons & Concerns	Jobs	Money	Timeliness
Direct cash payments to Alaskans to defray energy bills.	Administratively simple. Fits with owner state concept and AK constitution: share the wealth of oil revenues.	Not tailored to those most in need. Could create long-term expectation of subsidy.			
Use North Slope propane .	Could possibly provide alternative, lower cost fuel, especially to Interior which does not have access to natural gas.	Unclear that propane is available at low cost. AOGCC ruled in August 2012 that use of North Slope propane other than reinjection for field maintenance is wasteful.			

(This table continues on the next page)

Table R-2. Reducing the Price of Fuel in Alaska

The dominant component of the price of fuel in Alaska is crude oil which accounts for approximately 70 % of the overall price. With regards to prices, it is important to recognize that the state of Alaska has little influence the cost of crude oil, which is set by the world market. If crude prices continue to rise, the importance of this component could increase further. The state may have limited capacity to influence the price of fuel in Alaska by addressing the other cost components that contribute to fuel prices such as refining margins, storage, transportation, and distribution. Unfortunately, without controlling the entire supply chain from drilling to fuel delivery, it is hard to assure that savings at some point in the supply chain are passed on to the consumer and not just captured as profit at some other link in the chain. There is some evidence that increased fuel storage might allow increased competition by creating infrastructure that would allow additional refined products to be imported from the lower 48 and Asia.

	Pros	Cons	Jobs	Money	Timeliness
Reducing Fuel Prices					
Lower state fuel taxes.	Relief to fuel consumers.	Reduced state income. Alaska already has the lowest state taxes in the country. Could negatively affect Alaska's ability to attract federal transportation funding.	Fewer state dollars for state supported jobs.		Could be done immediately
Increase storage for gasoline, especially in ports which can accept tankers and near population centers.	Increased storage could enable new competitors to enter local markets by importing tankers of gasoline or other refined products from Asia or the lower 48. Increased competition could lead to lower prices. Also, increased storage could allow buyers to time fuel buying to lower cycles in the market.	Increased imports would compete with refineries in Alaska and affect business for current transporters of these products such as the Alaska Railroad.	Could lead to loss of local jobs in refining and support industries.	Lower fuel prices would translate to increased money circulating in the local economy.	

	Pros	Cons	Jobs	Money	Timeliness
Create a price gouging law.	Thirty other states have some form of price gouging law.	Most of these laws are only implemented in emergency situations such as natural disasters.			
Regulate fuel prices under the Regulatory Commission of Alaska (RCA).	Could result in lower consumer prices, especially in short run.	RCA regulates "natural monopolies" as utilities. It is unclear if fuel qualifies as most Alaskan markets have some choices. May apply in rural situations lacking choice of suppliers. RCA would be required to guarantee a reasonable rate of return. A regulated monopoly creates barriers to lower priced competition. It is questionable if interstate commerce, fuel imported from other states, could be regulated. Cost of regulation would be spread over relatively few gallons, especially in rural areas, could reach 50+ cents/gallon.			

	Pros	Cons	Jobs	Money	Timeliness
Regulate Alaska refineries under the RCA.	Would have to determine a reasonable rate of return to local refineries.	Hard to estimate if prices would fall for consumers or if current refinery margins would be considered reasonable. See above considerations for retail regulation.			
Sell Alaska's royalty oil at a discount to refineries.	Would lower the input cost of crude to refineries.	Reduced state revenue. Could be unconstitutional as royalty oil is supposed to benefit all Alaskans equally. A discount does not assure that the refined product would be cheaper. Alaska would need a guarantee from the refiner and downstream entities to pass through a lower price. Even with a subsidy, it is unclear if Alaskan refineries can compete on price with refineries in Asia and the lower 48 due to the economy of scale advantages of larger refineries and Alaska refineries' less efficient size.			

	Pros	Cons	Jobs	Money	Timeliness
Build or buy State-owned refinery		Doubtful that state could operate a small refinery at lower costs than large refineries elsewhere.		Might require state subsidy.	New facility would require lengthy permitting process.
Transport crude from western Cook Inlet by pipeline instead of tanker.	Crude is currently transported from Drift River to the Nikiski refinery by tanker. A proposed pipeline might reduce transportation costs.	Uncertain if transportation costs will be reduced. If so, unclear if reduced costs will be reflected in the lower prices for refined products.	Could reduce jobs for local tankers.		
Reducing Rural Fuel Prices					
Improved infrastructure					
- Improved marine headers and terminals	Improve safety and allow more competitors to access remote ports. Decrease delivery time which could decrease transportation costs.	Requires additional funding. Cost effectiveness is unclear.			
- Improve maritime support	Lower transportation costs by improving mapping, dredging and other shipping support.	Requires additional funding. Cost effectiveness is unclear.			
- Increase intertie and road connections between remote communities	Consolidate and reduce need for fuel related infrastructure.	Needs a cost estimate including capital and operating costs. Interties between small load centers could be expensive. There may be mixed community support for roads in remote locations.			

	Pros	Cons	Jobs	Money	Timeliness
Fuel co-ops	Could improve buying power to leverage lower prices	Have had mixed results. Problems include: credit risk to all members if one member of co-op fails to pay; suppliers shifting costs to other consumers to offset lower price paid by co-op; reduced competition as fewer buyers are available to attract suppliers.			
State sponsored fuel price hedging service	Buying fuel at a guaranteed future price. Price is predictably locked in.	Price may or may not be lowest in market cycle. Pay a premium for a futures contract.			

Executive Summary and Top Recommendations

The Senate Finance Committee, through its Senate Energy Working Group, has asked a series of important questions about energy prices, energy costs, and energy use. The Committee also asks the "overarching" question of **what can be done to reduce gasoline and heating fuel prices in Alaska? Which of these strategies has the greatest likelihood of success for the least cost to state government?** This report contains our responses to both the overarching and specific questions posed. Our answers and recommendations are based on reviews of the most current, publicly available data regarding fuel prices and fuel use. We interviewed numerous agency officials, businesspeople, and residents participating in a range of energy related programs supported by the State of Alaska.

Reducing Prices

During 2000-2005, wholesale Alaska prices for gasoline and heating fuel dipped below prices in Washington several times.[1] But, in 2009-2010, prices for these same products soared in Alaska and exceeded Washington prices by 50 cents per gallon or more. However, since 1999 the price of jet fuel has rarely exceeded Washington levels by more than 5%, with the gap declining over time.

The relative stability of jet fuel prices is a function of a relatively deep and liquid market subject to competition. There are several high-volume buyers, mainly at the Anchorage International Airport, who have several options - including buying from any of the in-state refineries and/or importing a range of volumes from the lower 48 or from Asia at different times of the year to place into local storage. It is the combination of 1) having the option to buy in large enough quantities to demand a fair price and 2) having the storage to accommodate large buys that helps keep Alaska jet fuel prices stable.

Our analysis suggests that the state could promote these same kinds of competitive market conditions for gasoline and heating fuel by 1) increasing the storage capacity for these fuels, especially in urban areas, that is available to independent merchants; 2) encouraging the purchase of these fuels in higher volumes at lower wholesale prices; or some combination of these approaches.

Storage can help exert competitive pressure only when existing and potential resellers thereby gain access to multiple suppliers, such as refiners outside Alaska. This might occur in Southcentral. For the Fairbanks area, storage might make a difference in securing the lowest possible prices from local refiners, but only if buyers can be coordinated and organized to exert some market power.

With regards to prices, it is important to recognize that the state of Alaska has little ability to influence the cost of crude oil as set by the world market. Crude oil is now the dominant

[1] Prices are based on statewide averages. Prices in many rural Alaska markets did not fall below Washington prices.

component of both heating fuel and gasoline prices, accounting for almost three-fourths of the price of gasoline. If crude oil prices rise further, their relative influence on delivered fuel prices will increase even more.

The state has some ability to reduce the price of fuel by addressing the other cost components that contribute to fuel prices, such as storage, transportation, and distribution. This potential capacity is especially significant in rural Alaska where the non-crude costs add significantly to the delivered price of fuel. There is evidence that fuel prices can be decreased by improving the marine transportation system or fuel storage infrastructure in conjunction with bulk fuel buying.

Reducing the burden of fuel bills

In addition to reducing the price of fuel, another strategy is to reduce the overall fuel cost burden borne by Alaskans. While the price of fuels may fluctuate, Alaskans' heating bills can be significantly and permanently reduced by consuming more efficiently.

The state's investment in energy efficiency to date has proven remarkably successful at reducing the cost of energy to households. On average, households served by energy efficiency programs have reduced fuel use by 28-33 percent. With only ten percent of the housing stock having been addressed to date, annual statewide savings by households are close to $30 million per year. These energy savings continue in subsequent years. Savings on energy are then freed up to spend locally in the Alaska economy which, in turn, creates more jobs.

Energy efficiency efforts are also labor intensive. The numbers of jobs created by energy efficiency and related consumer cost savings compare to major industrial developments or large-scale capital projects in Alaska. Investing in energy efficient buildings is a statewide capital project that uses Alaska's workforce, saves money, and creates jobs statewide. Public funds invested in energy efficiency compare very favorably to other capital projects in terms of effectively creating both short term and permanent jobs in a relatively immediate time frame and have shown a significant, quick return on the state's investment.

While many factors affect whether an individual homeowner seeks to weatherize their home, the primary constraint that limits how quickly the overall Alaska housing stock becomes more efficient is the dependability of funding. Multi-year funding for energy efficiency retrofits for buildings would create a stable investment and business environment for the construction industry to commit to the energy retrofit sector and create realistic expectations for homeowners and building owners looking to improve their efficiency.

In approximately 4.5 years, the state has successfully retrofitted approximately 10% of Alaska's housing stock. If the top 10% of the remaining housing stock is sufficiently efficient to not need retrofitting and the bottom 10% is not worth retrofitting, there remains 70% of the housing stock to address. At current rates, it would take over 31 years to complete this effort.[2]

[2] Based on 4.5 years to retrofit 10% of the housing stock, it would take 31 more years to retrofit an additional 70%.

Doubling the current rate of effort would retrofit Alaska's housing stock in 15 years, bringing energy savings and related permanent jobs into the Alaska economy sooner and appears to be within reach of current administrative capacity. Tripling the current rate of effort would retrofit the remaining housing stock in 10.5 years. Retrofit programs also need to be adjusted to incorporate more of Alaska's housing stock.

Efficiency appears to be the most effective, dependable path to lowering energy costs for all segments of energy consumers. Significant potential savings to Alaska businesses and government - over $125 million and over $200 million per year respectively - remain to be realized. Commercial buildings and facilities use 27% more energy than the residential market according to he EIA. Audits performed by AHFC and AEA indicate an average 30% potential savings through economically viable energy efficiency measures.. Programs need to improve their appeal for investment by managers and owners of public and commercial buildings. For example, AEA has the Commercial Energy Audit program which pays for part or all of an energy audit for private commercial buildings, but offers no actual retrofit money.

Unlike residential retrofits which are supported by direct government service or rebates to homeowners, public retrofits are planned to be served by a relatively new revolving loan program. It remains to be seen if public agencies will avail themselves of this program. Public agencies are generally not as familiar with applying for loans as applying for grants or appropriations. Applying for and managing a loan was perceived as an additional demand on staff which may already have limited capacity, especially in smaller agencies or rural communities. Also, the rates offered by AHFC for these loans are not considered by some to be sufficiently attractive compared to current market rates to attract participation.

Alaska Housing Finance Corporation (AHFC) reports that the audits done by AHFC contractors have stimulated discussion and prompted some public agencies to take energy efficiency action. However, to date AHFC has only had a few formal requests for financing. Similarly, a new loan fund for commercial buildings administered by the Department of Commerce has not been well used to date. Matching grants or other incentives for commercial buildings may be of interest.

By contrast, the Renewable Energy Fund grants program is extremely popular. Currently, REF grants underwrite alternative means of generating heat and power, but do not pay for efficiency investments. **The state could promote more savings on fuel bills for less up-front expenditure by allowing, or perhaps giving preference to, projects that bundle together cost-effective energy efficiency with renewable supply.** We found no opposition to this idea, and it is one of our top recommendations for action.

Potential heating fuel cost reduction program

A different way to reduce the burden of the cost of fuel is to provide direct funding to households. A direct cash assistance program to help defray high fuel costs patterned on or added to the Power Cost Equalization (PCE) program would cost about $62 million per year if it

served 62,000 households (equal to half the households not now served by gas) and provided an average of $2 per gallon for 500 gallons per household.

An alternative approach to augmenting PCE would be to simply provide cash assistance to households. The level of assistance could be tied to world crude oil prices.

Rural Alaska

There is some evidence that rural Alaska fuel prices can be decreased by improving transportation or fuel storage infrastructure in conjunction with bulk fuel buying.

There have been fuel cooperatives in the market for more than 10 years. Cooperatives have been suggested as a way to provide buying power to smaller buyers; to reduce administrative costs; and to provide business support and help ensure communities have available cash to buy fuel. In actual practice they have had mixed results, as they face significant challenges in rural fuel markets. These challenges include: credit risk, cost shifting, and reduced competition.

Top Policy Recommendations

We explored a wide range of policy recommendations, which are outlined above in Table R-1 and Table R-2 and are discussed in the text.

Our top policy recommendations are:

- The State should investigate and support improved access to increased bulk fuel storage storage near urban markets. Storage could allow new competitors to enter local markets by importing tanker loads of gasoline of other refined products from Asia or the lower 48 when prices are lower. Lack of storage is currently a barrier to large scale imports of fuels.
- Multi-year funding for energy efficiency retrofits for buildings would create a stable investment and business environment for the construction industry to commit to the energy retrofit sector. Energy efficiency has proven highly successful at reducing fuel use and associated costs for homeowners. In addition to thousands of jobs created statewide in the construction industry, thousands of additional jobs are created due to spending of the money saved on fuel in the general economy.
- Doubling the rate of retrofitting residential homes is within administrative reach and would speed up achieving associated savings and creating jobs. To date, only 10% of Alaskan homes have been retrofitted. At current rates, it would take over 30 years to address remaining homes worthy of retrofit.
- Provide energy audits and other incentives to public agencies and commercial building owners to begin energy efficiency retrofits. There are significant savings to be realized in both the public and private sectors as well as significant jobs to be created statewide through retrofits. Lack of audits which can help establish priorities are a current barrier.
- Create an energy efficiency “help desk” resource for smaller communities and public agencies which do not currently have the capacity to prioritize energy efficiency projects or to prepare the necessary application meterials to access financing.

1. Heating fuel and gasoline consumption and expenditures

Gasoline and heating fuel consumption by region

The following tables provide current best estimates of gasoline and heating fuel used by individuals; by business and government; and (for diesel fuel) by industry. With the exception of residential heating fuel, the estimates are constructed so that all "bottom-up" totals add to statewide totals reported by the Energy Information Administration State Energy Data System (SEDS). We believe that SEDS greatly understates residential heating fuel consumption, so we rely for those numbers on our own bottom-up estimates.

Table 1. General regional data

Census Area	AEA Energy Region	climate _zone	Census 2010 population	avg employ-ment 2011	occupied housing units 2010
Aleutians East Borough	Aleutians	7	3,141	1,991	553
Aleutians West Census Area	Aleutians	7	5,561	3,844	1,212
Anchorage Municipality	Railbelt	7	291,826	152,876	107,332
Bethel Census Area	Lower Yukon-Kuskokwim	8	17,013	6,848	4,651
Bristol Bay Borough	Bristol Bay	7	997	1,420	423
Denali Borough	Railbelt	8	1,826	1,837	806
Dillingham Census Area	Bristol Bay	7	4,847	2,586	1,563
Fairbanks North Star Borough	Railbelt	8	97,581	39,018	36,441
Haines Borough	Southeast	7	2,508	1,025	1,149
Hoonah-Angoon Census Area	Southeast	6	2,150	692	913
Juneau City and Borough	Southeast	6	31,275	18,057	12,187
Kenai Peninsula Borough	Railbelt	7	55,400	19,438	22,161
Ketchikan Gateway Borough	Southeast	6	13,477	7,299	5,305
Kodiak Island Borough	Kodiak	7	13,592	6,416	4,630
Lake and Peninsula Borough	Bristol Bay	7	1,631	785	553
Matanuska-Susitna Borough	Railbelt	7	88,995	20,302	31,824
Nome Census Area	Bering Straits	8	9,492	3,839	2,815
North Slope Borough	North Slope	9	9,430	13,950	2,029
Northwest Arctic Borough	Northwest Arctic	8	7,523	2,874	1,919
Petersburg Census Area	Southeast	6	3,815	1,667	1,599
Prince of Wales-Hyder Census Area	Southeast	6	5,559	1,920	2,194
Sitka City and Borough	Southeast	6	8,881	4,355	3,545
Skagway Municipality	Southeast	6	968	790	436
Southeast Fairbanks Census Area	Yukon-Koyukuk/Upper Tanana	8	7,029	2,628	2,567
Valdez-Cordova Census Area	Copper River/Chugach	6	9,636	1,388	3,966
Wade Hampton Census Area	Lower Yukon-Kuskokwim	8	7,459	4,767	1,745
Wrangell City and Borough	Southeast	6	2,369	2,419	1,053
Yakutat City and Borough	Southeast	6	662	843	270
Yukon-Koyukuk Census Area	Yukon-Koyukuk/Upper Tanana	8	5,588	320	2,217
	Total Alaska		710,231	326,194	258,058

Source: U.S. decennial census, Alaska Dept of Labor and Workforce Development (AKDOLWD)

Table 2. Estimated gasoline and diesel motor fuel use by region (gallons)

	Gasoline		Diesel motor fuel	
Census Area	Individuals	Business & Govt	Individuals	Business & Govt
Aleutians East Borough	370,298	246,865	201,979	471,284
Aleutians West Census Area	811,576	541,050	442,674	1,032,906
Anchorage Municipality	71,871,322	47,914,215	39,202,201	91,471,801
Bethel Census Area	3,114,388	2,076,259	1,698,743	3,963,733
Bristol Bay Borough	283,248	188,832	154,498	360,494
Denali Borough	539,711	359,807	294,385	686,899
Dillingham Census Area	1,046,611	697,741	570,874	1,332,039
Fairbanks North Star Borough	24,401,510	16,267,673	13,309,799	31,056,199
Haines Borough	769,390	512,927	419,664	979,215
Hoonah-Angoon Census Area	611,360	407,573	333,466	778,088
Juneau City and Borough	8,160,621	5,440,414	4,451,210	10,386,156
Kenai Peninsula Borough	14,839,380	9,892,920	8,094,138	18,886,321
Ketchikan Gateway Borough	3,552,318	2,368,212	1,937,611	4,521,093
Kodiak Island Borough	3,100,326	2,066,884	1,691,072	3,945,836
Lake and Peninsula Borough	370,298	246,865	201,979	471,284
Matanuska-Susitna Borough	21,309,888	14,206,592	11,623,475	27,121,442
Nome Census Area	1,884,972	1,256,648	1,028,157	2,399,034
North Slope Borough	1,358,653	905,768	741,077	1,729,179
Northwest Arctic Borough	1,284,995	856,663	700,900	1,635,434
Petersburg Census Area	1,070,717	713,812	584,023	1,362,720
Prince of Wales-Hyder Census Area	1,469,139	979,426	801,342	1,869,798
Sitka City and Borough	2,373,792	1,582,528	1,294,784	3,021,164
Skagway Municipality	291,953	194,635	159,246	371,573
Southeast Fairbanks Census Area	1,718,907	1,145,938	937,577	2,187,680
Valdez-Cordova Census Area	2,655,701	1,770,467	1,448,551	3,379,953
Wade Hampton Census Area	1,168,482	778,988	637,348	1,487,145
Wrangell City and Borough	705,107	470,071	384,600	897,401
Yakutat City and Borough	180,797	120,531	98,615	230,103
Yukon-Koyukuk Census Area	1,484,541	989,694	809,742	1,889,399
Total Alaska	172,800,000	115,200,000	94,253,731	219,925,373
	total gasoline	288,000,000	*total diesel*	314,179,104

Source: EIA State Energy Data System, allocations to regions by authors based on relative population.

Table 3. Estimated heating fuel use in buildings by region (gallons)

	Heating Fuel for Buildings	
Census Area	Individuals	Business & Govt
Aleutians East Borough	614,073	579,113
Aleutians West Census Area	1,208,004	1,139,230
Anchorage Municipality	2,199,973	2,074,723
Bethel Census Area	3,605,491	3,400,222
Bristol Bay Borough	500,391	471,902
Denali Borough	484,270	456,700
Dillingham Census Area	1,664,083	1,569,343
Fairbanks North Star Borough	25,855,554	24,383,534
Haines Borough	1,030,616	971,940
Hoonah-Angoon Census Area	750,541	707,810
Juneau City and Borough	9,460,327	8,921,728
Kenai Peninsula Borough	8,190,586	7,724,276
Ketchikan Gateway Borough	4,338,797	4,091,778
Kodiak Island Borough	4,324,799	4,078,577
Lake and Peninsula Borough	570,813	538,315
Matanuska-Susitna Borough	6,295,798	5,937,363
Nome Census Area	2,286,870	2,156,673
North Slope Borough	2,207,394	2,081,722
Northwest Arctic Borough	1,522,794	1,436,097
Petersburg Census Area	1,198,088	1,129,878
Prince of Wales-Hyder Census Area	1,470,291	1,386,583
Sitka City and Borough	2,763,607	2,606,268
Skagway Municipality	417,879	394,088
Southeast Fairbanks Census Area	1,480,105	1,395,839
Valdez-Cordova Census Area	3,387,801	3,194,925
Wade Hampton Census Area	1,254,270	1,182,861
Wrangell City and Borough	603,424	569,070
Yakutat City and Borough	279,730	263,804
Yukon-Koyukuk Census Area	1,035,484	976,531
Total Alaska	91,001,854	85,820,896
	total heating oil use:	176,822,750

Source: Author calculations based on AEA *Alaska End Use Study*, AHFC Alaska Retrofit Information System (ARIS), PCE monthly consumption data, and U.S. Census.

Table 4. Estimated direct industrial diesel fuel use by region (gallons)

Census Area	diesel fuel for direct industrial use
Aleutians East Borough	665,033
Aleutians West Census Area	1,283,972
Anchorage Municipality	51,063,597
Bethel Census Area	2,287,367
Bristol Bay Borough	474,308
Denali Borough	613,594
Dillingham Census Area	863,775
Fairbanks North Star Borough	13,032,781
Haines Borough	342,370
Hoonah-Angoon Census Area	231,142
Juneau City and Borough	6,031,394
Kenai Peninsula Borough	6,492,675
Ketchikan Gateway Borough	2,438,010
Kodiak Island Borough	2,143,070
Lake and Peninsula Borough	262,205
Matanuska-Susitna Borough	6,781,268
Nome Census Area	1,282,302
North Slope Borough	4,659,575
Northwest Arctic Borough	959,973
Petersburg Census Area	556,811
Prince of Wales-Hyder Census Area	641,318
Sitka City and Borough	1,454,656
Skagway Municipality	263,876
Southeast Fairbanks Census Area	877,804
Valdez-Cordova Census Area	463,619
Wade Hampton Census Area	1,592,272
Wrangell City and Borough	807,994
Yakutat City and Borough	281,579
Yukon-Koyukuk Census Area	106,886
Total Alaska	108,955,224

Notes: Includes fish processors, power generation, and other stationary sources.
Source: EIA State Energy Data System; regional allocation based on employment.

Spending on gasoline and heating fuel from 2001-2010

The following table shows total expenditures by Alaskans on heating fuel, gasoline, and diesel motor fuel. All dollar amounts are adjusted for inflation using the Anchorage Consumer Price Index. Individual expenditures per capita for heating fuel are based on the estimate that 40% of the total heating demand is met by oil. The table also includes expenditures on diesel by industry for stationary source uses, a category that may include some electric power self-generation.

Table 5. Expenditures on heating fuel and gasoline, 2001-2010

Real year 2010 dollars

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total population	633,714	642,337	648,414	659,286	666,946	675,302	680,300	687,455	698,895	714,146
Population using oil as primary heat	253,486	256,935	259,366	263,714	266,778	270,121	272,120	274,982	279,558	285,658
Total expenditures (2010$ million)	1,379	1,136	1,196	1,847	2,090	2,478	2,473	3,184	2,597	2,808
Individuals										
Heating Fuel	179	113	121	171	215	289	224	258	222	259
Gasoline	294	275	306	390	444	482	508	613	476	567
Diesel Motor fuel	135	115	116	236	254	307	302	396	338	320
Business & Govt										
Heating fuel	102	62	55	85	98	129	110	189	110	232
Gasoline	196	184	204	260	296	321	339	409	317	378
Diesel motor fuel	315	268	270	550	594	717	705	924	789	747
Diesel for industry (incl elec. power)	159	118	124	155	190	234	285	395	344	306
Individual expenditures per capita ($)										
Heating fuel	706	441	466	647	805	1,069	824	937	795	907
Gasoline & diesel motor fuel	677	608	650	950	1,047	1,168	1,191	1,468	1,165	1,242
Per capita personal income (2010$)	40,542	40,912	40,409	40,955	41,917	42,861	44,485	46,140	43,471	43,749
Individual expenditures as % of per capita personal income										
Heating fuel	1.7%	1.1%	1.2%	1.6%	1.9%	2.5%	1.9%	2.0%	1.8%	2.1%
Gasoline & diesel motor fuel	1.7%	1.5%	1.6%	2.3%	2.5%	2.7%	2.7%	3.2%	2.7%	2.8%

Source: U.S. decennial Census, American Community Survey, EIA State Energy Data System.

2. Reducing the Price of Gasoline and Heating Fuel in Alaska

In this section, we first present historical data on Alaska fuel prices with comparisons to Washington and Hawaii. We then consider the components of the Alaska prices and analyze whether any of these components can be reduced through action by the State.

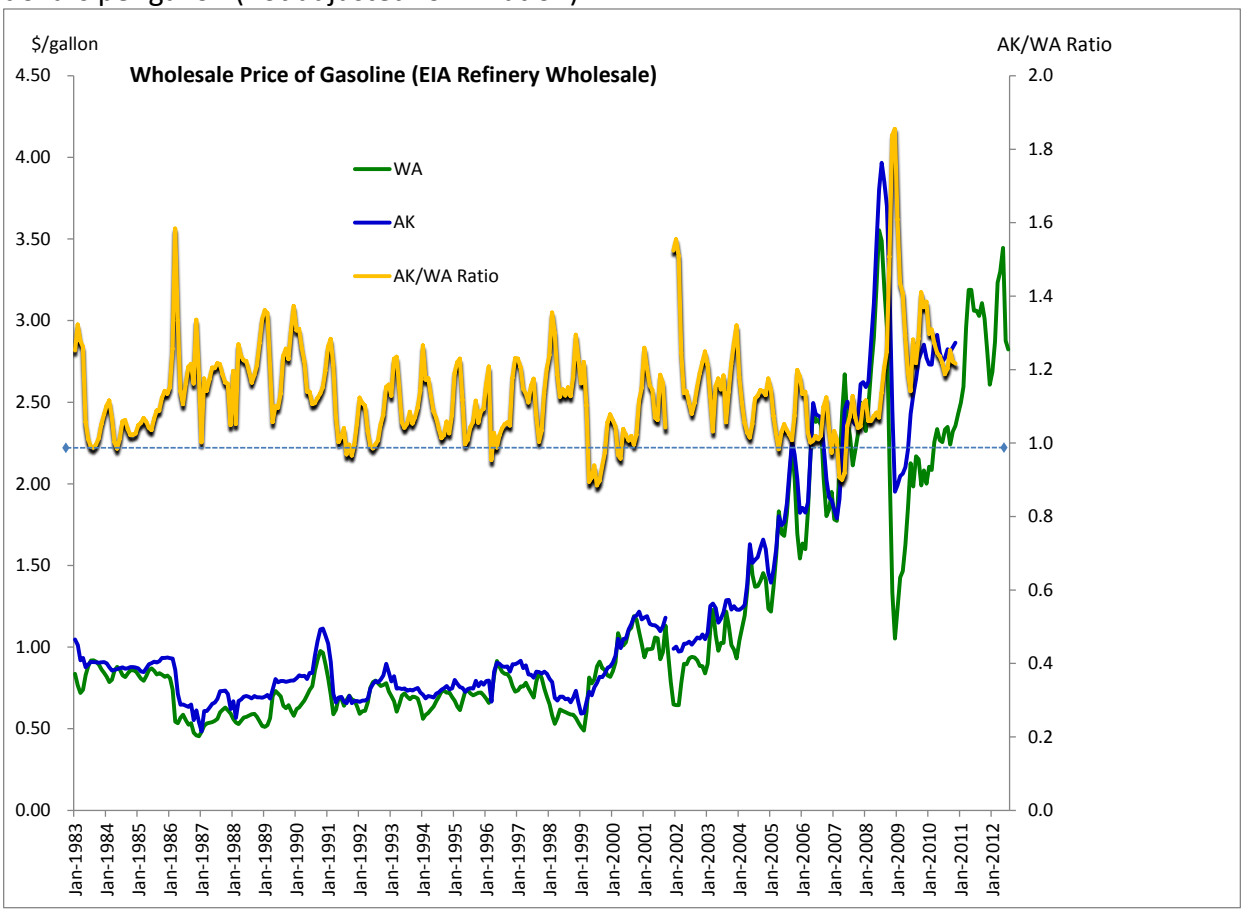
Price comparisons over past 20 years: Alaska vs. Washington and the U.S.

Wholesale prices

The following figures show wholesale prices (measured at Washington and Alaska refineries) for gasoline, heating fuel, and jet fuel. Jet fuel is used as a comparison because the Alaska and Washington prices have tracked together very closely during the past ten years and the ratio of AK to WA has been trending downward and is very close to 1.0. As we discuss in other parts of this report, we believe the Alaska jet fuel market may be more competitive relative to Alaska's heating fuel and gasoline markets due to more suppliers and more market power possessed by coordinated buyers acting in a group.

Figure 1. Wholesale gasoline prices, 1983-2012

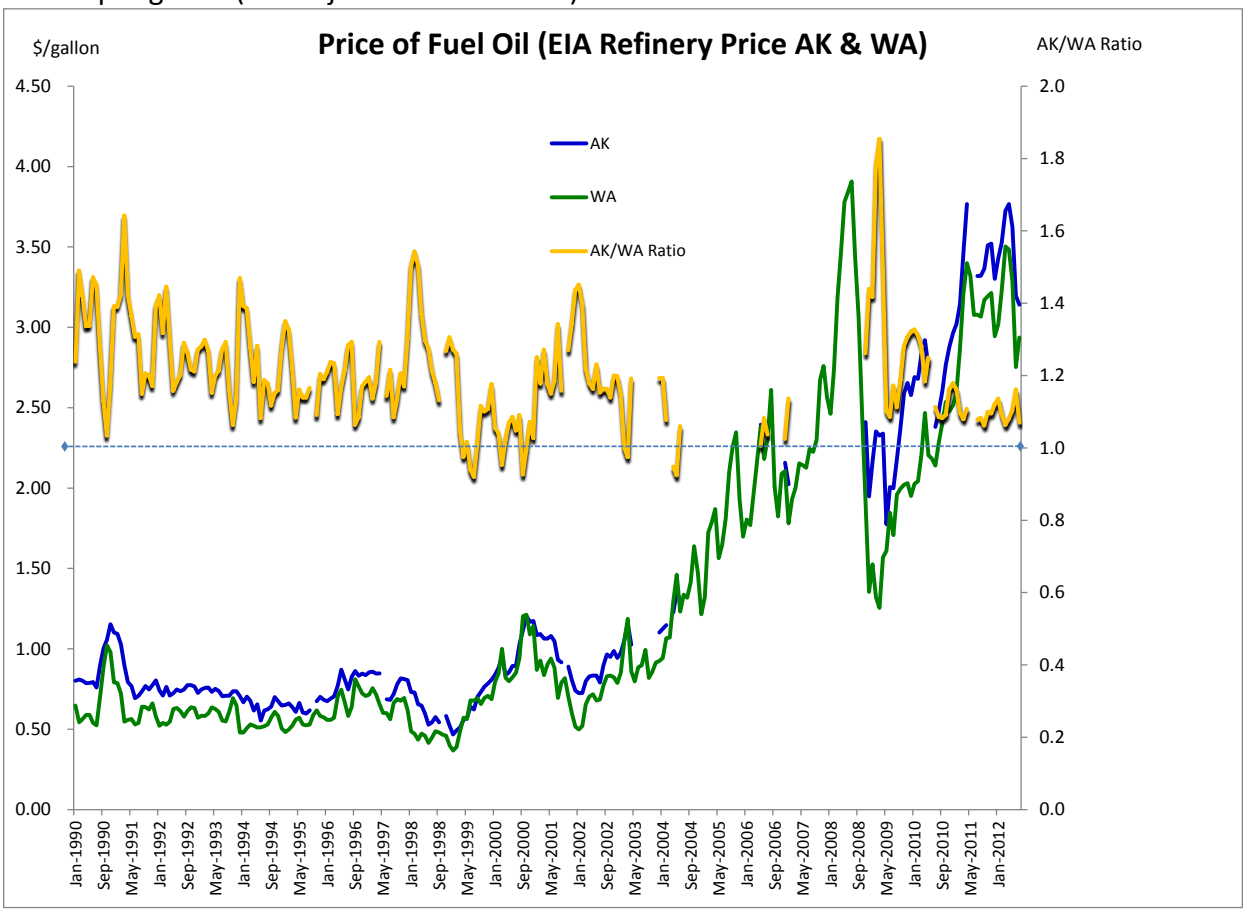
dollars per gallon (not adjusted for inflation)



Source: EIA

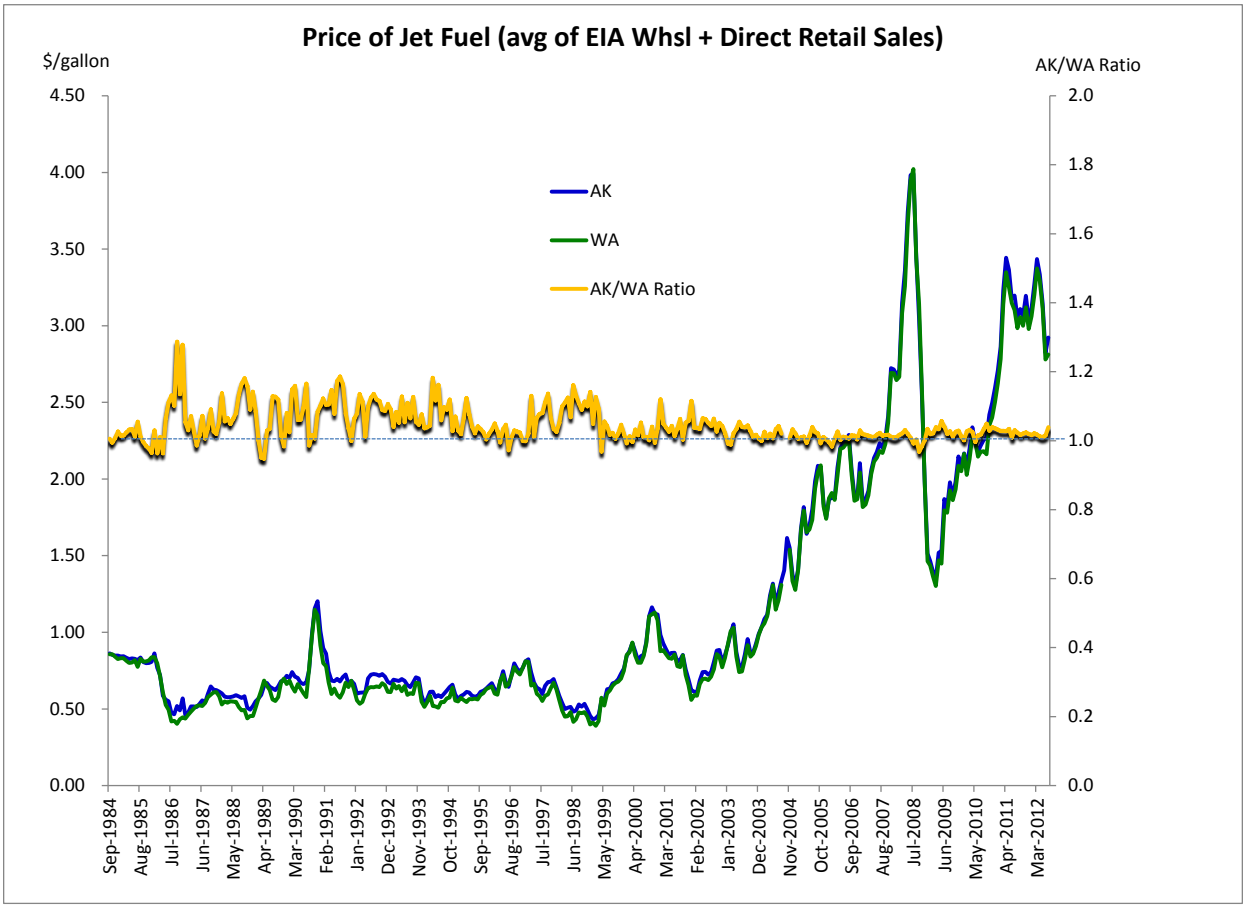
Figure 2. Wholesale heating fuel prices: AK vs. WA, 1990-2012

dollars per gallon (not adjusted for inflation)



Source: EIA.

Figure 3. Wholesale jet fuel Prices: AK vs. WA, 1984-2012



Source: EIA

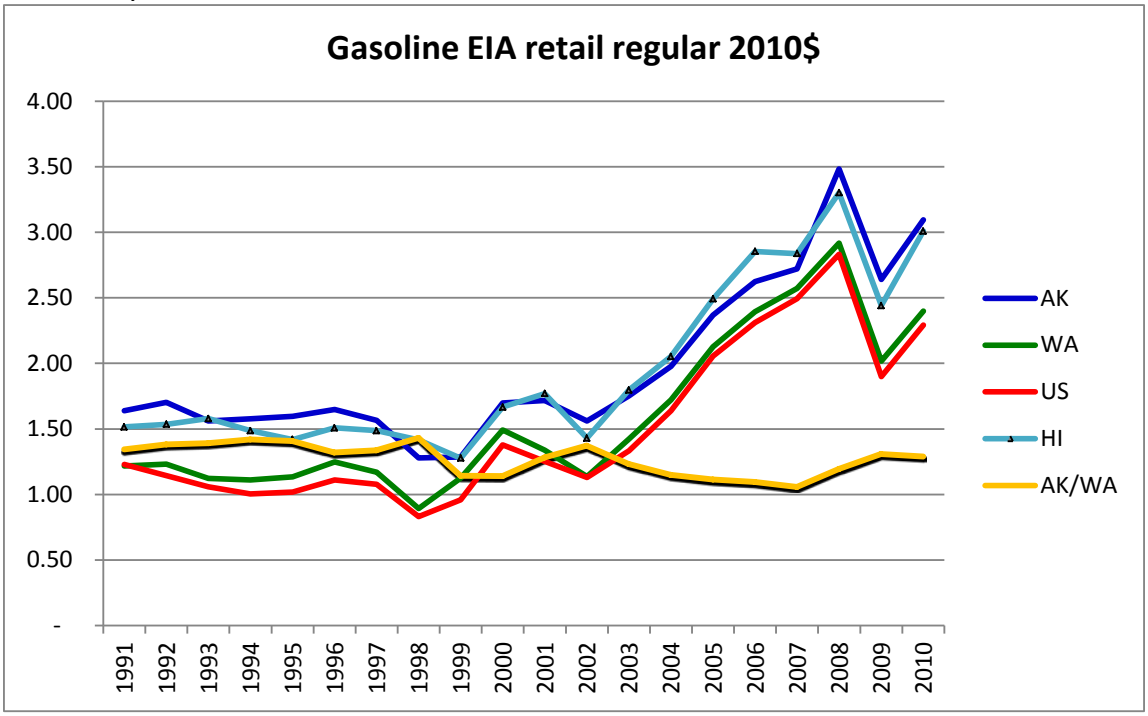
Retail prices

The following two graphs show retail gasoline and heating fuel prices in constant year 2010 dollars. We have included Hawaii as a comparison state for gasoline prices because it shares some characteristics with Alaska such as relatively small market size and distance to major refiners.

It is critical to remember that these are weighted average prices with the weights determined by population. Many, if not most, communities in Alaska have faced and still do face higher prices than these averages, which are dominated by Anchorage, Mat-Su, and Kenai values.

Figure 4. Retail gasoline prices: AK, WA, HI, US, 1991-2010

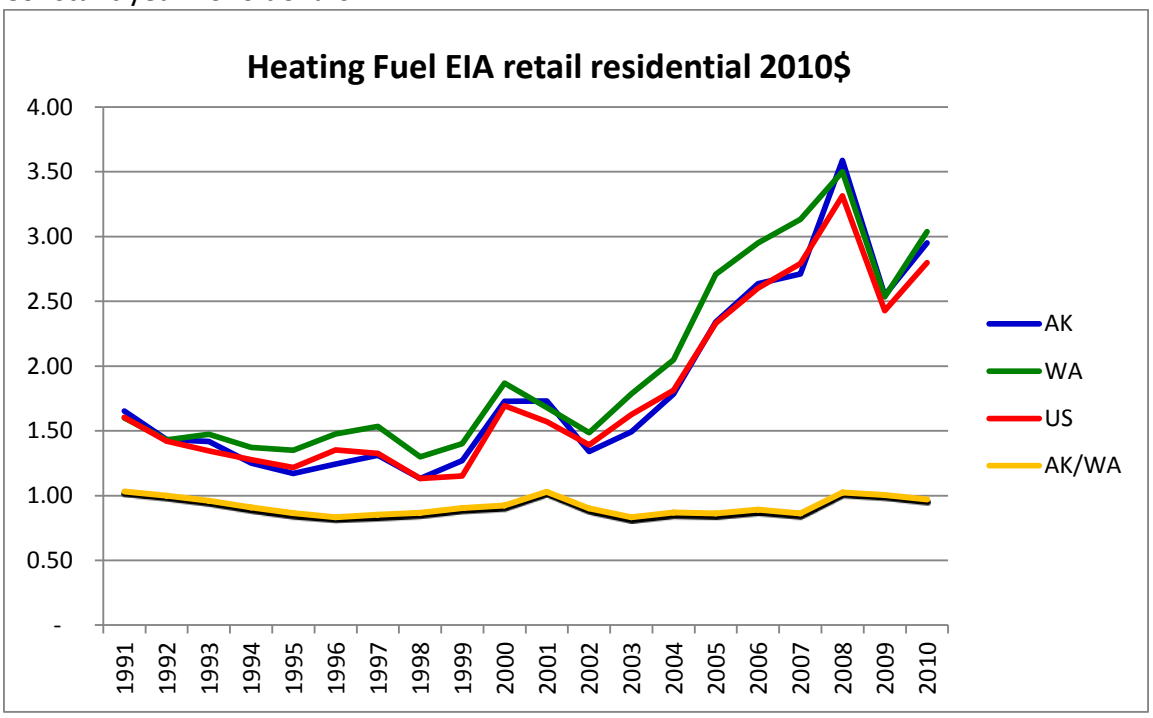
Constant year 2010 dollars



Source: EIA

Figure 5. Retail heating fuel prices: AK, WA, US

Constant year 2010 dollars



Source: EIA

Understanding the Components of the Price of Gasoline

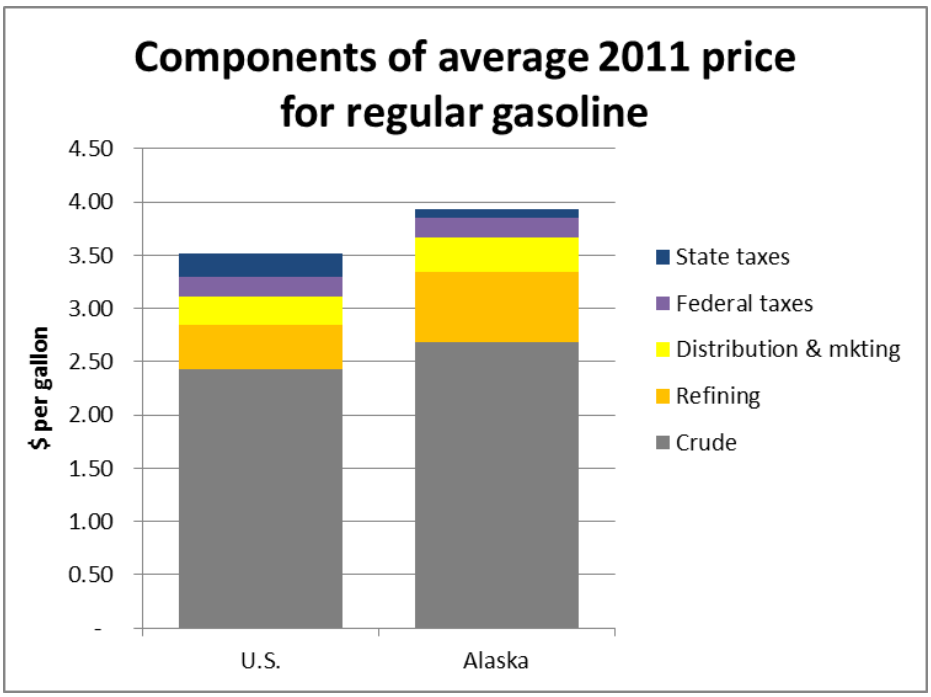
As a basis for assessing whether the price of fuel can be lowered in Alaska, it is important to first understand the components that go into the price of fuel and which of these components can be managed by government policy or increased competition.

The main components of the retail price of refined gasoline delivered to a filling station in a local community include the following:

- The cost of crude oil
- Refining costs and profits
- Distribution and marketing costs and profits
- Taxes

Our estimates of these components for the year 2011 for both the U.S. and for Alaska are shown in Figure 6 and Table 6.

Figure 6. Components of average U.S. and Alaska gasoline prices for 2011



source: Author calculations. Data from: Energy Information Administration, Alaska DOR, OPIS

Table 6. Components of average U.S. and Alaska gasoline prices for 2011

dollars per gallon for regular grade

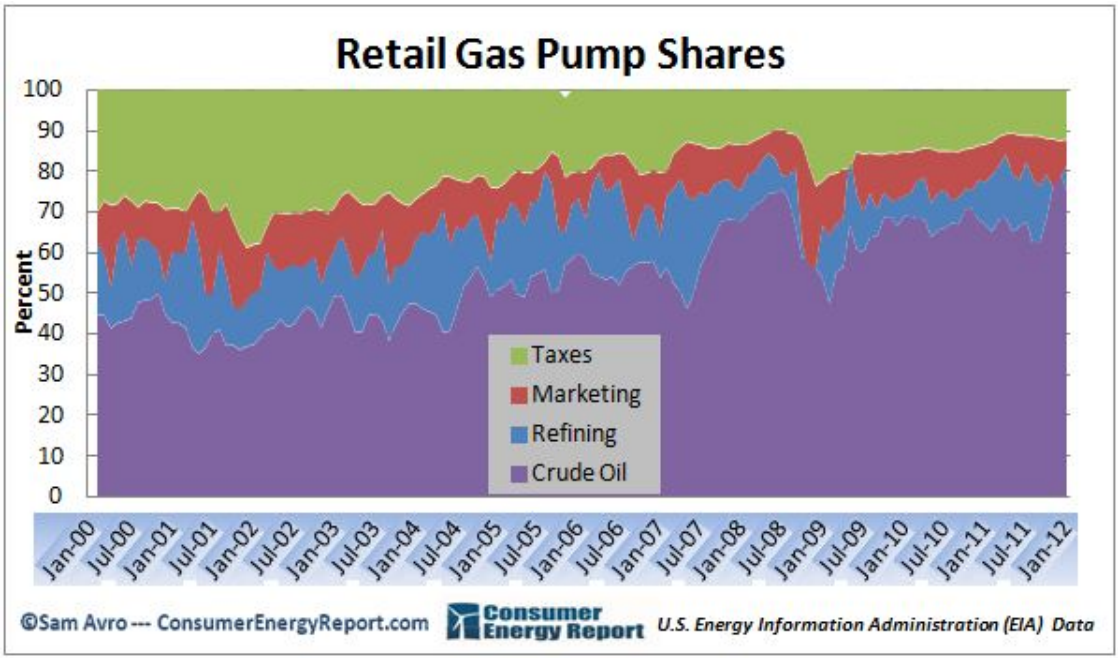
	U.S.		Alaska	
	$/gal	%	$/gal	%
Retail price	3.52		3.93	
Crude	2.43	69%	2.68	68%
Refining	0.42	12%	0.66	17%
Distribution & mkting	0.26	7%	0.33	8%
Federal taxes	0.18	5%	0.18	5%
State taxes	0.23	7%	0.08	2%

source: Author calculations. Data from: Energy Information Administration, Alaska DOR, OPIS

Crude oil price set on the world market is the single biggest component of the price of gasoline

The single biggest component of the price of gasoline is the cost of the crude oil from which it is made. This may be a surprising fact for some because it is a relatively new reality: When crude oil cost $12 per barrel in 1998, the contribution of crude to gasoline prices was only 31 cents per gallon. As the cost of crude has risen dramatically in recent years, its share of the cost of retail gasoline has also risen. In 2000, crude accounted for just over 40% of the price of retail gasoline; in 2011 crude priced at $2.43 per gallon accounted for about 70% of the cost of retail gasoline.

Figure 7. Increasing share of crude oil in average U.S. retail gasoline prices



http://www.consumerenergyreport.com/2012/03/21/what-makes-up-the-cost-of-a-gallon-of-gasoline/

The cost of crude is determined in the world market. Crude oil prices are determined by both supply and demand factors. On the demand side, world economic growth is the biggest factor. While the U.S. and Europe suffered a recession that depressed oil demand there, developing countries like China and India continued to grow, leading to overall growth in world demand. One of the major factors on the supply side is the Organization of the Petroleum Exporting Countries (OPEC), which can sometimes exert significant influence on prices by setting an upper production limit on its members, which produced about 43% of the world's crude oil in 2011. Oil prices have often spiked in response to disruptions in the international and domestic supply of crude oil.

Taxes add to the price of gasoline – But Alaska has the lowest in the nation

On average, federal, state, and local government taxes are the second-largest part of the retail price of gasoline. However, Alaska has the lowest state taxes in the country at only 8 cents per gallon. The next lowest is Wyoming at 14 cents per gallon. New York residents pay the highest taxes of 49 cents per gallon. Federal excise taxes – which fund highway construction -- are currently 18.4¢ per gallon. [3] Alaska temporarily suspended its gasoline tax from September 2008 through August 2009 under a bill championed by Governor Sarah Palin.

Refining and other price components

Refining costs and profits vary from region to region of the United States, partly due to the different gasoline formulations required in different parts of the country. Other factors include the economies of scale of the size of refineries and the input costs of labor and energy. These are examined further later in this report.

Distribution, marketing, and retail dealer costs, as well as profits make up the remainder of the retail price of gasoline. Some retail outlets are owned and operated by refiners, while others are independent businesses that purchase gasoline from refiners and marketers for resale to the public.

In Alaska, Tesoro owns 31 retail "2Go" stations and has branding agreements with an additional 47 independently-owned retailers.[4] Holiday Station Stores, a convenience store operator based in Minnesota, sells gasoline through 25 Holiday-branded outlets.[5] The price on the pump includes the retailer's cost to purchase the finished gasoline and the costs of operating the service station. It also reflects local market conditions and factors, such as the desirability of the location and the marketing strategy of the owner.

The cost of doing business by individual dealers can vary greatly depending on where the dealer is located. These costs include wages and salaries, benefits, equipment, lease/rent, insurance, overhead, and state and local fees. Even retail stations next to each other can have different

[3] State Gasoline Tax Rates as of January 2012, Tax Foundation, http://taxfoundation.org/article/state-gasoline-tax-rates-january-1-2012

[4] http://www.tsocorp.com/stellent/groups/public/documents/documents/alaskafact.pdf

[5] http://www.holidaystationstores.com/StoreLocator.aspx#states

traffic patterns, rents, and sources of supply that affect their prices. The number and location of local competitors can also affect prices.

Shouldn't gas be cheap here if we produce so much oil?

While some Alaskans may complain about the high cost of gasoline at the pump, people in some other oil-rich countries enjoy cheap gas thanks to direct government subsidies. The world's ten cheapest places to buy gasoline include many of the top oil producers, who can afford to heavily subsidize fuel down to the following pump prices per gallon: Venezuela- 18 cents, Saudi Arabia – 48 cents, Libya – 54 cents, Turkmenistan – 72 cents (plus 34 gallons free gas per month), Bahrain – 78 cents, Kuwait – 84 cents, Qatar – 90 cents, Egypt – $1.14, Oman, $1.20, and Algeria - $1.20. Many of these subsidies are expensive. For example, Saudi Arabia spends $13.3 billion per year – about $500 per capita -- on gasoline and diesel subsidies. In some cases, past political unrest associated with changes to these subsidies dissuades governments from removing or changing them.[6]

By contrast, Norway, a major oil producer, has the world's most expensive gas prices at $10.12/ gallon. [7]

Differences in Fuel Prices between Alaska and Washington

We calculated the difference between Alaska and Washington prices for jet fuel, gasoline, and heating fuel. (See Figures 1-5 above; Figure 4 also includes a comparison to Hawaii). As referenced earlier, fluctuating crude oil prices are the dominant factor in changes to prices for these refined products. Price for all three products spiked in price following spikes in crude oil prices, but behaved differently relative to Washington prices.

In 2008, there was an unprecedented spike in crude oil prices which set off increases in prices for refined products. Oil prices increased from $85 per barrel in February 2008 to a record high of nearly $145 per barrel in July. Gasoline prices reached record highs in every state, including Alaska, in the summer of 2008. There is much debate among analysts on the cause of this unprecedented crude oil spike. Following this, there was an unprecedented drop in crude prices which fell to under $30 per barrel by December 2008.

While fuel prices rose quickly in conjunction with the crude oil price spike, fuel prices were slower to decline in conjunction with falling crude oil prices. This phenomenon is known among economists as "asymmetric price adjustment". Again, there is much disagreement among analysts as to why prices tend to fall more slowly than they rise.[8]

[6] http://www.csmonitor.com/World/2012/0229/World-s-cheapest-gas-Top-10-countries/Venezuela-0.18-per-gallon-0.05-per-liter

[7] http://www.bloomberg.com/slideshow/2012-08-13/highest-cheapest-gas-prices-by-country.html#slide2

[8] Federal Trade Commission – Bureau of Economics – Gasoline Price Changes and the Petroleum Industry: An Update, September 2011.

Figure 8. Monthly and daily crude oil prices, 2000-2012

Source: New York Mercantile Exchange prices for West Texas Intermediate since 2000, monthly overlaid on daily prices showing daily variation.

It is instructive to look at how prices for jet fuel, gasoline, and heating fuel tracked during this period of crude price volatility. We found that for gasoline and heating fuel, Alaska wholesale prices rose similarly to Washington prices along with increases in crude oil costs. But when crude oil costs declined, Alaska prices were slower to come down than Washington prices. For jet fuel, however, Alaska and Washington prices tracked each other closely both when prices rose and fell.

During 2000-2005, wholesale Alaska prices for gasoline and heating fuel dipped below prices in Washington several times. But, in 2009-2010, prices for these same products soared in Alaska and exceeded Washington prices by 50 cents per gallon or more (
Figure 1 and Figure 2).

Retail gasoline prices behaved differently. Alaska retail prices for gasoline were consistently higher than Washington prices, but have been falling and are now close to the same price in urban areas for both states (Figure 4). As of January 25, 2013, the average retail price reported on www.gasbuddy.com was 8 cents lower in Anchorage than in Seattle.[9] Average retail prices for heating fuel were almost always lower in Alaska than in Washington state during 2000-2010 (Figure 5).

Throughout this same period, the difference in price for jet fuel varied far less and was never more than 10 cents per gallon higher in Alaska than in Washington. For jet fuel, Alaska prices closely track Washington prices both when crude oil costs go up and down. More interestingly, the difference in price for jet fuel prices is far smaller and less volatile than the difference in prices between Alaska and Washington for gasoline and heating fuel (Figure 3).

[9] www.anchoragegasprices.com ($3.492) and www.seattlegasprices.com ($3.407).

Are competitive jet fuel prices associated with bulk buying, storage, and competition?

An important question for policy makers is whether there are elements of Alaska's jet fuel market and infrastructure that can be used as a model for moderating price levels and price differentials for gasoline and heating fuel.

The relative stability of jet fuel prices is a function of a relatively deep and liquid market. There are several high-volume buyers, mainly at the Anchorage International Airport, who have several options - including buying from the in-state refineries and/or importing a range of volumes from the lower 48 or from Asia at different times of the year to place into local storage. It is the combination of buying in large enough quantities to demand a fair price and having the storage to accommodate large buys that helps keep Alaska jet fuel prices stable.

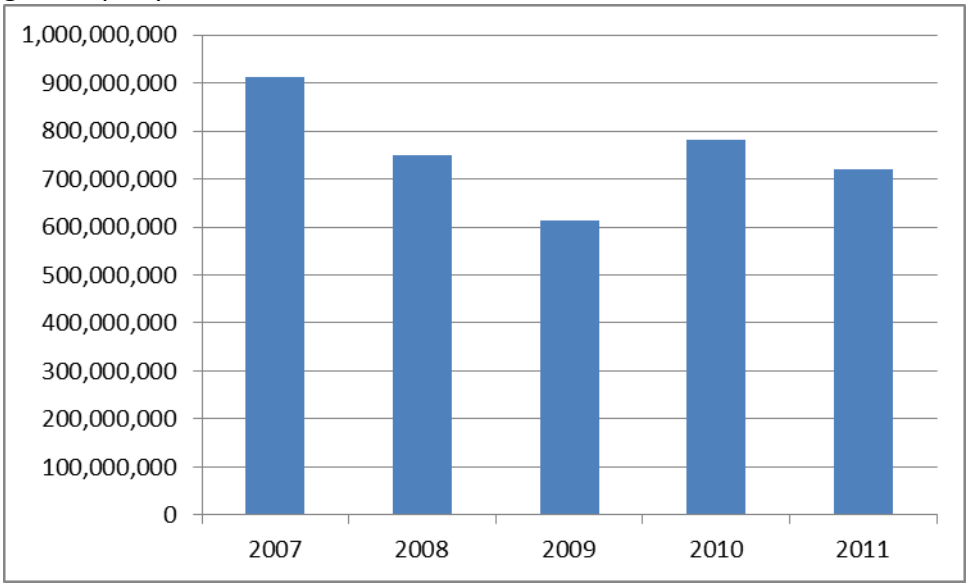
Our analysis of the jet fuel market shows that the buyers, airlines operating from the Anchorage International Airport, have taken steps to diversify their choices of where and when to buy jet fuel. Many of these changes may have been precipitated by cutbacks on jet fuel production at the Flint Hills refinery during the recession.

A consortium of approximately 19 airlines (both passenger and freight) coordinates on infrastructure to deliver and store jet fuel at the airport. The consortium works with Aircraft Services International Group (ASIG), which operates the hydrant system that distributes the fuel. The airlines do not necessarily coordinate on fuel buying. Each airline has its own contracts with multiple fuel providers. Each contract may be for a different price. This is all proprietary information not made available to the airport, which is managed by the state. The consortium also does not tell the airport what each airline pays to belong to the consortium.

In 2006/2007, jet fuel use at the Anchorage airport approached 1 billion gallons per year (about 2.7 million gallons per day or 65,000 barrels per day (bpd)). Use dropped to approximately 625 million gallons per year during the recession and has since rebounded to about 700 million gallons/year (45,000 bpd).

Figure 9. Jet fuel consumption at Ted Stevens Anchorage International Airport

gallons per year

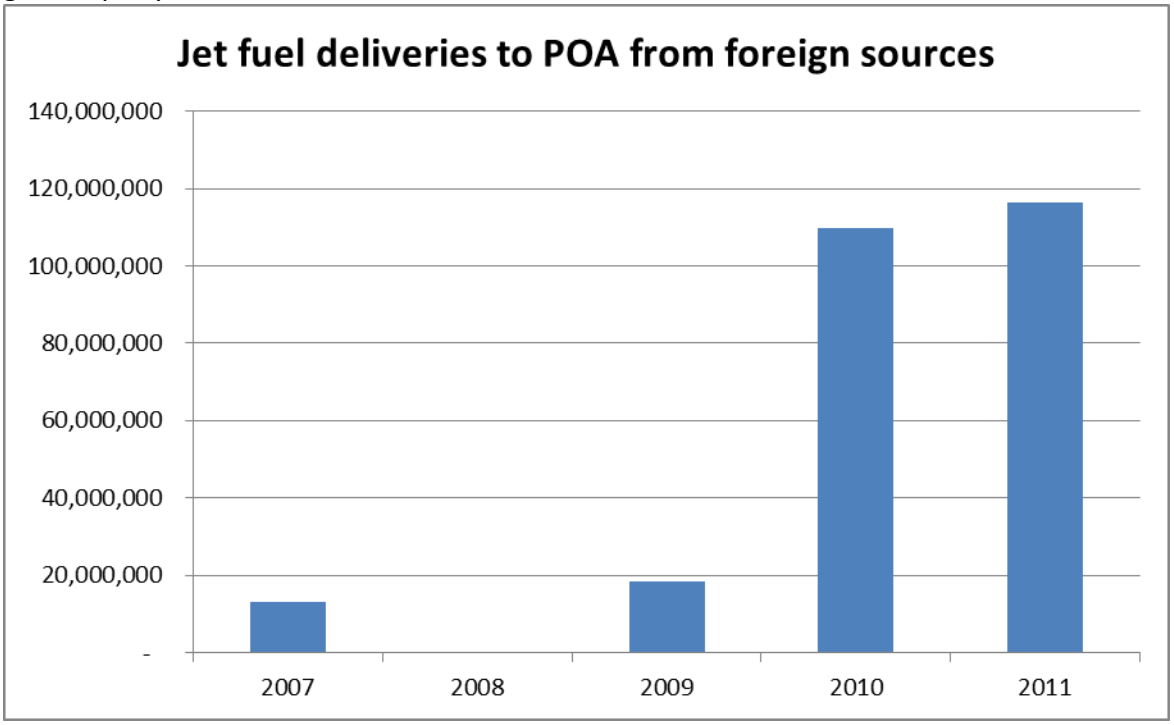


source: Mr. John Parrott, Airport Manager, State of Alaska International Airport System

When jet fuel demand dropped during the recession, the Flint Hills refinery in North Pole cut production and shut down its Tower #3. Soon thereafter in 2009, jet fuel demand began to increase by tens of millions of gallons. Flint Hills did not restart Tower #3, so the air carriers faced a fuel shortage and the Anchorage airport was losing business as flights were serviced at other airports. The State of Alaska and the Coast Guard worked quickly to get spill contingency plans approved for additional tankers so that more tankers could be approved to deliver fuel to the Port of Anchorage to meet the post-recession demand not being served by Flint Hills. The resulting increase in jet fuel imported from foreign sources is shown in Figure 10.

Figure 10. Jet fuel deliveries from foreign sources to the Port of Anchorage

gallons per year



Source: Stephen Ribuffo, Deputy Director, Port of Anchorage, data supplied December 28, 2012.

Since the largest and most cost-efficient tankers making international deliveries hold 14 million gallons (33,000 bbl) of jet fuel, the airport consortium needed additional storage to handle these large increments of fuel. Airport jet fuel storage was expanded by eighty percent in October 2012. The consortium built 16 million gallons of additional storage at the airport, bringing total storage capacity up to 36 million gallons (857,000 barrels). The consortium consulted with AIDEA regarding financing, but decided to finance the new storage privately.

A significant question thus arises: Could the state create this same competitive market environment for gasoline and heating fuel by encouraging larger volume buying of these fuels by independent distributors or retailers; by increasing storage capacity for these fuels, especially in urban areas; or some combination of these approaches?

Table 1 above showed that total gasoline use in Alaska is slightly less than 300 million gallons per year, or about one half of the jet fuel usage at the Anchorage airport. That amount could be supplied by 20 full tankers, and one tanker load could supply 18 days worth of statewide consumption. At first blush, therefore, storage capacity of between 20 and 30 million gallons (between about 500,000 and 700,000 barrels) would be needed in order for independent buyers to be able to order fuel in the most cost-efficient quantities. By comparison, Central Alaska Energy (an affiliate of Vitus Marine) is currently developing 5 million gallons of fuel

storage capacity at Port MacKenzie,[10] and total current fuel storage capacity at the Port of Anchorage is about 118 million gallons.[11] Smaller tankers of the "handysize" class, with capacity of about 2 million gallons (48,000 bbl) can also bring petroleum products from U.S. ports to Anchorage.[12]

Prices could be lowered with more storage controlled by independent buyers in two ways. First, additional buyers might seek, find, purchase, and import lower-priced fuel into Alaska. Second, the mere **ability** of independent buyers to do this could create a credible threat that would have to be met by in-state refiners offering similarly low prices. In other words, the price of fuel imported by the full tanker-load and stored for days or weeks would provide market discipline similar to that seen in the jet fuel market.

It is important to recognize that any increases in actual fuel imports would cut into sales volumes from Alaska refineries. Alternatively, even if volumes were not reduced, profits could be reduced if lower prices were "enforced" by the threat of imports. Local refineries would still have to absorb their fixed costs regardless of reduced demand for their product. It is hard to know how much either reduced prices or reduced volumes would impact their economic viability. In addition, a reduction in sales of locally refined products could lead to reduced business for current transporters of these products such as the Alaska Railroad.

Alaska's refineries and the challenges of economies of scale

To date, Alaska refineries have been sized smaller to produce primarily for the local Alaska market. While Alaska consumes 3.5 times of petroleum products per capita as the national average, and has significant demand from air carriers and the military, the overall volume used in Alaska is still relatively small. The distance to larger consumer markets for Alaska refineries creates a disadvantage of additional transportation costs for any exported refined products. Indeed, because refined products are more expensive to transport by tanker than crude oil, it has never been cost effective for Alaska's refineries to produce products for export. Export volume is necessary for local refineries to realize economies of scale. Thus, although Alaska has a history of considering larger, world class refineries based in Alaska, none have met the economic test to move forward. Since most Alaska oil producers also have their own, large refineries on the West Coast that are scaled more economically, they choose to ship their produced crude to their own refineries.

Many of the costs described above relate to the disadvantages of economies of scale for Alaska refineries versus larger refineries in the lower 48 and overseas. The relative small size of Alaska refineries gives them a less favorable economy of scale which drives up the cost of each gallon of fuel produced.

[10] *Alaska Journal of Commerce*, September 6, 2012.
[11] Steve Ribuffo, Port of Anchorage. Personal communication. December 2012.
[12] Northern Economics. 2008. Port of Anchorage Transportation Cost Comparison Study. Table Es-2 http://www.muni.org/Departments/port/TIGERIIBCA/2%20Cost%20Comparison%20Study.pdf

There is a tendency in the oil and chemical industries for larger plants to have lower unit costs for production, processing and transportation. For example, with petroleum refining the amount of steel in a refinery tank is proportional to its surface area which increases with the square of its dimensions, while the volume of fluids it can hold is proportional to the cube of its dimensions. In other words, in the case of tanks as part of a refinery's infrastructure, larger tanks cost less to build per gallon of fuel than smaller tanks. Likewise, increasing the size of a given piece of equipment does not necessarily require any increase in operating or supervisory manpower.

In both cases, fixed costs for infrastructure and manpower are lower per unit volume of product for a larger refinery. Following a common rule of thumb for sizing processing equipment and pipelines, doubling the size of a refinery can reduce the fixed cost per unit by close to 25%. [13] This gives larger refineries outside of Alaska a big advantage in producing cheaper fuel.

Are profit margins at Alaska refineries to blame for high Alaska fuel prices?

Refiner "margins" in Alaska (and elsewhere) are defined as the refiner's wholesale product price minus the price for Alaska North Slope (ANS) crude. Margins are best thought of as the gross revenues earned by the refinery itself -- they must be sufficient to cover both the operating and the capital costs of the refining enterprise. While refiner margins are higher in Alaska, the higher levels could be due to higher variable costs (in addition to the above-mentioned higher fixed costs per unit due to small scale of operations). According to Tesoro officials these higher variable costs include:

- higher crude costs as ANS crude is more expensive than West Texas Intermediate crude which is available to lower 48 refiners;
- higher energy and electricity costs to run refineries in Alaska;
- costs of heating incoming cold crude to the Flint Hills North Pole refinery;
- higher labor costs (approximately 30% higher than Washington); and
- higher fixed costs for infrastructure for both the refineries and retailers spread out across smaller volumes of sales.[14]

Alaska refinery margins stayed up after the crude oil price peak in 2008 relative to other markets because of a potential combination of factors, including:

- higher costs could have driven Alaska refineries to more aggressively test the market with higher prices in an attempt to harvest cash margins,

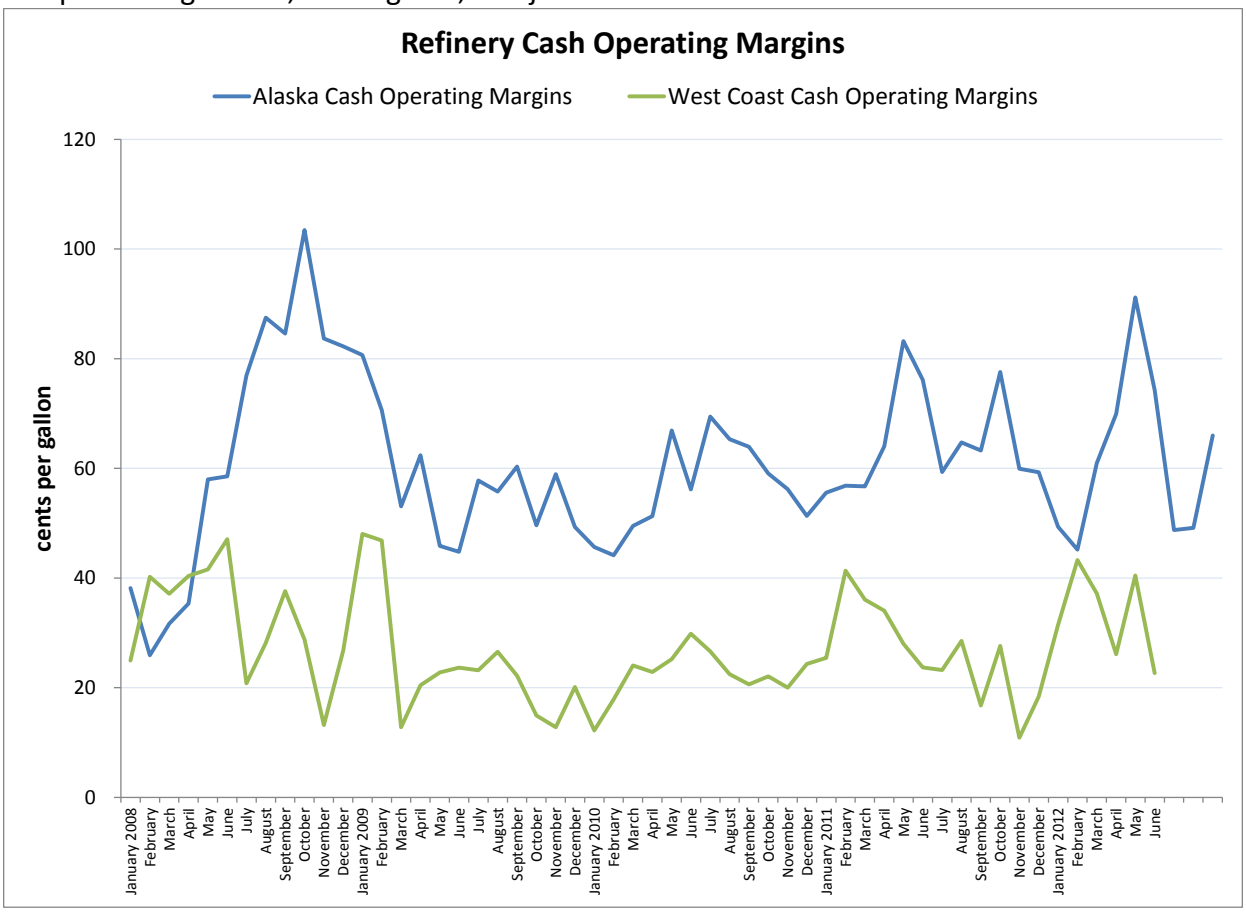
[13] Tussing, Arlon R. and Kramer, Lois S., Hydrocarbons Processing, A Primer for Alaskans, p. 131. Institute for Social and Economic Research, 1981.
[14] Testimony of James Tangaro, Vice President, Kenai Refinery and Jeff Cook, Flint Hills refinery before the Alaska Senate Energy Working Group, September 10, 2012.

- there was less competition in the Alaska market compared to prior periods. This might be a result of more product line differentiation driven by government regulation which required the addition of Ultra Low Sulfur Diesel as a new fuel. This, in turn, led to more seasonal opportunities to test the market and harvest higher margins. Some storage capacity for other fuels may have been reduced when some tank farm capacity was converted to Ultra Low Sulfur Diesel. A similar line of reasoning has been used to explain the increase in margins and prices in the midwest where biofuel requirements have created more differentiation in the market which creates more opportunities for short-term shortages to arise and and to be exploited by "margin hunters" who charge what the market will bear.

Alaska **may** now be facing a new, higher-margin regime compared to historical practice across all of the major product lines (jet fuel, gasoline and heating oil/diesel) offered by the in-state refineries. The following figure shows how Alaska refinery cash operating margins – the gross margin less estimated operating costs -- increased beginning in June 2008, but also suggests that they may have moderated during 2012.

Figure 11. Alaska vs. West Coast cash operating refinery margins, 2008 – June 2012

composite of gasoline, heating fuel, and jet fuel



Source: Authors' analysis of estimated crude oil refinery acquisition costs, OPIS product rack prices, and estimated costs for lower-48 refineries.

We do not have access to proprietary data to be able to directly observe whether similarly sized refineries in other states have larger or smaller cash operating margins. However, we can make some general observations about refinery margins elsewhere based on recent data that for a composite of refineries where "small" refineries are defined as having $27 million to $935 million in annual sales.[15]

It would appear that small refinery equity valuations have fallen significantly in the past year compared to the prior five years. The equity valuation multiples (the ratio of shareolder equity to annual sales) for the small refineries have fallen from 0.62 on a five year average to 0.11 in the latest data, below the median value of 0.39.

These data are consistent with industry comments that small refineries can not afford to stay in business and have been undergoing a sales cycle where prices are low as the industry "consolidates" in the face of declining demand for gasoline and a down profit market.[16]

The question that remains outstanding is the extent to which this logic can be applied to Alaska refineries. At first blush, it would appear that the Alaska refineries have increased their cash operating margins as market opportunities arose and may have created some operating margin headroom sufficient to allow them to continue to operate - especially balanced against the potential high cost of closure.

The next logical question is whether the size of those cash operating margins is reasonable under market circumstances. Unfortunately, there is insufficient evidence in the public record to make an informed judgment about that.

We have circumstantial evidence that Alaska refinery cash operating margins have grown, but in the absence of more detailed information, especially with respect to barriers to exit, it is not obvious that those margins exceed what might be awarded by a regulatory body that would be required to assess their risk-adjusted cost of capital and to determine a risk-adjusted cash operating margin.

Do any states have laws that prohibit price gouging? Could such a law lower gasoline prices in Alaska?

Questions about price gouging arise regularly. On November 27, 2012, six west coast senators asked the U.S. Justice Department to investigate allegations of possible market manipulation

[15] Ibbotson/Morningstar June 2012 data

[16] See, eg, Overturff, M. The Fifth Headwind: Will Moving Towards Energy Sustainability Really Inhibit Industrial Productivity Growth? IAEE *Energy Forum*, Winter 2013. Citing the declining demand for gasoline, Overturf states: "Since 2006, gasoline sales in the U.S. have been in a precipitous decline, causing unprecedented refinery closures."

and false reporting by West Coast oil refineries, which may have created a perception of a supply shortage following the shut down of one refinery.[17]

In the case of higher, sustained prices for Alaska gasoline, a 2009 Attorney General's investigation found "no evidence of collusion or other illegal antitrust behavior among Alaska's refiners, wholesale marketers or retailers to fix output or prices…the spread between Alaska gasoline prices and prices in the Lower-48 markets that began to widen during July 2008 is likely the result of market-related conditions in Alaska, combined with the unprecedented price volatility and uncertainty that occurred in crude oil markets during the year." [18] However, the small number of sellers probably is minimizing competitive pressure.

About 30 states have some form of price gouging laws. Alaska does not have a price gouging law of any kind. Most price gouging laws are triggered by a declared state of local or national emergency, such as a natural disaster. The laws then prohibit sales above the price ordinarily charged. In November 2012, New Jersey sued seven gas stations for alleged price gouging stemming from Superstorm Sandy.[19] A few states have price gouging laws that are triggered by "abnormal market disruption" or "market emergencies." However, if prices rise and they appear to do so due to market conditions, this would not be considered price gouging.[20]

Should the RCA regulate Alaska refinery gate prices?

It is not at all clear that existing federal statutes permit Alaska to regulate refineries, or if such regulation is constitutional. The following discussion leaves aside these questions to focus on economic and administrative issues.

RCA regulation of Alaska refineries could be difficult and expensive due to the differences between Alaska's two largest refineries: Flint Hills in North Pole and Tesoro in Nikiski. Whether an enterprise is regulated under a "Rate Base / Rate of Return" model or "Operating Margin Regulatory Model" depends on its business model and capital structure. Given that there appear to be material differences in business models between the two refineries, the burden of constructing a regulatory regime, either one for each or one for both, is problematic in so far as both regimes are likely to be expensive to create and sustain.

According to recent data, large enterprises with refineries have debt/equity ratios of 10-20%. However, small enterprise refineries have debt equity ratios of 60-80%.[21] Circumstantial evidence suggests smaller enterprise refineries, which would include Alaska refineries, might have high debt loads and therefore high margin requirements under rate base rate of return regulation. There would be the potential need to consider an Operating Margin Regulatory Model (OMRM).

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[17] http://www.cantwell.senate.gov/public/index.cfm/2012/11/6-west-coast-senators-urge-doj-to-investigate-western-gas-price-spikes

[18] 2008 Alaska Gasoline Pricing Investigation, Attorney General's Office, February 2009.

[19] http://www.northjersey.com/news/state/NJ_AG_files_suits_alleging_storm_price_gouging.html

[20] 2008 Alaska Gasoline Pricing Investigation, Attorney General's Office, February 2009.

[21] Ibbotson/Morningstar June 2012 data.

In the case of Flint Hills, it is conceivable that an operating margin or operating ratio might be more reflective of the business model and risks. This is the case if the refinery is relatively "simple" and the operating cost is large and volatile relative to current and future depreciation which is more typical of older smaller scale refineries that have been run hard, maintained, but not refreshed with new capital.

Tesoro-Nikiski, having recently invested in Ultra Low Sulfur Diesel capital equipment and potentially other new capital, might be regulated under the more traditional rate base / rate of return approach.

Individualized regulation is likely to be costly due to the need for customization. The regulation of the transport tariff, including quality bank, of the Trans Alaska Pipeline System (TAPS) is a case in point. It was extremely expensive to litigate and regulate due to the apparent need to create a "hybrid" regulatory model because the fundamental rate base rate of return model did not fit and the "quality bank" started using an old industry standard that quickly become outdated as both crude oil and product markets changed. The one-off regulatory regime at the FERC and APUC/RCA has cost hundreds of millions of dollars in cumulative litigation and lobbying over the decades since the 1970s.

The net impact on prices relative to current and near term market conditions is challenging to predict. Regulation might lower prices, but it might also raise prices and reinforce regulatory lag – the tendency of high regulated prices not to fall when costs fall. Furthermore, it is unlikely that jet fuel customers would welcome regulation since they have competitive supply options yet with regulation they would have to spend considerable resources participating in the process to guard against possible cost-shifting.

Can the price charged to refineries for royalty oil be discounted to bring down Alaska fuel prices?

Since the price of crude oil is the largest input cost for refineries, the question arises whether fuel prices could be brought down by offering Alaska's royalty oil at a discount to refineries. There are serious doubts as to whether selling Alaska's royalty oil at a discount would be allowed due to legal and constitutional requirements that the oil be sold at maximum value.

In Alaska, the Flint Hills North Pole and PetroStar Valdez refineries use exclusively Alaska North Slope (ANS) crude. Tesoro's Nikiski refinery uses ANS crude for about 50% of its operations and purchases the other 50% from Cook Inlet and from other countries.

Leaving aside the legal elements, the state would need to do more than just sell Alaska's oil at a discount to refineries to guarantee that the reduced cost to the refiners was reflected in fuel prices. The state would also need to enter into some kind of a **contract refining arrangement** with refiners to buy back refined product at a fixed price or fixed margin. This arrangement would guarantee that the reduced cost of crude was passed along to the refined product price. Otherwise, since Alaska refineries control such a large portion of the in-state market share for

refined products, there would be no external force guaranteeing that the refineries lower their prices in response to enjoying a lower crude oil rate. Similarly, the state could request competitive bids to refine its royalty crude and even award a certain extra margin in the ranking of bids for an in-state refiner.

It is important to consider that the State would also have to sell or oversee the sale of the lower-priced refined product to final buyers. Otherwise, retailers could reap some or all of the benefits of the low wholesale price without reducing retail prices.

Should the State run its own refinery?

The question often arises as to whether the state should own and operate its own refinery. Due to the need for economies of scale, it is highly unlikely that the state could build a refinery that could produce fuel at lower costs than refineries elsewhere in the world.

Competing with larger scale refineries might require a large state subsidy. Unless a state-owned refinery could produce fuel at lower costs than can be imported into Alaska from elsewhere, it may be more economical to continue to export Alaska crude to provide state revenues and to import lower priced refined products.

The State of Alaska does not have a good track record operating competitive businesses that compete with imports. The Matanuska Maid Dairy serves as a salient example of the difficulties of running a publicly-owned, small scale, process manufacturing operation that is competing against numerous other suppliers who can ship their product in bulk to Alaska at low cost.

Should retail fuel prices be regulated by the Regulatory Commission of Alaska (RCA)?

There are two reasons why we believe that retail price regulation of heating fuel and/or gasoline should not be pursued. First, we do not think that rural retail fuel distribution in small communities is a natural monopoly for which a sole supplier should or could be protected from competition. Second, our calculations suggest that the cost of regulating a new retail fuel sector would be prohibitive, perhaps reaching more than 50 cents per gallon. We discuss each of these reasons in turn.

General policy considerations

The economy of the United States is a competitive, private enterprise system. In such systems, the economy is organized on decentralized lines of private property and private enterprise. Competition is relied upon to promote public welfare and the competitive market is the central institution regulating economic activity. But it has long been accepted that some industries, in which competition is not fully effective, must be regulated by the government to protect the public interest. Those businesses that have been subjected to detailed public regulation are known collectively as “public utilities”.[22] The main justification for regulation is that a single supplier can most efficiently serve the relevant market – the so-called “natural monopoly”

[22] Phillips, Charles F., 1985, The Regulation of Public Utilities, Arlington, Virginia: Public Utility Reports, Inc., pp. 3-4.

situation. The question here is whether retail fuel distribution is a natural monopoly and whether the entities that provide the fuel meet the definition of a utility that would warrant regulation.[23]

Public utilities, as commonly used, refers to a diverse group of businesses which have been subjected over several decades to detailed local, state, and federal regulation as to rates and services. These businesses generally fall into two major classes:

1) Those which provide, directly or indirectly, continuous or repeated services through more or less permanent connection between the supplier and buyer (e.g., electricity, natural gas, telephone, water and sewer) and
2) Those that provide public transportation services (e.g., airlines, bus companies, motor freight carriers, railroads, and oil and gas pipelines).

In these respects, public utilities differ in several ways from other industries in that they seem to operate most efficiently as monopolies. If their economic power is not controlled by the competitive market, it must be controlled by public authority to protect the public welfare. The need for regulation of these industries in the United States is compelling because the majority are under private ownership; in most other Western countries, the need for regulation is eliminated by public ownership of these natural monopolies. In Alaska the majority of electric, water and sewer utilities are not regulated because they are publically owned or non-profit cooperatives.

The characteristics of the rural Alaska fuel market, especially those communities with two or fewer fuel distributors and very high retail prices, arguably meet the economic criteria for regulation. The fuel market is not unlike a number of other product markets in Alaska—higher prices cannot be accounted for simply by higher transportation and operating costs.

From a public policy perspective, the two relevant questions regarding fuel regulation are: 1) Do market barriers exist that prevent entry of potential competitors despite high industry profits that should, theoretically, attract competition? and 2) Is fuel a public necessity, such as water or electricity, that justifies regulation?

Although one could argue that fuel is a public necessity similar to electricity, there is a major difference. Unlike electricity consumers, purchasers of fuel are not permanently connected to providers. Thus, consumers of fuel products can shift freely between available providers and there potentially are many different suppliers of fuel, at least at the wholesale level.

It should be noted that while regulation is intended to protect consumers from excessive prices when a competitive market fails to provide this protection, regulation also protects the provider of services or commodities from competition. Generally speaking, a company that is regulated is also certified to provide a service. For example, providers of electricity, natural gas,

[23] One reviewer noted that these concerns apply with equal force to the potential regulation of refineries.

and garbage services in Alaska are certified to provide services in their exclusive areas at rates to be reviewed and approved by the Regulatory Commission of Alaska (RCA). The RCA statutes require that certificated utilities be granted: 1) a reasonable return on their investment and 2) rates that allow recovery of justifiable operating costs. The competitive market offers no such guarantees.

Therefore, while regulation of fuel prices might in the short run provide customers with more reasonable prices, it could also erect a long-run barrier to increased competition and cost-cutting. Too, as part of the certification process, regulated utilities have an obligation to serve all customers. It is debatable whether the fuel industry has, or should be required to have, an obligation to serve all customers. It is also questionable whether the state could regulate the price of fuel brought from the lower 48 as this would extend to regulating interstate commerce.

It is interesting to note that if the fuel market were currently regulated in Alaska, it is unlikely that the recent Vitus Marine-Alaska Village Electrical Cooperative (AVEC) partnership would have entered the market. In this case, a fuel buyer entered into an agreement with a shipper and was able to reduce the price of fuel delivered to many villages in western Alaska. Their entry and ability to deliver fuel at lower prices not only lowered the price of fuel for AVEC, but for other communities whose fuel suppliers lowered prices to maintain market share.

The cost of regulating retail fuel prices

RCA regulatory cost charges are recovered for each utility sector through a regulatory cost charge (RCC) that is equalized per unit of sales within that sector. This formula has the effect of allocating the great majority of regulatory costs to places with large populations. For example, Anchorage Water and Wastewater customers pay a surcharge of 1.363%, yielding more than $700,000 of annual RCC payments. These payments support about 12% of RCA's entire $6 million dollar budget. It is hard to believe that it costs the RCA $700,000 to regulate the rates of AWWU. More likely, the RCC payments by the large Anchorage customer base are supporting the total cost of regulating many smaller water and wastewater utilities throughout the state.

This kind of cost spreading would not be possible if retail heating fuel and/or gasoline sales were regulated only in small communities. Instead, our initial analysis suggests that the required surcharge on heating fuel would be between 3 cents and 43 cents per gallon under optimistic assumptions about the total cost to RCA of regulating what would be a new utility sector. The analysis is summarized in Table 7. In addition to the cost on the RCA side, there would necessarily be additional costs incurred by the regulated entity that would be passed through to customers. It is not unreasonable to think that these costs to the entity would equal the costs to the RCA, yielding estimated total costs of regulation equal to **between 6 cents and 83 cents per gallon.**

Table 7. Potential cost to RCA to regulate retail fuel sales

		low cost scenario	high cost scenario
Cost of regulating sector:	fixed $	200,000	400,000
	variable $ per entity	1,000	5,000
Total regulation cost for retail fuel sector:		300,000	650,000
Number of regulated entities		100	50
Number of persons served per entity		200	50
Number of persons paying into RCC		20,000	2,500
Regulated gallons per person		600	600
Number of regulated gallons		12,000,000	1,500,000
RCC required recovery, $ per gallon		0.03	0.43

What is the potential for using North Slope propane as a fuel for use in Interior and rural Alaska?

While use of North Slope propane as a fuel has been discussed for some time,[24] the most recent analyses depend for favorable economics on a very low wellhead (ANS) price of propane, consistent with a characterization of that propane as a "byproduct" of oil production. However, the Alaska Oil and Gas Conservation Commission on August 17, 2012 most recently found that using propane for field maintenance has "clear and substantial benefits to ultimate recovery" in a ruling that recommends against selling North Slope propane as fuel. [25]

Because propane contributes to a system generating a net gain in energy production, if the oil industry did choose to sell propane rather than re-inject it, the AOGCC would have to look at that as potential waste, according to AOGCC Chairman Cathy Forster. Selling one oil-equivalent barrel of propane today would result in a net loss of 0.93 oil-equivalent barrels of valuable liquids in the future.

Similarly, this finding appears to negate, at least for the near future, proposals to substantially switch to propane as a fuel source for vehicles.

[24] See, eg, Nick Szymoniak, Scott Goldsmith. 2009 Propane from the North Slope: Could It Reduce Energy Costs in the Interior? http://www.iser.uaa.alaska.edu/Publications/ANGDApropane2.pdf
and:
Tobias Schwoerer and Ginny Fay. 2010. Economic Feasibility of North Slope Propane Production and Distribution to Select Alaska Communities.
http://www.iser.uaa.alaska.edu/Publications/Schwoerer_ay2010propane_phase2final.pdf

[25] THE PETITION OF Harold C. Heinze, Docket Number: OTH-II-51 the Alaska Oil and Gas Conservation , Other Order No. 075 in accordance with AS 31.05, whether or not waste of Prudhoe Bay Unit propane is occurring at the Prudhoe Bay, Prudhoe Bay Oil Pool Field ~ North Slope Borough, Alaska, August 17, 2012.

3. Reducing the Burden of Energy Costs to Alaskans by Increasing Energy Efficiency

While the price of fuels may fluctuate, Alaskans' heating bills can be significantly and permanently reduced by consuming more efficiently. Fuel bills are the product of price times quantity consumed. Decreasing the quantity of fuel consumed while preserving the amount of useful energy (light, heat, hot water) is equivalent to a permanent and certain reduction in price.

The available evidence shows that the State of Alaska's efforts to improve energy efficiency have been highly effective in cutting energy bills by reducing the amount of fuel Alaskans need to buy. These programs and related savings have had significant impacts on household savings and statewide job creation. On average, households served by energy efficiency programs have reduced fuel use by 28-33 percent. With only ten percent of the housing stock having been addressed, annual statewide savings by households are close to $30 million per year. Efficiency programs have also created jobs statewide because retrofitting houses requires local labor as well as regional and statewide professional services. In addition, the spending of saved fuel dollars are estimated to have created over 300 permanent jobs. These numbers for savings and jobs will grow as additional homes are made more energy efficient.

Energy efficiency retrofits completed to date have focused on residential housing. The state greatly expanded funding for home weatherization and created the Home Energy Rebate Program (HERP) to stimulate private spending on home energy efficiency retrofits about 4.5 years ago. Considerable data has been collected to evaluate the effects of these program expansions. The state is now expanding its focus to commercial and public buildings where significant potential savings may be realized both by private business and by public agencies. Limited data suggests the potential for significant energy and public cost savings. Modifications to existing programs and the potential to accelerate energy savings are discussed below.

Investing in energy efficient buildings is a statewide capital project that uses Alaska's workforce, saves money, and creates jobs statewide

With ten percent of Alaska's households already having participated in energy efficiency retrofits, the programs are familiar and popular statewide. Constituents report reduced fuel bills and increased comfort. Nonetheless, when asked about priorities for energy projects that can reduce costs for Alaskan households, policy makers may naturally focus on large projects that create new energy supply as well as short-term construction jobs.

It's important to look at energy efficiency programs in the same way: they are major, statewide capital investment projects that create immediate and ongoing jobs while producing saved energy and lower fuel bills. They also offer a relatively quick return on the state's investment.

Alaskans are familiar with state policies that attempt to create jobs through large capital projects or industrial development. These types of jobs are generally tied to a discrete project

located in a specific location. By contrast, energy efficiency retrofits take place statewide and range from small scale home retrofits to larger retrofits for public and commercial buildings. Retrofits can be achieved relatively quickly, so savings and job creation are realized quickly as well relative to other state spending choices to create jobs or save energy.

Projects that improve efficiency create jobs in two ways. First, jobs are created for a wide mix of workers throughout the construction and related trades. Second, after higher efficiency is achieved, money saved on energy is available to spend elsewhere in the Alaska economy. This money continues to circulate in the Alaska economy and creates new jobs to the extent that the local economic content of the purchased goods exceeds the local economic content of fuel.[26] These jobs continue year after year. The number of jobs created by efficiency will continue to expand as more homes and businesses are retrofitted to save energy. Money saved in the public sector can be allocated to other public needs or used to offset the need for higher taxes or fees. Money saved in the commercial sector will be available for future investment or other spending.

With both creation of short term construction jobs and this add-on effect of permanent jobs created by energy savings, state energy efficiency investments compare favorably to other capital projects in terms of job creation.

As will be detailed in the following section, to date approximately 10% of the housing stock has been retrofitted. Over 2,700 short-term jobs have already been created in addition to over 300 permanent jobs created by newly available money from household savings on energy bills being spent elsewhere in the economy. Projections for jobs created by retrofitting just an additional 70% of residential buildings run to over 30,000 short-term jobs and over 2,600 permanent jobs.[27] This does not account for the significant number of jobs to be created by larger scale retrofitting and savings associated with public and commercial buildings as these newer programs come up to speed.

Energy Savings, Cost Savings, and Jobs Created through Efficiency in Alaska's Residential Housing Stock

To date, approximately 10% of the state's housing stock has been retrofitted through one of two energy efficiency programs – the Weatherization Assistance Program and the Home Energy Rebate Program. Savings and jobs created are reviewed below. According to the US Census, there are approximately 258,000 occupied housing units in Alaska. Approximately 8,400

[26] Reduced spending on fossil fuels causes what is known as a "displacement effect." In a detailed 1989 study of the Low-Income Weatherization Program, Colt found that the displacement effect was small – about 20% of the spending and respending of saved energy dollars. http://www.iser.uaa.alaska.edu/Publications/workingpapers/WP_89.2_Income_Employment_WeatherizationPgm.pdf

[27] See Table 6 for details on savings and jobs sources and calculations.

housing units have been retrofitted under the weatherization program and 17,500 have received rebates for work done under the Home Energy Rebate Program. In addition, 1,700 homeowners have been paid under the 5 Star Plus program for energy efficient new construction. [28]

The **Home Energy Rebate Program**, which has no income requirements, has spent $145.5 million from April 2008 through November 2012 retrofitting 17,500 homes. In addition to state funds, homeowners are estimated to have spent over $99 million in private money on energy retrofits.[29] On average, rebates have covered 60% of retrofit spending with homeowners spending an additional 40%.[30] As a result of this program, Alaskans are saving an estimated $22 million annually in heating costs, with participants spending on average 26% less on fuel.[31] State funding accounts for creation of 1,746 jobs.[32] Local spending of money saved on energy bills has created an additional 240 jobs.[33] Annual fuel use has dropped an estimated 33% among retrofitted homes with an annual energy savings of 1.6 trillion Btus. This includes annual savings of 1.1 Bcf of natural gas and 2.5 million gallons of heating fuel.[34]

Both public and private investment in the Home Energy Rebate Program is estimated to be recouped quickly through savings on energy bills. On average, homeowners can expect to recoup their out-of-pocket costs in roughly 3.5 years. That estimate assumes fuel prices stay the same, but if they increase, the savings would also increase and shorten the payback time. Combined public and private spending for the rebate program will be returned in homeowner savings in 8.5 years based on current fuel prices.[35]

The **Weatherization Assistance Program** serves households at or below the median Alaska income.[36] As of September 30, 2012, the Weatherization Assistance Program had retrofitted

[28] AHFC Legislative update for Weatherization and Home Energy Rebate Programs, Dec. 1, 2012.
[29] Homeowners can be reimbursed only up to $10,000 under HERP, so it is assumed that many did not report complete retrofits costs beyond $10,000 for which they would not be reimbursed. The average reimbursement per household was $6,391 with the average reported out-of-pocket expenses of $4,447.
[30] Scott Goldsmith, Sohrab Pathan, and Nathan Wiltse. Snapshot: The Home Energy Rebate Program. Institute of Social and Economic Research and Cold Climate Housing Research Center, May 2012. http://www.iser.uaa.alaska.edu/Publications/2012_05_16-HERP.pdf
[31] Ibid.
[32] As cited in above "Snapshot", $1 million in state spending generates 12 jobs. $145.5 million in state spending would generate 1,746 jobs.
[33] As cited in above 'Snapshot" $1 million in household spending generates 11 jobs based on ISER estimate of jobs created by Permanent Fund dividend spending. $22 million in spending money saved on fuel in the general economy would generate 240 jobs.
[34] *Snapshot* p. 4.
[35] Ibid. See Figure 15, Investment in Energy Rebate Program.
[36] The median household income divides households into two equal segments with the first half earning less than the median and the other half earning more. About half of Alaskan households should qualify for this program. While the income limits for the program were raised to 100% of area median income in 2008, the program prioritizes households with less than 60% of area median income, or with an elderly person, a disabled person, or a young child in residence.

over 8,400 Alaska homes.[37] This produced average energy efficiency savings of 28% for single-family homes with average annual household savings of $1,295 per year for single-family homes and $396 per year for those living in multi-family units.[38] As of March 2012, the program has generated an estimated $7.8 million in annual energy cost savings. Including administrative costs, the program can spend up to an average of $11,000 per home on the road and marine highway system and up to an average of $30,000 per home in remote, rural locations.

The state has spent $185.2 million on the weatherization program, which translates to an estimated 2,222 annual jobs based on a multiplier of 12 annual jobs per $1 million in new state spending for retrofits. In addition, the program has created an additional 86 permanent jobs associated with new household spending of the money that was saved on energy costs.[39] Total estimated statewide energy savings from the Weatherization Assistance Program to date are nearing 371 billion Btus per year, which includes over 1 million gallons of heating fuel and 87.3 million cu feet of natural gas per year in addition to savings of electricity, wood, and other sources.

[37] AHFC Legislative update for Weatherization and Home Energy Rebate Programs, Dec. 1, 2012.

[38] Weatherization Assistance Program Outcomes, Cold Climate Housing Research Center, August 6, 2012. Note that results were higher than average for certain areas. As of March 5, 2012, the Northern, West, and Interior. regions realized an average energy savings of 43% and an average annual cost savings of $1,889 for each household.

[39] Permanent jobs created are based on ISER estimates of Permanent Fund Dividend spending in which $1 million in new money in the Alaska economy creates 11 jobs - $7.8 million in spending money saved on fuel in the general economy would generate 86 jobs.

Table 8. Residential Buildings and Energy Efficiency: Savings and Jobs Created

	Avg. annual energy savings per household[40]	Annual savings statewide[41]	Energy savings statewide	Annual savings of natural gas	Annual savings of heating fuel	Jobs created through retrofit of residential buildings[42]	Permanent jobs created through spending of savings elsewhere in economy[43]
Home Energy Rebate Program	$1,297	$22 million	1.6 trillion BTU	1.1 Billion cu ft[44]	2.5 million gallons[45]	1,746	242
Weatherization Assistance Program	$1,295	$7.8 million	371 billion BTU	87.3 million cu ft	1 million gallons	2,222	86
Combined		$29.8 million	1.971 billion BTU	1.97 billion cu ft	3.5 million gallons	3,968	328

How long would it take to retrofit all of Alaska's housing stock at this rate? What would be the costs and savings?

Given the high returns in energy savings, household dollar savings, and jobs created, multi-year investments in energy efficiency are highly recommended. While many factors -- such as the price of fuel, homeowner finances, and the current efficiency of a home -- affect whether an individual homeowner seeks to weatherize their home, the primary constraint that limits how quickly the overall Alaska housing stock becomes more efficient is the dependability of funding. Multi-year funding creates a stable investment and business environment for construction industry to gear up for energy retrofit business instead of a boom and bust cycle. Dependable

[40] Average savings are for single family residences. Savings vary by region with higher savings in areas with higher fuel costs. Northern, West, and Interior regions realized an average energy savings of 43% and an average annual cost savings of $1,889 for each household under the weatherization program.

[41] Annual statewide savings are through September 2011 for HERP (16,500 homes) and March 2012 for weatherization program, (6,800 homes). According to AHFC's December 2012 legislative update, an additional 2,600 homes have been retrofitted since then, delivering additional savings not yet accounted for in published estimates.

[42] Estimates of projected retrofit jobs are based on a multiplier that estimates $1 million in new state spending generates 7 direct retrofitting jobs and 5 indirect jobs. The state has spent $145.5 million on the Home Energy Rebate Program and $185.2 million on the Weatherization Assistance Program.

[43] See note 14.

[44] *Snapshot*

[45] *Snapshot*

funding also creates realistic expectations for homeowners and building owners looking to improve energy efficiency. This conclusion was voiced by numerous agency staff and industry participants.

The retrofit market has been a proven job creator for local construction jobs. Retrofit construction had the added benefit of creating jobs during the employment lull of the recession. However, with current, unpredictable funding, contractors are reluctant to focus on the full potential of the retrofit market. A lack of long term funding makes it difficult to maintain a qualified workforce. Consistent funding would avoid a boom and bust cycle in this segment of the construction industry. For example, when the retrofit programs first came on line, the state went from 30 to 127 energy raters in just over one year. Now, the state is down to just 73 active energy raters.[46]

In approximately 4.5 years, the state has successfully retrofitted approximately 10% of Alaska's housing stock. If we assume that the top 10% of the remaining housing stock is sufficiently efficient to not need retrofitting and that the bottom 10% is not worth retrofitting, there remains 70% of the housing stock to address.

At current rates, it would take over 31 years to complete this effort.[47] Doubling the current rate of effort would retrofit Alaska's housing stock in 15 years, bringing energy savings and related permanent jobs created through savings into the Alaska economy sooner. Tripling the current rate of effort would retrofit the remaining housing stock in 10.5 years. By accelerating energy efficiency efforts, tens of thousands of near term energy retrofit jobs could be created and jobs related to savings could be realized sooner and predictably.

According to Scott Waterman, State Energy Program Manager at AHFC, doubling the rate of the Home Energy Rebate Program is within reach, but the limiting factor is dependability of funding. At its height, the program was serving homes at three times the current rate. Currently, there is not a backlog of households waiting to participate in the rebate program, but administrators are wary of accelerating the program without dependable funding, because they do not want to see homeowners enter the program only to be frustrated by not being able to find qualified workers to undertake retrofitting their home.

The Weatherization Assistance Program is more decentralized and administered by seventeen weatherization agencies including thirteen Housing Authorities, so the capacity to accelerate retrofits may vary. Again, the need to create a steady source of funding to allow the development of a well-trained, available workforce and to reach energy savings potential sooner is advised.

[46] AHFC Legislative update for Weatherization and Home Energy Rebate Programs, Dec. 1, 2012.
[47] Based on 4.5 years to retrofit 10% of the housing stock, it would take 31 more years to retrofit an additional 70%.

It is important to note that the Weatherization Assistance Program addresses both health and safety issues as well as energy efficiency. Guidelines were established in 2008 regarding the amount of funding allowed to be applied to each house. It would be worthwhile to review whether these funding guidelines have kept pace with changes in material or labor costs. AHFC plans to do an in-depth analysis this spring between the cost differential statewide for weatherization.

Homes currently not covered by energy efficiency retrofit programs – reaching out to landlords

While the existing programs have proven highly successful, many categories of Alaskans are not covered, especially renters. Of Alaska's 258,000 occupied housing units, over 95,000 (37%) are occupied by renters.[48] This is a significant portion of Alaska's housing stock. Currently, the Home Energy Rebate Program only covers owner-occupied housing. Individual renters can apply under the Weatherization Assistance Program if they meet income qualifications. Renters with above median incomes cannot participate. In most areas, renters make up 75% or more of the households that go through the Weatherization Assistance Program and many live in multi-family units.[49] While a rental unit may be more comfortable and possibly more affordable following a retrofit, it is a high bar to expect renters to make an effort to improve their landlord's property. Measures should be explored to create energy efficiency programs which encourage landlords to participate.

Another segment of the population likely underserved are those who qualify for the Home Energy Rebate Program, but do not have sufficient personal resources to pay for retrofit costs up front, which can run up to $10,000, and then wait for a reimbursement. According to AHFC surveys of individuals who do not follow through with retrofitting their home, financing is the main barrier. AHFC has a Second Mortgage for Energy Conservation loan that is used to bridge the gap. The rebate is then paid towards the remaining debt on the loan. Also, some already have a highly efficient home and the cost to go further is too high.

[48] US Bureau of the Census, Housing Characteristics, 2012, US Census Briefs, October 2011.
[49] Cited in Snapshot : The Home Energy Rebate Program, Scott Goldsmith, Sohrab Pathan, and Nathan Wiltse, Institute of Social and Economic Research and Cold Climate Housing Research Center, May 2012.

Table 9. Residential buildings and energy efficiency: savings and jobs created by retrofitting all of Alaska's housing stock

	Homes retrofitted to date (approx. 10% of AK housing stock)[50]	State funding spent to date	Annual savings statewide[51]	Homes remaining to be retrofitted (approx. 70% of AK housing stock)	Estimated cost to retrofit entire AK housing stock	Projected annual energy savings[52]	Projected jobs created through retrofit of residential buildings	Projected Permanent jobs created by spending of savings elsewhere in economy
Home Energy Rebate Program	17,500	$145 million (an additional $99 million was spent by homeowners)	$22 million			$176 million/yr		
Weatherization Assistance Program	8,400	$185.2 million[53]	$7.8 million			$62.4million/yr		
Combined	25,900	$330.2 million	$29.8 million	180,600[54]	+/-$3 billion[55]	$238.4 million/yr	+/-36,000[56]	2,600[57]

Potential annual savings of natural gas through residential efficiency as compared to Southcentral natural gas use

There are concerns about future limits to natural gas availability for the Railbelt region. Currently, in the summer ENSTAR pipes gas directly from Cook Inlet wells to consumers, but in the winter it has to draw on stored gas to meet peak demand, which adds to costs. Efficiency programs can help reduce both overall gas use and the need to store gas for peak demand.

About two-thirds of the estimated fuel already being saved under the Home Energy Rebate Program is natural gas, more than one billion cubic feet annually.[58] The Weatherization

[50] AHFC Legislative Update for Weatherization and Home Energy Rebate Programs, Dec. 1, 2012.

[51] Annual statewide savings are through September 2011 for HERP (16,500 homes) and March 2012 for weatherization program, (6,800 homes). According to AHFC's December 2012 legislative update, an additional 2,600 homes have been retrofitted since then, delivering additional savings not yet published.

[52] Figures are extrapolated from known savings on 10% of the housing stock to an additional 70% of homes retrofitted for a total of 80% of the housing stock. Estimates on cost savings are conservatively based on current prices for fuel. Savings would be higher if prices for fuel continue to rise.

[53] AHFC Legislative Update for Weatherization and Home Energy Rebate Programs Dec. 1, 2012.

[54] According to the US Census Bureau, there are approximately 258,000 occupied housing units in Alaska. Seventy per cent of this figure is 180,600.

[55] AHFC power point presentation, March 2011. Includes money already spent. Also, extrapolating from $330 million spent to date to weatherize 10% to completing 80% of the housing stock would be $2.64 billion.

[56] Based on $3 billion in spending. Estimates of projected retrofit jobs are based on a multiplier that estimates $1 million in new state spending generates 7 direct retrofitting jobs and 5 indirect jobs.
Permanent jobs created are based on ISER estimates of Permanent Fund Dividend spending in which $1 million in new money in the Alaska economy creates 11 jobs.

[57] Permanent jobs created are based on ISER estimates of Permanent Fund Dividend spending in which $1 million in new money in the Alaska economy creates 11 jobs. An estimated $238 million dollars in energy savings would create 2,600 permanent jobs.

Assistance Program reports close to 87.3 million cubic feet of natural gas already being saved annually in the Railbelt.[59]

Table 10. Potential natural gas savings in residential buildings

	Annual savings of natural gas (after retrofit of 10% of housing stock)	Projected Annual savings of natural gas (after retrofit of additional 70% of housing stock)	Total Cook Inlet natural gas use by Railbelt customers in 2010 for heat and power	Current savings relative to Cook Inlet natural gas use	Projected annual savings relative to Cook Inlet natural gas use
Home Energy Rebate Program	1.1 Billion cu ft	8.8 billion cu ft[60]			
Weatherization Assistance Program	87.3 million cu ft	698.4 million cu ft			
	1.187 billion cu ft	9.5 billion cu ft	71 billion cubic feet per year (Bcf/yr)[61]	1.7%	13.4%

Note these are rough estimates based on current savings. A full accounting would need to assess location of future homes in need of retrofit and their reliance on natural gas.

Energy Savings, Cost Savings, and Jobs Created through Efficiency in Public Buildings

While a complete inventory does not yet exist, it is estimated that there are upwards of 5,000 public buildings in Alaska. A rough estimate by AHFC of annual energy costs is $641 million in public funds per year. With average projected savings of $25,000 per year for each building, potential annual savings in reduced energy costs would be $125 million per year.[62] Investment Grade Audits performed on 327 public facilities show that most have the potential for significant energy use reduction. AHFC's White Paper on Energy Use in Alaska's Public Facilities, October, 2012, provides detailed listing of ways to save energy and money through design, retrofit, and operation of public buildings.

These calculations conservatively estimate overall, statewide, average efficiency savings of 19.5% when individual buildings may expect savings nearing 30%. Likewise, the $25,000

[58] Snapshot: The Home Energy Rebate Program ISER and CCHRC HERP Outcomes Assessment, May 2012.
[59] Weatherization Assistance Program Outcomes, CCHRC and AHFC, August 2012. The current savings associated with improved residential energy efficiency for the Railbelt is reported as 873,683 therms. One therm is approximately equivalent to 100 cu feet of natural gas.
[60] These projected savings are based on retrofitting 80% of homes - 10% already retrofitted plus an additional 70%.
[61] Author estimates based primarily on Northern Economics, In-State Natural Gas Demand Study. 2010. Appendix B.
[62] White Paper on Energy Use in Alaska's Public Facilities, AHFC, October 17, 2012. Extrapolation based on 5,000 buildings with a median building size of 28,820 square feet with an average energy cost index of $4.45/sq ft.

projected savings per building would vary depending on the type and size of building. This extrapolation is not based on a random sample of public buildings. The initial energy use data was voluntarily submitted by building owners. The sample is also biased by audits being performed on larger buildings.

Table 11. Public Buildings and Energy Efficiency: Potential Savings and Jobs Created

# of Public Buildings	Annual energy costs for public buildings	Projected annual savings	Projected annual public savings	Jobs created through retrofit of public buildings[63]	Permanent jobs created through spending of savings elsewhere in economy
5,000	$641.2 million	$25,000/building	$125 million	7,568	1,375

Source: CCHRC White Paper.

DOTPF began an inventory and retrofit of public buildings over 10,000 square feet as required under Senate Bill 220, which set a goal of retrofitting 25% of state-owned public buildings over 10,000 square feet by 2020. Approximately 175 buildings fall into this category. Over fifty retrofits have been completed with additional buildings in progress. Many of these retrofits were funded by $10 million in American Recovery and Reinvestment Act (ARRA) federal funds. Many of the agencies who participated in these retrofits are now interested in retrofitting additional facilities.

Energy savings have been difficult to estimate due to lack of baseline data. State agencies are more recently collaborating with AHFC to track and record energy consumption and costs. To address this, the OMB office has directed all branch agencies to designate staff to enter utility data into the State's energy consumption tracking system called ARIS (Alaska Retrofit Information System) developed through AFHC. Entering of the utility data into the system is mandatory. The DOTPF Energy Office, which is already tasked with managing the design and construction of the energy retrofit projects, is coordinating the ARIS implementation.

In cases where retrofits of state buildings have been accomplished through Energy Performance Contracts, energy savings are measured and verified. Measured and reported energy savings from State Energy Performance Contracts total over $1.8 million.[64]

[63] Estimates of projected retrofit jobs are based on a multiplier that estimates $1 million in new state spending generates 7 direct retrofitting jobs and 5 indirect jobs. Permanent jobs created are based on ISER estimates of Permanent Fund Dividend spending in which $1 million in new money in the Alaska economy creates 11 jobs.
[64] Christopher Hodgin, DOTPF, December 21, 2012.

Spending for school energy bills versus spending for energy efficient schools

With limited public funds available and high demand for services, schools make a good case study for looking at tradeoffs between spending state money on fuel and electric bills vs. spending money on energy efficiency. If public schools were retrofitted to higher efficiency, significant savings could be redirected to other education funding needs such as teachers.

In recent years, the state has appropriated tens of millions of dollars in supplemental energy spending for schools. By contrast, even with a conservative goal of improving efficiency in school buildings by 20%, roughly $18 million per year would be freed up to fund other education needs. In addition, about 200 jobs would be created elsewhere in the economy as retrofits were performed. These estimates are summarized in Table 10. The estimates of square footage and annual energy costs are provided by the Cold Climate Housing Research Center and are based on a survey of 38% of state's 479 public schools. Efficiency outcomes could vary, but using a guideline of 20-30% improvement in efficiency is realistic.

Table 12. Schools and Energy Efficiency: Potential Savings and Jobs Created

# of schools in Alaska	Total sq. footage[65]	Annual energy costs	Projected annual school savings (based on energy savings of 20%)	Jobs created by retrofit of schools	Permanent jobs created through spending of savings elsewhere in economy
479	26 million sq ft	$90 million	$18 million	1,090	198

For example, Klatt Elementary School in Anchorage reduced its natural gas use by close to 25% after switching to more efficient boilers and control systems. In March 2010, the Anchorage School District reported saving close to $115,000[66] in annual energy costs after a pilot project at eight schools focusing only on changes in operations. The district spends over $15 million annually on natural gas and electricity costs.

Grants vs. Loans

The legislature created the Alaska Energy Efficiency Revolving Loan Program in 2010 to provide a mechanism for funding retrofits of public buildings. However, administrators, local government leaders, and Energy Service Companies have consistently noted resistance among government agencies and local governments to using a loan program when they are used to operating with government grants. This general conclusion – that loans are a cumbersome and

[65] Estimate of square footage and annual energy costs provided by CCHRC in White Paper on Energy Use in Alaska's Public Facilities, October 17, 2012, AHFC – Energy Usage and Costs in Audited Schools. Based on survey of 38% of state's 479 public schools.

[66] Schools' energy efficiency practices proving successful, Anchorage School District, March, 12, 2010. http://www.asdk12.org/PR/DistrictNews/article.asp?storyID=1549

unpopular method of stimulating energy efficiency – is well-documented in the energy economics literature.[67]

Public agencies are generally not as familiar with applying for loans as applying for grants or appropriations. In the case of the energy efficiency loans, agencies may not understand that repayment of the loans can be structured similarly to a performance contract where payments are made with funds from energy savings. Applying for and managing a loan was perceived as an additional demand on staff. Smaller governments lack the personnel to apply for a loan and to oversee retrofits. Agencies looked first to using their existing operating funds, bonding or deferred maintenance funds. Also, the rates offered by AHFC for these loans are not considered by some to be sufficiently attractive compared to current market rates to be worth the effort of participating.

AHFC reports that the audits done by AHFC contractors have stimulated discussion and prompted some agencies to take energy efficiency action. However, to date AHFC has only had a few formal requests for financing. They estimate that a number of buildings are likely to have energy efficiency retrofits in the coming year. These range from direct digital controls in three Kenai Peninsula Borough Schools, to the City of Kenai, City of Nome, Fairbanks Northstar Borough, Anchorage School District, City and Borough of Haines, City of Homer and others. [68]

Failure or delay to retrofit public buildings is an ongoing cost to Alaska's government saddled with paying high fuel bills which could be lowered through efficiency. Changes to the loan program should be considered to accelerate these savings. Potential changes suggested included adjusting to a 0% interest rate; requiring agencies to spend some percentage of their deferred maintenance budget on lowering utility bills or working with the loan program; and providing assistance to local governments to work with the loan program.

In contrast, a grant program available to local governments, the Renewable Energy Fund Grant Program, has proved very popular. Currently the REF funds alternative means of generating power, but does not pay for efficiency investments. The state has the potential to further leverage energy savings created by at least allowing, or perhaps giving preference to, projects which bundle both energy efficiency and renewable energy. Last April's Process Evaluation Report for the REF program identified this approach as a recommended improvement.[69]

Assistance for Public Agencies in Rural Alaska: Closing the Gap on Capacity

While new programs are intended to move public agencies forward toward energy efficiency, many smaller agencies or communities lack the capacity to participate in these programs. As referenced above, many smaller public agencies lack personnel capable of analyzing or setting

[67] See, eg: Walls, Margaret. 2012. Policies to Encourage Home Energy Efficiency Improvements Comparing Loans, Subsidies, and Standards. Resources for the Future www.rff.org. December. RFF DP 12-47. This paper found that grants generated 7 times the energy savings as loans, for an identical outlay of public funds.
[68] Scott Waterman, AHFC, December 14, 2012.
[69] http://www.akenergyauthority.org/PDF%20files/REGRP%20Process%20Report%20-%20Final.pdf (see pg. 11.)

priorities for energy efficiency investments. These agencies and communities may also lack personnel capable of analyzing, applying for, and then managing energy efficiency loan and project. Resources to help smaller agencies and communities develop energy efficiency plans and access energy efficiency funding would be helpful.

In the past, many communities, especially in western and Interior Alaska, were assisted by the Village Energy Efficiency Program (VEEP). The Alaska Energy Authority plans to restart this program in 2013. Villages will need to apply once a solicitation is put out. VEEP will not include commercial retrofits. The program serves public and community buildings. In the past some of the contractors have done work on commercial structures while they are in the village, but it has been paid for privately with the benefit to the commercial building owner that they can take advantage of having a contractor already on site and bundle their materials order in a larger order.

Commercial Buildings and Energy Efficiency: Potential Savings and Jobs Created

Based on census population data and available data from the Alaska Energy Authority's 2012 End Use Study and 147 completed investment grade audits, Cady Lister of AEA estimates that there are 15,700 commercial buildings with a total of 260 million square feet in Alaska. By comparison, AHFC roughly estimates the total square footage statewide for public buildings at 144 million square feet. [70] With the potential savings for public buildings estimated at $125 million per year, energy efficiency savings for commercial buildings could be expected to exceed $200 million per year.

According to AEA's 2012 End Use Study, non-residential building energy use is highest in Climate Zone 7, which includes southcentral Alaska and the largest number of non-residential buildings. Warehouse type buildings use the largest total amount of energy which is in keeping with their large size. The amount of overall energy spending on heat varies by region. Direct heating in southcentral Alaska accounts for just over 50% of the total energy used in nonresidential buildings for this region. By contrast, the EUS found that in Bethel 72% of energy use went to heating. [71]

In 2011 and 2012 the AEA granted funds to 146 Alaska businesses to receive energy audit services. In addition, more than 60 buildings received energy audits in 2011. [72] The program provides reimbursements of qualified commercial energy audits for privately owned commercial buildings.

It is too soon to collect firm numbers on how many of these businesses have followed through to date with efficiency measures as a result of their audit but one year out from the first round of the program more than twenty per cent of participants reported that they had started

[70] AHFC estimates 5,000 public buildings with a median building size of 28,820 square feet for a total of 144 million square feet. White Paper on Energy Use in Alaska's Public Facilities, AHFC, October 17, 2012.
[71] Alaska Energy Authority End Use Study: 2012. http://www.akenergyauthority.org/PDF%20files/EndUseStudy2012/AlaskaEndUseStudy2012.pdf
[72] Alaska Energy Authority, http://www.akenergyauthority.org/efficiencyaudits.html

implementing improvements. Some businesses reported that they would like to do more but were having difficulty accessing financing to do so.

There is a current waitlist of businesses who would like to participate in the next round of commercial energy audits. Commercial energy audit program regulations are currently in draft form and AEA hopes to announce funding availability in late February or early March of 2013.

Commercial building owners can now apply for assistance to the Department of Commerce, Community, and Economic Development's Alternative Energy and Conservation Revolving Loan Fund which began accepting applications on September 10, 2012. No loan applications have been received to date.[73] The maximum loan amount is $50,000. Loan requests over $30,000 require a letter of denial from a private financial institution. The maximum term is 20 years with a 5 percent interest rate. There are restrictions on the types of efficiency improvements that can be paid for with loan funds.

There are various barriers that create disincentives for businesses to pursue energy efficiencies. Most businesses are looking for returns on investments that pay back in 3-5 years, while some retrofit options, such as replacing boilers, have a longer term payback. Comments from Energy Service Companies and others have mentioned that the 5% interest rate is not compelling enough to warrant the effort for a relatively small loan.[74]

Reducing energy costs is central to keeping businesses in Alaskan communities. Recommendations include consideration of a matching grant program to improve incentives for businesses to participate. Also, Energy Service Companies (ESCOs), which finance retrofits in return for getting paid through the money saved on energy, are only interested in financing retrofits for businesses with utility bills topping $250,000 year. Efforts should be made to create programs where ESCOs could service smaller businesses. Many smaller businesses are comparable in scale and energy use to residential houses. Thus, the success of the HERP program suggests that one policy option is to simply offer rebates to small businesses in owner-occupied buildings. A second option would be to offer direct incentive payments to private sector ESCOs to serve smaller buildings with shared savings contracts.

4. Heating Fuel Cost Assistance

Potential adjustments to Low Income Heating Assistance Program (LIHEAP) or Alaska heating assistance program (AHAP)

Alaska administers approximately $10 million in federal funding and $20 million in state funding for heating assistance each year which is also shared with tribes Several tribal organizations

[73] Personal communication, Jim Andersen, DCCED Division of Economic Development, Commercial, Loan Manager, December 18, 2012.
[74] Amber McDonough, Siemens, Personal communication, October 16, 2012.

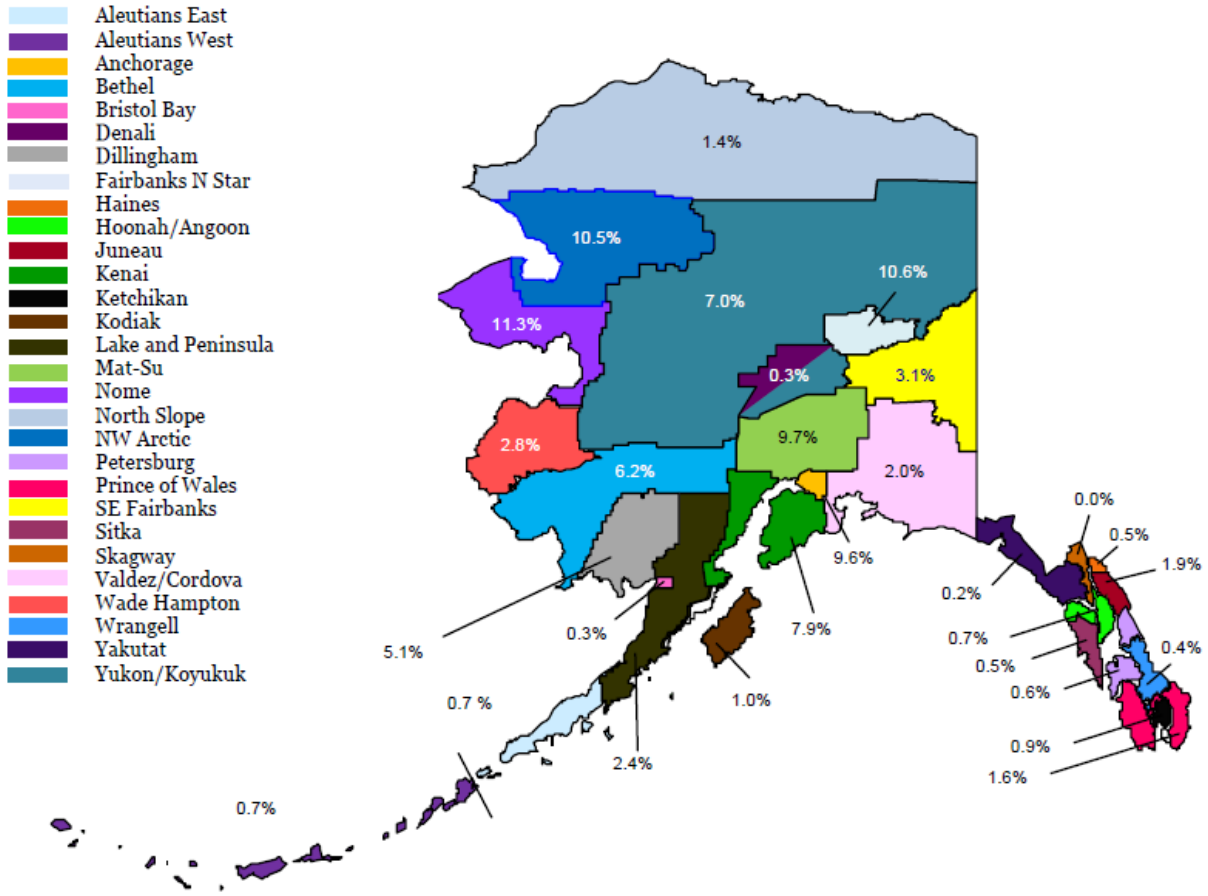
also receive Citgo funds from Venezuela but they can not depend on these funds to be available from year to year.

While the percentage of households receiving assistance is higher in some rural census districts, funds serve both urban and rural households. In FY 2012, the state distributed approximately $3 million to Anchorage households and roughly the same amount to Fairbanks households. This accounts for approximately 20% of spending for heating assistance statewide. The allocation of funds to regions is shown in Table 13 and Figure 12.

Table 13. FY12 Heating assistance households and expenditures by census area --state and tribal LIHEAP and AKAHP programs

Census Area	Households	Expenditures	Percent of total Expenditures
ALEUTIANS EAST	126	$ 175,240	0.7%
ALEUTIANS WEST	104	$ 183,405	0.7%
ANCHORAGE	3,088	$ 2,595,960	9.6%
BETHEL	1,952	$ 1,670,574	6.2%
BRISTOL BAY	42	$ 81,590	0.3%
DENALI	66	$ 81,531	0.3%
DILLINGHAM	581	$ 1,374,781	5.1%
FAIRBANKS N STAR	2,102	$ 2,850,924	10.6%
HAINES	156	$ 126,991	0.5%
HOONAH-ANGOON	254	$ 198,532	0.7%
JUNEAU	809	$ 523,280	1.9%
KENAI	2,258	$ 2,132,076	7.9%
KETCHIKAN GATEWAY	327	$ 229,044	0.9%
KODIAK	290	$ 280,344	1.0%
LAKE AND PENINSULA	258	$ 634,410	2.4%
MAT-SU	2,845	$ 2,605,953	9.7%
NOME	818	$ 3,029,056	11.3%
NORTH SLOPE	141	$ 376,095	1.4%
NW ARCTIC	656	$ 2,821,515	10.5%
PETERSBURG	203	$ 155,941	0.6%
PRINCE OF WALES	614	$ 441,506	1.6%
SE FAIRBANKS	564	$ 842,304	3.1%
SITKA	178	$ 144,467	0.5%
SKAGWAY	14	$ 12,744	0.0%
VALDEZ/CORDOVA	404	$ 536,490	2.0%
WADE HAMPTON	826	$ 765,196	2.8%
WRANGELL	118	$ 95,437	0.4%
YAKUTAT	85	$ 57,997	0.2%
YUKON/KOYUKUK	1,104	$ 1,880,764	7.0%
State Total	20,983	$ 26,904,147	100.0%

Figure 12. Distribution of FY12 heating assistance expenditures by census area



Benefits for households are based on gross monthly income as a percentage of poverty levels; size of household; fuel type; dwelling; and whether there are elderly, disabled, or children under the age of six in the household.

For example, an Anchorage family of four heating with natural gas with an income of $2,500/month (60% of the poverty level) would receive $450. A Fairbanks family of 2 heating with oil with an income of $1975/month (50% of the poverty level) would receive $900. A Savoonga family of five including a disabled or elderly person heating with oil with an income of $2,850/month (70% of the poverty level) would receive $2,850.[75]

While income limits are higher for state funding than federal funds, the bulk of state funding still goes to qualifying lower income LIHEAP households. The state serves approximately 13,000 households. An additional 6-7,000 households are served by tribes. The program does not

[75] LIHEAP FY 2013 Detailed Plan, State of Alaska, October 9, 2012, p. 22. http://dhss.alaska.gov/dpa/Documents/dpa/programs/hap/Fy2013DetailedPlan.pdf

currently track what percentage of the recipient's fuel bill is covered by assistance, but is working to improve data collection.

Administrators advised against dramatically raising the cap on who would qualify for assistance. If more households qualified, the amount of assistance to households on average could be reduced.[76] Administrators also warned that federal LIHEAP funds could be subject to sequestering if that is the approach taken to reduce federal spending. Anticipated cuts would be 8-9% beginning in 2013 for ten years.

Potential heating fuel cost reduction program

Since Alaska is a net seller of oil, financial assistance to defray high fuel prices can be thought of as a "share-the-wealth" policy so long as the programs are not "sticky". In other words, programs must have provisions for automatic adjustments or phase-out when crude oil prices fall. The current PCE program contains this general mechanism since reimbursements depend on actual diesel fuel costs documented by invoices. A successful heating fuel cost reduction program should also maintain the full incentive effect of a high price for additional or "marginal" consumption beyond some basic level. In addition, the program should not penalize investments in efficiency or frugal behavior that reduces the consumption of fuel.

Heating fuel could be subsidized through reimbursements paid to fuel providers in a manner that would essentially mimic the Power Cost Equalization program but without the full requirements of regulatory oversight needed for PCE. One or more retailer entities could submit requests for reimbursement on behalf of residential heating customers and then provide a credit on that customer's bill. The danger of price increases that might nullify the reimbursement could be addressed by requiring a simplified filing of cost data such as invoices that the retailer pays to a wholesale distributor. It is our understanding that entities (often village councils) who are recipients of bulk fuel revolving loan funds must certify their non-profit status as fuel resellers.

We developed a very preliminary estimate of the cost of a broad-based heating fuel cost reduction program. The major assumptions are:

- 62,000 eligible households (about 50% of the estimated 125,000 Alaska households who are not connected to natural gas)
- 500 gallons per year limit eligible for assistance
- $2.00/gallon average reimbursement level (this could vary depending on differing actual prices of fuel in different areas)

The resulting cost of the program would be $62 million per year. An annual expenditure of this amount could be permanently endowed for approximately $1.2 billion, assuming a 5% rate of return.

[76] Personal communication Ron Kreher and Susan Marshal, DHSS, October 25, 2012.

An alternative approach to augmenting PCE would be to simply provide cash assistance to households that is tied to world crude oil prices. When crude prices are high, Alaska collects more revenue and can afford to provide additional cash to citizens. This concept is similar to the "resource rebate" provided in 2008, but it could be tailored to climate and household income in addition to being tied to crude oil prices. An added benefit of cash assistance is that a cash assistance outlay would provide a benchmark against which to judge other programs and capital projects that purport to provide "low-cost" energy. Any energy project – such as a wind farm -- that could deliver actual cost reductions could be financed by reallocating some monies from the cash assistance program such that both the state and individual citizens would share in the cost reduction benefits.

5. Addressing Fuel Prices in Western and Rural Alaska by Reducing the Costs of Transporting, Delivering, Storing, and Purchasing Fuel

Remote rural communities face additional costs at each point in system of transporting, delivering, storing, and purchasing fuel. In this section we look at some potential solutions at each juncture.

Components of Rural Fuel Costs

There are many physical movements to transport fuel from the refinery to the end user's tanks.

1. Fuel is purchased from the refinery and shipped via a linehaul barge (the term used to reflect a large ocean-going barge) or trucked, as is the case for the upper Yukon River.
2. Fuel is put into a tank farm at a regional terminal or fuel hub or a smaller barge for storage.
3. Fuel is loaded from the terminal/fuel hub into smaller barges for delivery of fuel to each smaller community's local tank farm.
4. Local tank farms sell fuel to individual customers either at the tank farm or by truck distribution.

The estimated average cost of delivering fuel from Cook Inlet to Western Alaska communities is approximately $1.00 per gallon. These costs can easily increase by $0.20 per gallon for docking and fuel off-loading deficiencies that increase the time, safety, and environmental risks of fuel handling. Another estimated average of $1.60 in costs occurs once the fuel is delivered to communities, to cover the cost of fuel storage tanks, working capital of holding fuel until sold, and tank-farm operations such as fuel sales. If, in our hypothetical example, the refinery price of fuel was $2.00, the final average cost of transporting and selling the fuel in the "average" community served by the small barge fleet would be $4.60. More risky or challenging delivery circumstances would increase these costs.

The Western Alaska fuel "market" is comprised of North Aleutian villages beginning with Nelson Lagoon proceeding north along the coast to Kotzebue Sound. Also included are ports of call on tributary rivers, the most prominent being the Yukon and Kuskokwim Rivers.

Three major competitors historically served the Western Alaska fuel distribution market, Crowley Marine Services, Yukon Fuel Company, and Delta Western. Crowley bought Yukon Fuel in 2005 and Ruby Marine, LLC (currently serving Yukon River customers) began operation in 2007, for a total of three competitors.

While it is possible to fly fuel to most locations, it can only be done cost effectively to communities within a few hundred miles of Kenai or Fairbanks refineries and then only in quantities of less than five thousand gallons. Marine transportation remains the most cost-effective way to deliver fuel to most Western Alaska communities. Due to the shallow waters of most ports of call, only a tug and barge combination is a viable method for delivery. Seasonal ice and remoteness are major factors influencing fuel transportation costs.

The competitive landscape in the marine delivery market has changed significantly over the last fifteen years. In the mid 1990s, Yukon Fuel's activity was primary on the Yukon River. Delta Western and Crowley served the rest of the Western Alaska market. Beginning in the late 1990s and after a failed attempt to buy Yukon Fuel, Delta Western started to exit the small delivery market to focus on linehaul and tank farm operations. Also, during the late 1990s Yukon Fuel started an aggressive pricing program to expand its service territory. This plan was successful and took Yukon Fuel's small-delivery volume from seven million gallons in 1995 to nineteen million gallons in 2002. This increase in volume came from securing former Crowley customers and by picking up old Delta Western customers.

During this time both Crowley and Yukon Fuel charged some customers rates below cost, trying to secure additional market share. The strategy was to try to gain efficiencies and economies of scale that would lower the costs for all deliveries. One part of the plan benefited customers with larger tank farms.

By 2002, this strategy had increased Yukon Fuel's market share but resulted in relatively low profitability. In 2005, Yukon Fuel was sold to Crowley. As a direct result of very low profits, the market saw almost no reinvestment in equipment that would be expected to occur in a healthy market.

Since Yukon Fuel's purchase in 2005, prices have been increasing. However, evidence of prices remaining at depressed levels is the continued absence of Delta Western in the majority of the market. Delta Western has the capital and operational knowledge to compete for fuel sales in small Western Alaska communities, yet they have had a relativity small role in the market from 2006 to 2009. When comparing current fuel delivery prices to fuel delivery prices from more than five years ago, it must be factored in that prices from that time period were not sustainable, as evidenced by the sale of Yukon Fuel and the lack of participation by Delta Western.

In 2010, Vitus Marine started operations in partnership with Alaska Village Electric Cooperative (AVEC). AVEC financed the construction of two articulating tug and barge units that were

delivered and went into service in western Alaska in late 2011. One barge has a capacity of 8,000 barrels and the second a capacity of 10,000 barrels. AVEC financed construction of new fuel barges and entered into a five year contract with Vitus to deliver fuel. The arrangement has lowered costs of delivering fuel to the region, mainly by reducing the costs of transporting fuel by an estimated 10%. In turn, other fuel suppliers to the region have lowered their prices as well to be competitive with Vitus.[77]

Fuel Delivery Infrastructure: Marine Headers and Terminals

The state could invest in improvements that would lower the cost of delivering fuel, such as consolidated and safe marine headers in each community or a terminal that could take large international fuel tankers. The Denali Commission recently partnered with the U.S. Army Corps of Engineers to investigate potential improvements to barge landings in the Alaska.[78] Improvements to barge landings could reduce the environmental risk of delivering fuel, reduce fuel costs by shortening the time it takes to deliver fuel, and increase competition by making it easier to deliver fuel for newcomers into the market. Before improving barge landings for the sake of fuel costs, a cost analysis should be performed as the cost of fuel may increase if the cost of the projects is greater than their savings. However, it may be difficult to value the environmental benefits of reduced spill risk.

By improving and consolidating marine headers the state could reduce the cost of delivering fuel to small communities served by barges. Currently, in some communities each fuel entity has a separate marine header. This requires that for the barge to deliver to each entity, it must pull up to a separate area of the beach. In communities where deliveries are constrained by tides, this can add significantly to delivery times.

Further, the state could reduce marine transportation costs by investing in improved maritime support. Any actions to reduce risk or decrease delivery times in the transportation industry could result in lower transportation differentials. Currently, Alaska lags behind the rest of the U.S. in ocean and river charting, aids to navigation (e.g., lights, buoys, channel markers), and dredging of critical channels that constrict draft and related efficiency. The lack of these critical maritime tools adds costs and risks to carriers.

Fuel Cooperatives

There have been fuel cooperatives in the market for more than 10 years.[79] Fuel cooperatives attempt to reduce the price of fuel by increasing the market share of the fuel buyer and thus increase their leverage in negotiating rates. Fuel cooperatives have also been suggested to reduce administrative costs by allowing the fuel distributor to only do business with one entity instead of many. A fuel cooperative can also assist communities by providing business support

[77] Meera Kohler, AVEC CEO, told the Alaska Journal of Commerce that they estimate their savings on delivered fuel at 12-15 cents per gallon. (Vitus bringing competition to Alaska Tim Bradner, Alaska Journal of Commerce, September 6, 2012.)

[78] Denali Commission, Barge Landing Report Executive Summary. http://denali.gov/index.php?option=com_docman&task=doc_download&gid=283&Itemid=101

[79] Wave Fuels reorganized as North Star Gas.

to help ensure that each community has the cash on hand to purchase fuel each year. This could reduce the risk of needing special barge trips later in the year or extra financial costs associated with using loans to purchase fuel.

Despite the possible benefits of fuel cooperatives, in actual practice they have had mixed results, as they face significant challenges in rural fuel markets. Some of the challenges include: credit risk, cost shifting, and reduced competition.

Credit Risk. In the past, the fuel cooperative would purchase all the fuel for the group. If one member of the cooperative failed to pay the cooperative, this threatened to take the whole organization under. This was the case with Wave Fuels through much of the mid-2000s, until the model was changed. Starting then, the cooperative did not own the fuel and only provided marketing services.

Cost Shifting. The market is already highly concentrated among organized buying groups. Customers such as AVEC, North Star Gas, and various school districts make up the bulk of the gallons sold in the market. Given that the industry is not excessive in profit, any further consolidation of fuel buying would most likely yield no concessions from the fuel distribution companies. Without excess profits, any price concessions given to larger buying groups mean the fuel distribution companies must raise prices for another group of customers to maintain a reasonable margin for its operations as a whole. This cost shifting results in a zero sum gain for the market as a whole. In general, it is the smaller, less sophisticated segments of the market that tend to lose out with cost shifting. This is already occurring to some extent, with larger buyers generally paying lower prices. But increased consolidation would likely exacerbate the situation.

Reduced Competition. If a new or larger fuel cooperative was created and purchased all its fuel from only one distributor, the likely effect is that since only Crowley has the necessary equipment to service the whole group, the only bid would come from Crowley. While this may seem counterintuitive, the end result is to decrease competition because it removes from the market smaller volumes that smaller operators and/or new operators could service. This realization resulted in the market actually going in the other direction. AVEC, the largest fuel purchaser for small communities, allowed its volume to split in the last bidding cycle to allow a new market entrant, Ruby Marine, a chance to bid in the market area it services.[80] Northstar Gas also attempts to purchase fuel from multiple distributors, though the only market not served entirely by Crowley is Bethel. In Bethel, Northstar Gas purchases its fuel from Delta Western.

Other Infrastructure Improvements.

Opportunities exist for lowering the cost of fuel by making investments in infrastructure projects that the private sector or local governments would otherwise not make. These projects

[80] Ruby Marine was the successful bidder.

are expensive, but further investigation may reveal the costs are outweighed by the associated social benefits.

Community Connections. Investment in roads and power lines connecting communities may present the most important potential option for reducing energy costs (indeed, all costs) in rural Alaska and in promoting the development of economic activity in rural communities. For example, if two communities are connected by a road, then only one bulk fuel farm and one barge delivery is required. The associated fixed costs are shared by both communities and spread over more gallons of fuel. A truck can transport fuel from one community to the other as needed. Additionally, a power line connecting the two communities would reduce the need for multiple power plants. The remaining power plant will have a larger and potentially more stable load, allowing it to operate at higher efficiencies. Renewable energy systems could be scaled to potentially be more economically viable.

A research project could assess the capital and operational costs of road and transmission expansion between communities. The assessment should focus on community clusters -- as opposed to connection to the road system -- as an initial opportunity. This would mitigate local opposition, since connections will be limited, but still allow for economies of scale and reductions in other capital investments that will offset the cost of roads and wires. The cost of constructing roads and power lines in rural Alaska is high but the benefits would surely expand beyond lower fuel and energy costs. While not all communities would welcome these connections, there are likely a sufficient number that would welcome the opportunity to test this sustainability model.

Denali Commission Tank Farms. In over 100 communities with previously inadequate fuel storage capabilities, the Denali Commission has constructed new fuel storage capacity. These new storage facilities are environmentally sound, reducing the risk of environmental costs associated with a spill. The increased storage capability also reduces the amount of expensive fuel that needs to be flown in due to inadequate storage. However, in order for the new Denali Commission tank farms to be sustainable into the future, some entity needs to ensure that business plans associated with each new tank farm are followed. Otherwise two things can happen: 1) The tank farm falls out of compliance or minimum safety standards due to lack of maintenance. 2) Prices become unfairly competitive to surrounding villages. This does not represent a true competitive advantage, but instead, neglect.

Fuel Price Risk Management. In recent years the price of petroleum and its refined products has become increasingly more volatile. Volatile prices create financial risk for participants in the fuel market. In rural Alaska fuel markets, it appears that the entire fuel price risk falls on the final consumer.

Fuel distributors in rural Alaska bear none of the financial risk, as they are able to pass on the entire price of the refined products. When fuel is purchased on contract, as it generally is in Western Alaska, the contract stipulates that the price the distributors sells to the community is based on the price of the refined product at the time it was purchased plus a transportation

differential. If the price of fuel increases or decreases while during transport, it does not impact the fuel distributor's sales price

By bearing the full risk of fuel price volatility, rural communities do not necessarily pay higher prices. They do not, however, pay stable prices. When a community in Western Alaska enters into a fuel contract in early spring, the fuel distributor provides a quote for the expected delivered price of fuel. If prices are higher at the time the distributor purchases fuel from the refinery, the community will have more expensive fuel than expected. When a community does not know how much its fuel will cost, it is difficult to financially plan for the year, especially when fuel prices constitute such a large portion of household income.

A state sponsored fuel price hedging service would not reduce the price of fuel a community pays, but it would create certainty about the price of fuel a community would pay. A state sponsored financial institute could purchase financial instruments in the spring when communities are putting fuel contracts to bid. These instruments, such as the purchase of a futures contract to buy fuel at a future date at specific prices, could be used to ensure that communities know how much fuel will cost when it arrives during the summer. If a community participates in the financial program it may be locked into fuel either more or less expensive than it would be otherwise. On average, fuel would actually be slightly more expensive as purchasing futures contracts would involve a small premium. The benefit would be that the community would know exactly how much cash it needs to have on hand when the barge arrives and its residents would know exactly how much their heating bill and electricity would be the following year. Everyone would know how much they have to save, and whether they will have enough money to make other investments. .

A similar policy option would be to require more transparency on the fuel invoices that communities pay when they purchase fuel from distributors under contract. Currently, distributors disclose the cost of the refined product at the refinery but, unless asked, do not supply the lift date of the fuel. There is also no clear chain of custody that ensures that the fuel purchased by the community was actually lifted on the day the distributor claims. It is not expected that the fuel distributors are unfairly reporting the refinery lift price of the fuel they sell, but this research could not find evidence of accounting practices that could prove that they were not. The state could implement standards that would require increased accounting transparency for fuel purchased under contract. This would have little impact on prices unless fuel distributors are inaccurately reporting refinery prices and lift dates.