Components of Delivered Fuel Prices in Alaska

prepared for
Alaska Energy Authority

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Abstract

This is a systematic analysis of components of delivered fuel prices in Alaska. Data for the analysis include limited publicly available Alaska fuel prices (fall 2007 prices), as well as information the authors gathered from extensive interviews with fuel retailers and transporters, communities, and agencies. We identify the individual components of delivered fuel costs—including world price of crude oil, refining costs, transportation costs, storage and distribution costs, taxes and financing costs—and investigate how these factors influence the final retail prices of home heating fuel and gasoline. Transportation, storage, and distribution costs appear to be the most variable factors driving the large retail fuel price differentials among Alaska communities. Therefore, we investigate how factors such as seasonal icing, the number of fuel transfers enroute to specific communities, local storage and delivery infrastructure, marine and river characteristics, and distance from refineries or fuel hubs influence fuel prices. We did an in-depth analysis of how those factors influence prices in ten case study communities around the state—Allakaket/Alatna, Angoon, Bethel, Chitina, False Pass, Fort Yukon, Lime Village, Mountain Village, Unalakleet, and Yakutat. Together, the quantitative data and information on Alaska fuel logistics provide a comprehensive analysis of Alaska's fuel prices.

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Alaska Aerofuel, Inc.

Alaska Department of Commerce, Community and Economic Development

Alaska Energy Authority

Alaska Village Electric Cooperative

Angoon Oil and Gas

Azachorok Village Corporation in Mountain Village, Alaska

Brooks Fuel, Inc.

Chitina Native Corporation

Crowley Maritime Corporation

Everts Air Alaska

Fisher's Fuel Incorporated

City of Allakaket and Alatna

City of Mountain Village

Delta Western, Inc.

Denali Commission

Gwitchyaa Zhee Utility in Fort Yukon, Alaska

Henry Hill Services

Lime Village Traditional Council

Mark A. Foster and Associates

Norton Sound Economic Development Corporation

Osprey Lodge near Lime Village, Alaska

Peter Pan Seafoods in False Pass, Alaska

Petro Marine Services

Ruby Marine

Rural Alaska Fuel Services

Small Municipality Energy Assistance Program

Unalakleet Native Corporation

Contents

Tables and Figures

I. Introduction

Purpose

This study is a systematic analysis and comparison of the components of delivered fuel prices in Alaska. The Alaska Energy Authority asked the Institute of Social and Economic Research (ISER), at the University of Alaska Anchorage, to do the study. The more Alaskans know about what drives fuel prices in various communities, the more it may be possible to identify opportunities for reducing or mitigating the high fuel prices many Alaskans face.

The framework underlying the analysis is that the delivered *price* of fuel in Alaska communities equals the sum of the following components:

- World price of crude oil
- Refining cost (Alaska, West Coast, other)
- Transportation cost (truck, railroad, barge, air)
- Storage and distribution costs
- Taxes (federal, state and local)
- Other (including subsidies and abnormal profits)

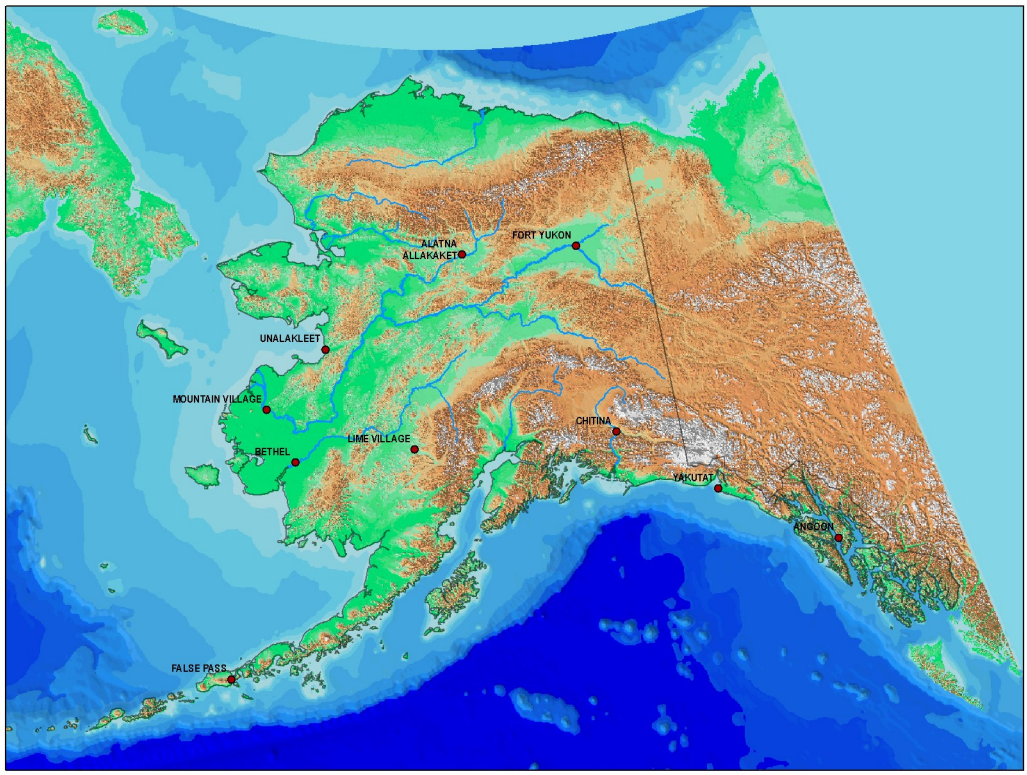
This framework holds true if the final component, "other," is calculated as the residual between total price and everything else. But the framework also serves as a research hypothesis: that the "other" component is generally small and/or readily identifiable as a bona fide cost. In other words, *delivered prices* ought to reflect *identifiable costs*.

Methods and report organization

We initially gathered information—mostly from existing sources—for 100 communities in Alaska. But we found that information was neither reliable enough nor consistent enough to use for statistical analysis. We therefore focused on comparative case studies of ten communities, reflecting as much as possible all the forces driving fuel prices around Alaska. Figure 1 shows locations of the study communities:

- Angoon
- Allakaket/Alatna
- Bethel
- Chitina
- False Pass
- Fort Yukon
- Lime Village
- Mountain Village
- Unalakleet
- Yakutat

Figure 1. Map of ten case study communities



Source: Meghan Wilson, ISER, 2007

In the rest of this section we provide some background discussion of fuel pricing and consumption in a national context. Section II covers world oil markets. In Section III we describe the refining process and refinery sources for Alaska fuel; we also present a statistical analysis of the relationship between crude oil prices and refined fuel prices. Section IV addresses product transportation and distribution—how fuel is transported and who stores, owns, and distributes the final products. Section V covers taxes, including federal excise taxes and state and local taxes. Subsidies and assistance programs are discussed in Section VI. Section VII reports the findings from the ten case studies. Section VIII concludes with a summary and discussion of some policy implications.

Background

"Petroleum" refers to crude oil or the refined products obtained by processing crude oil. Those include gasoline, diesel fuel, and heating oil.[1] Petroleum products are used in virtually every aspect of modern human life—heating our homes and offices, generating electricity, providing fuel so we can drive to the grocery store. Petroleum products are also used in plastics, foods, and medicines; they are part of things as diverse as tires, deodorant and ink.

[1] For more information on the physical characteristics of petroleum products, see: U.S. Energy Information Administration, Energy Basics 101, Petroleum Basics 101.
http://www.eia.doe.gov/basics/petroleum_basics.html

Fuel oil (also often called diesel) is one of several products distilled from crude oil and used for heating fuel or engine fuel. Alaskans use a number of petroleum products, including motor gasoline, diesel fuel #1, diesel fuel #2, aviation gasoline, and jet fuel. Motor gasolines are used in automobiles, small boats, and snowmachines; there are typically three grades of gasoline available (mostly in larger communities in Alaska). Diesel fuel #1 is a kerosene product used for heating fuel. Diesel fuel #2 is a light gas-oil used for home and commercial heating and as a motor fuel. Aviation gasoline and jet fuel are used to fuel aircraft, but a type of jet fuel is also often used for home heating. According to Crowley Marine, one of Alaska's largest fuel distributors, most of the diesel fuel in more populated areas like Southcentral Alaska and Fairbanks is ultra low sulfur diesel. Most villages in Western Alaska still use low sulfur diesel, because they are exempt from the ultra low sulfur diesel requirement until 2011.[2]

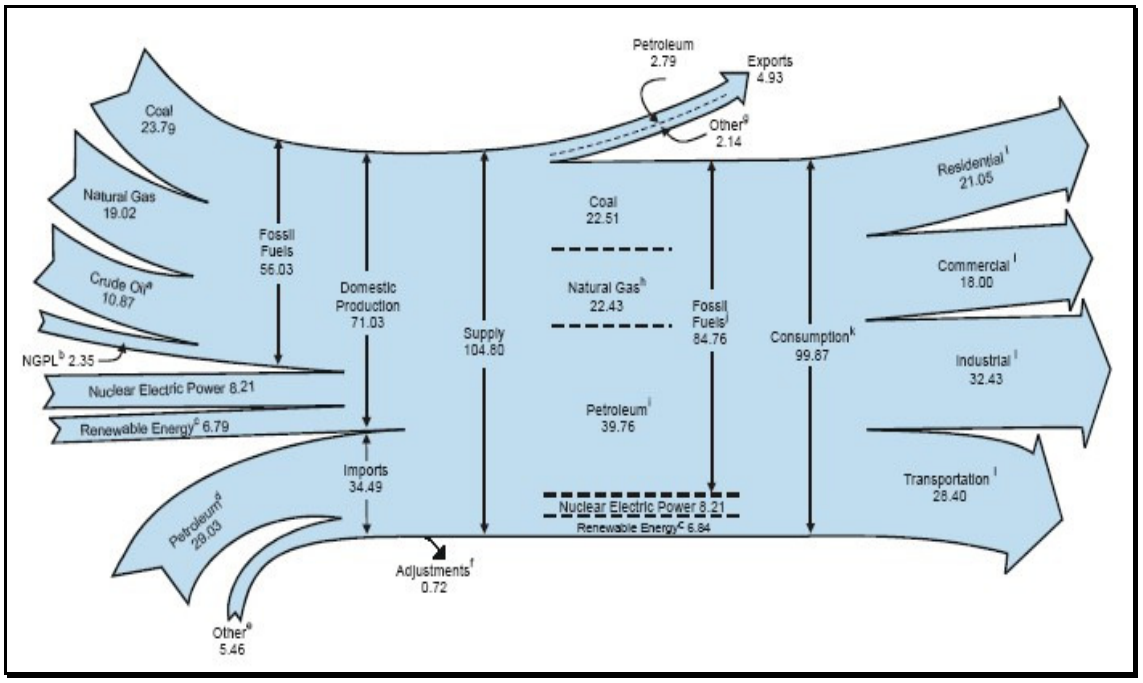
Alaska has the nation's highest per capita energy consumption, at 1,186 million Btu—almost four times the U.S. average of 342 million Btu—largely because so much jet fuel is consumed at the Anchorage and Fairbanks international airports.[3] Alaska produces more crude oil than any other state except Texas, but the prices of petroleum products in Alaska are among the highest in the country. According to state surveys, the average annual energy expenditure per household in rural Alaska is more than three times the U.S. average, while per capita income is less than 75% of the U.S. average. The burden of high energy prices falls particularly hard on remote communities, many of which also struggle with high unemployment, limited local economic bases, and local governments that are struggling to provide basic local services to residents and businesses.[4]

Fuel prices and components in the national context

Figure 2 illustrates the flow of energy (both domestic production and imports) through the U.S. economy, including final consumption by sector. Petroleum accounts for about 40% of total energy consumption.

[2] Phone Interview with Craig Tornga, Crowley Marine. October 24, 2007.
[3] Energy Information Administration, Annual Energy Review 2006. State-Level Energy Consumption, Expenditures and Prices, 2004.
[4] State of Alaska, Division of Community Advocacy – Report to the Commissioner. December 2005. Current Community Conditions: Fuel Prices across Alaska.

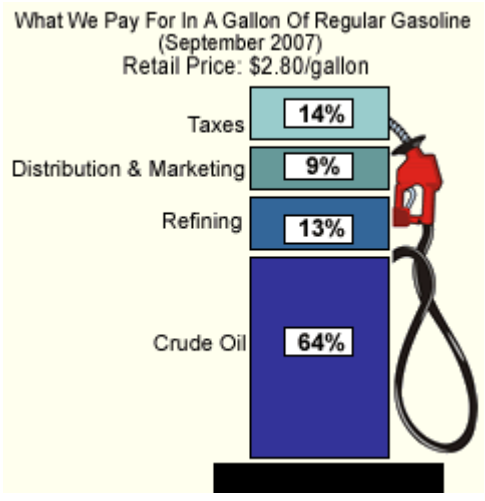
Figure 2. Energy flow through the U.S. in 2006 (Quadrillion Btu)

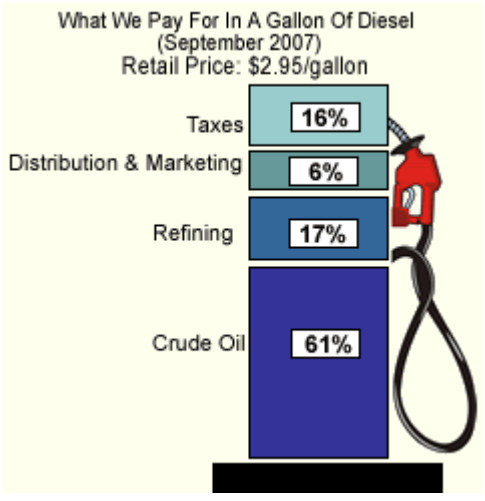


Source: Energy Information Administration, Annual Energy Review 2006

The Energy Information Administration has conducted research to determine the components of retail fuel prices. It believes the cost to produce and deliver fuel to consumers includes crude oil, refining, distribution and marketing, and taxes.[5] Figure 3 shows these components for gasoline and diesel prices as of September 2007.

Figure 3. Components of U.S. gasoline and diesel fuel prices, September 2007





Source: Energy Information Administration, Gasoline and Diesel Fuel Update.

[5] Energy Information Administration. Gasoline and Diesel Components. Gasoline Components History. 2006.

Crude oil prices are determined by worldwide supply and demand and are influenced by natural and political events that affect or potentially affect supplies. Consumption of and demand for crude oil products have increased, putting intense pressure on world crude oil supplies.

Refineries in the U.S. have operated at over 90% capacity during the last 10 years. The refining cost component is calculated by EIA as the difference between the monthly average of the spot price of gasoline or diesel fuel at the refinery and the average price of crude oil purchased by refiners.

Distribution and marketing costs include bulk storage, tanker truck transport, and retail sales operations (such as gas stations). In addition to seasonal shifts in demand caused by the winter heating season, retail fuel prices tend to rise with increasing distance between retail locations and distribution terminals and refineries. Areas farthest from the Gulf Coast, which is the source of nearly half the diesel fuel produced in the U.S., tend to have higher prices. Finally, the cost of doing business depends on location—including sources of supply, other competitors, and number of employees.[6] This component is calculated as the difference between the average retail price of gasoline or diesel fuel and the sum of the other three components (taxes, crude oil and refining).

Federal excise taxes were 18.4 cents per gallon on gasoline and 24.4 cents per gallon on diesel for motor fuel as of 2007, while state excise taxes averaged about 21.8 cents per gallon. Some states, counties, and cities levy additional taxes. Fuel oil used for home heating—which is also often called diesel and is virtually identical to diesel used for motor fuel—is exempt from federal and state taxes but is subject to local sales taxes.

The components of the cost of both gasoline and diesel have increased rapidly over the past few years. EIA statistics show that the prices of both diesel and gasoline doubled between 2002 and 2006. The broad pattern of component costs is similar for both fuels and both time periods. But the component breakdowns for these prices (Table 1 and Table 2) reveal some interesting possible trends. Costs of crude oil and refining made up larger percentages of the retail price in 2006 and taxes a smaller percentage. Distribution costs made up less of the retail price of gasoline but more of the price of diesel in 2006.

[6] EIA, 2006.

Table 1. Components of U.S. retail gasoline prices, 2002 and 2006

Month/Year	Retail Price (per gallon)	Refining (percentage)	Distribution and Marketing (percentage)	Taxes (percentage)	Crude Oil (percentage)
September 2002	$1.40	10.8%	12.6 %	30.0%	46.7%
September 2006	$2.80	12.8%	8.6%	14.2%	64.3%

Source: Energy Information Administration, Gasoline Components History.

Table 2. Components of U.S. retail diesel fuel prices, 2002 and 2006

Month/Year	Retail Price (per gallon)	Refining (percentage)	Distribution and Marketing (percentage)	Taxes (percentage)	Crude Oil (percentage)
September 2002	$1.41	12.0%	7.5 %	34.2%	46.3%
September 2006	$2.78	13.8%	15.2%	19.1%	51.9%

Source: Energy Information Administration, Diesel Components History.

II. Crude oil prices

World crude oil prices

- Crude oil is a global commodity and crude oil prices are determined by global supply and demand. Apart from an allowance for tanker transportation costs and quality differentials, it makes economic sense to speak of the world price of oil.
- The price of crude oil is one of the most significant factors determining the price of petroleum products. The prices of gasoline and diesel—and especially the *changes* in those prices—are largely determined by the worldwide demand for and supply of crude oil.
- World crude oil prices reflect the interactions of thousands of buyers and sellers, each with their own knowledge and expectations about the demand for and supply of crude oil and petroleum products. These interactions occur in both the physical and the futures markets, with the resulting prices reflecting both current and future expected supply and demand conditions.[7]
- Regional and local markets for refined products are also influenced by the level of competitiveness in these markets and the costs of distribution to end-users.

Petroleum products represent a critical source of fuel for the world's economy, with oil being the largest source of energy for the world economy. The value of crude oil is driven by demand for petroleum products, particularly for use in transportation. Petroleum products power most motor vehicles, aircraft, marine vessels, and trains worldwide. In total, products derived from oil, such as motor gasoline, jet fuel, diesel fuel, and heating oil, supply nearly 40 percent of the energy consumed by households, businesses, and manufacturers. Natural gas and coal, by comparison, each supply less than 25 percent of the world's energy needs.[8]

According to the American Petroleum Institute (API), current high world oil prices result from sustained, strong economic growth, notably including that in China. This economic growth resulted in stronger-than-anticipated global demand for these fuels, which reduced excess production capacity as well as the quality of the crude oil available in the marketplace. These changes in global supply and demand were compounded by unexpected losses in both crude oil production and refining capacity in the United States as a result of damage from hurricanes Katrina and Rita in 2005. Oil prices have risen sharply, particularly for better-quality crude oils. In summary, API attributes changes in world oil prices and subsequent prices of refined products to be driven largely by the forces of supply and demand.[9]

The Energy Information Administration (EIA) also attributes current oil prices and volatility to overall shifts in supply and demand, but to a number of specific international events as well. In 2000, real oil prices fluctuated between $20 and $30 per barrel (year 2006 dollars) and had been relatively stable since 1986 (Figure 4). The recession in the

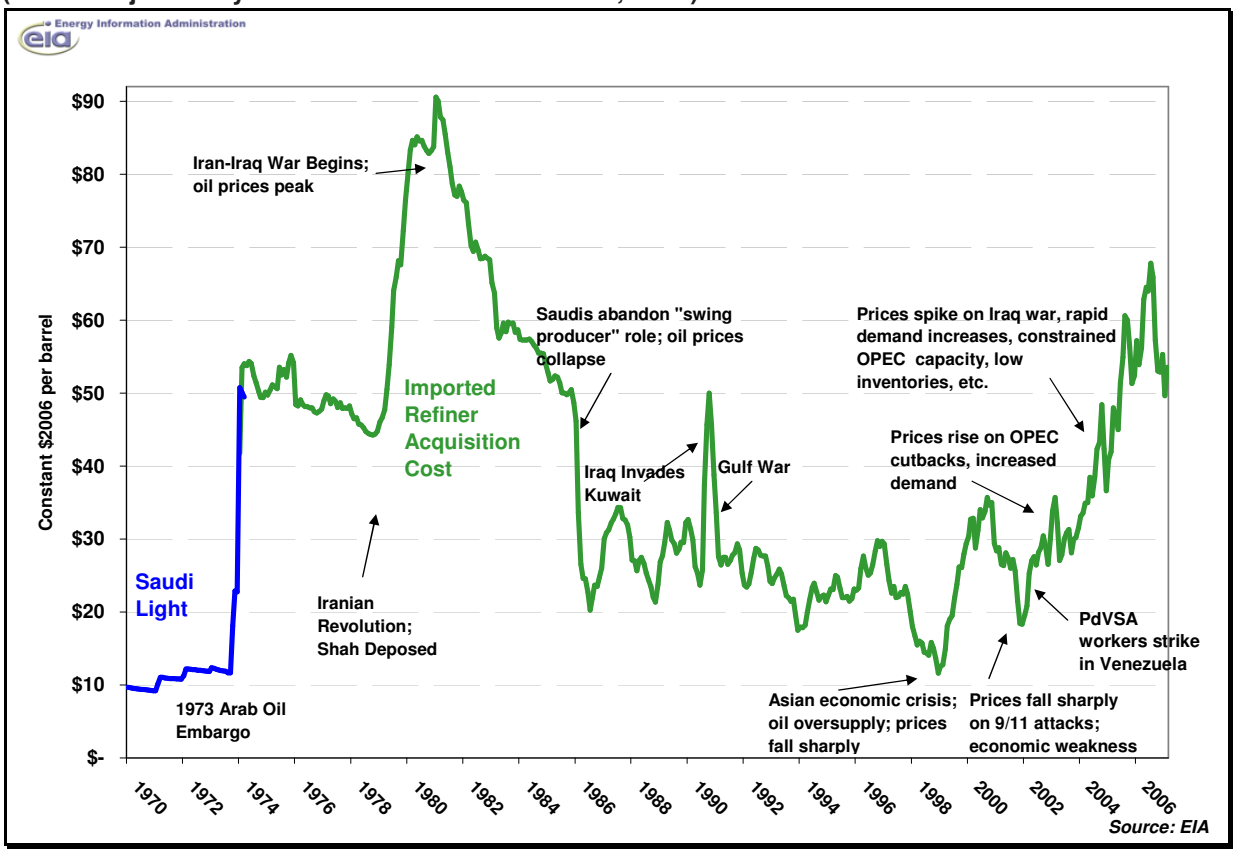
[7] Grant, Kenneth, 2006, et al., p. 2.
[8] U.S. Energy Information Administration, International Energy Outlook 2005, Table A2.
[9] Grant, 2006.

U.S. following the September 11, 2001 attacks reduced demand and caused oil prices to drop below $20 a barrel. In the following two years, however, the U.S. economy began to rebound, increasing energy demand and causing an upward trend in oil prices. The current upward trend of oil prices largely began in late 2003.

After the U.S. invaded Iraq, world oil prices began to escalate sharply. The war in Iraq proved to be more complicated than originally predicted, and energy market uncertainty was further exasperated in August 2003 when Iraqi insurgents began attacking an oil pipeline in northern Iraq.

In 2004, the price of oil reached $50 a barrel. In addition to the deteriorating security situation in Iraq and the regular attacks on pipelines, workers in oil-rich Nigeria launched a general strike to protest rising domestic fuel prices.

Figure 4. Major events and real world oil prices, 1970-2006
(Prices adjusted by CPI for all Urban Consumers, 2006)



By the end of 2005, oil prices hit $70 a barrel and then stabilized between $60 and $70. EIA blamed instability in Iraq, mounting ethnic unrest in Nigeria, concerns about Iran's nuclear program, and growing energy demand in China for the dramatic price increase. Contributing to rising oil prices was also Hurricane Katrina, which devastated the eastern coast of the Gulf of Mexico, damaging offshore oil rigs, disrupting supply, and affecting U.S. refining capacity.

These events were followed in 2006 by a number of other events—growing unrest in Iraq; Russia's temporary reduction of gas supplies to Europe; the threat of sanctions against Iran; an escalating ethnic insurgency in Nigeria's oil-producing region; a low-

scale war between Israel and Lebanon; an attack on Saudi Arabia's Abqaiq oil facilities; and a temporary shutdown of a section of the trans-Alaska oil pipeline. EIA cites all these events as contributing to 2006 oil prices of over $80 a barrel. During October 2007, oil prices reached record highs—tied to growing fears that Turkey would invade northern Iraq, the weak U.S. dollar, and impending increased winter demand for energy. Prices have continued up throughout the first half of 2008, rising above $130 a barrel.

OPEC (the Organization of Petroleum Exporting Countries) blames the spike on geopolitical developments and speculation and maintains there is no supply shortage and no reason to boost production—but as of fall 2007 it held out the possibility of meeting to discuss additional supply boosts.[10] Table 3 shows the volatility in world oil prices and markets during fall 2007. Monthly Alaska North Slope oil prices from 1988 to 2007 are shown in Table 4.

Despite these higher prices, the world economy grew in 2004 and 2005. A worldwide recession in response to high oil prices would have dampened price increases, but sustained economic growth fueled continued demand. With the current geopolitical outlook, world oil prices are likely to continue to rise.[11]

[10] Power and Interest News Report, 29 October 2007, "Record Oil Prices and Washington's Desire for Energy Independence".
[11] Power and Interest News Report, 09 August 2006, "Economic Brief: Alaska Pipeline Shutdown and the Rise of Oil Prices".

Table 3. World crude oil prices by location and type

(US dollars per barrel)

Crude Type	9/28/2007	10/5/2007	10/12/2007	10/19/2007	10/26/2007	11/2/2007
Total World	75.91	75.57	75.66	80.12	81.27	86.02
United States	73.50	73.65	73.39	77.84	79.47	83.69
OPEC* Average	76.52	76.18	76.22	80.58	81.62	86.47
Abu Dhabi, Murban 39º	79.40	78.53	78.88	82.17	83.52	87.98
Algeria, Saharan Blend 44º	80.09	79.80	79.65	84.67	85.49	91.12
Angola, Cabinda 32º	76.40	75.69	74.75	79.48	80.44	85.72
Dubai, Fateh 32º	75.61	74.00	73.92	77.23	78.90	83.22
Gabon, Mandji 30º	NA	NA	NA	NA	NA	NA
Indonesia, Minas 34º	79.08	80.95	80.83	84.74	86.98	92.34
Iran, Heavy 30º	75.37	74.68	74.41	78.43	79.40	84.89
Iran, Light 34º	76.91	76.23	76.03	80.13	81.10	86.59
Iraq, Kirkuk 36º	73.94	74.28	74.67	79.25	79.63	85.45
Kuwait, Kuwait 31º	73.97	72.88	72.85	76.19	77.72	82.40
Libya, Es Sider 37º	77.00	77.19	77.56	82.45	83.37	89.13
Neutral Zone, Khafji 28º	75.77	75.56	75.58	80.16	81.43	85.81
Nigeria, Bonny Light 37º	80.96	80.44	80.19	85.15	86.12	91.42
Nigeria, Forcados 31º	80.56	80.04	79.84	84.81	85.76	91.02
Qatar, Dukhan 40º	78.22	78.55	78.98	80.71	81.17	85.72
Saudi Arabia, Arabian Heavy 27º	73.12	72.46	72.48	77.06	78.33	82.41
Saudi Arabia, Arabian Light 34º	75.77	75.56	75.58	80.16	81.43	85.81
Saudi Arabia, Arabian Medium 31º	74.37	73.91	73.93	78.51	79.78	83.86
Venezeula, Bachaquero 17º	NA	NA	NA	NA	NA	NA
Venezeula, Bachaquero 24º	NA	NA	NA	NA	NA	NA
Venezuela, Tia Juana Light 31º	74.77	74.57	75.17	80.29	80.43	84.66
Non-OPEC* Average	75.18	74.85	74.99	79.59	80.85	85.48
Australia, Gippsland 42º	81.50	80.08	79.26	83.35	84.68	90.04
Cameroon, Kole 34º	76.16	76.58	76.55	81.78	81.59	87.30
Canada, Canadian Par 40º	80.89	80.61	77.71	81.99	85.48	88.30
Canada, Heavy Hardisty 22º	60.99	60.13	60.02	61.87	67.94	69.52
China, Daqing 33º	76.47	77.46	77.07	80.93	83.04	88.32
Colombia, Cano Limon 30º	77.51	76.64	77.10	82.38	83.53	87.78
Ecuador, Oriente 30º	67.56	67.18	67.53	72.79	74.02	77.98
Egypt, Suez Blend 33º	72.43	72.82	73.16	77.59	78.17	84.08
Gabon, Mandji 30º	NA	NA	NA	NA	NA	NA
Malaysia, Tapis Blend 44º	84.40	84.04	83.49	87.26	88.81	94.33
Mexico, Isthmus 33º	74.66	74.46	75.06	80.18	80.32	84.55
Mexico, Maya 22º	66.60	66.41	66.98	71.72	72.04	76.43
Norway, Ekofisk Blend 42º	79.20	79.26	79.23	84.32	84.92	90.44
Oman, Oman Blend 34º	75.63	74.45	74.47	77.84	79.23	83.28
Russia, Urals 32º	75.43	74.96	75.88	81.00	81.47	86.72
United Kingdom, Brent Blend 38º	77.96	78.07	78.66	83.61	84.14	89.40

Source: Energy Information Administration, November 2007.

See http://tonto.eia.doe.gov/dnav/pet/pet_pri_wco_k_w.htm for detailed information on price sources and definitions.

Last Updated 11/07/2007 - = No Data Reported; -- = Not Applicable; NA = Not Available; W = Withheld to avoid disclosure of individual company data. Degrees refer to specific weight and quality of crude.

Alaska crude oil prices

There is no price for Alaska crude oil on the New York Mercantile Exchange (NYMEX) or other commodity exchanges. The spot price of Alaska North Slope (ANS) crude oil is calculated by subtracting a market differential from the price of West Texas Intermediate (WTI) quoted on the NYMEX. Four different assessment services estimate that market differential and report a daily spot price for ANS.[12]

As can be seen in Table 4, month-to-month crude oil prices are volatile—monthly ANS West Coast prices ranged from $17.52 per barrel to $73.10 per barrel between 2002 and 2007 alone. But the trend has been up dramatically since 2002. As recently as December 1998, ANS prices dipped as low as $9.39.The 60-month moving average for the period from 1988 to 2007 was $42.62 per barrel.

Table 4. Alaska monthly crude oil prices, 1988 to 2007

($$ per barrel, nominal dollars)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1988	14.23	14.03	13.79	15.29	14.86	14.14	13.70	13.63	12.58	11.34	11.36	13.23
1989	15.11	15.99	17.25	19.37	17.64	17.00	16.78	16.04	16.62	17.27	17.49	19.07
1990	20.00	19.30	17.91	14.82	14.38	13.20	15.55	25.99	32.16	31.53	28.79	24.02
1991	20.57	15.74	17.02	17.56	16.67	16.36	17.25	17.18	17.37	18.47	17.57	14.83
1992	14.92	15.30	15.50	16.96	18.03	20.20	19.40	17.97	18.46	18.71	17.46	16.33
1993	15.62	16.78	17.35	18.17	17.47	16.02	14.84	15.42	14.98	15.39	13.07	10.29
1994	11.66	12.59	12.91	14.96	16.47	16.43	16.52	16.66	16.11	16.02	16.71	15.38
1995	16.16	17.14	17.31	18.36	18.43	17.43	16.23	16.72	16.65	15.96	15.88	16.94
1996	17.23	17.78	20.40	22.04	19.65	18.98	19.79	19.90	21.69	22.60	21.50	23.66
1997	23.57	21.03	20.07	18.54	19.41	17.30	17.48	17.98	18.09	19.59	18.33	16.39
1998	14.79	13.39	12.25	12.41	12.31	11.62	12.92	12.49	14.13	13.38	11.47	9.39
1999	10.69	10.43	13.07	15.64	15.86	15.82	18.16	20.08	22.96	21.83	23.65	24.54
2000	25.74	27.65	28.01	23.83	27.15	29.62	27.63	29.40	32.25	31.56	32.74	23.72
2001	24.37	26.02	24.70	25.55	26.70	25.82	24.60	24.12	23.21	19.45	17.23	16.69
2002	17.52	19.14	22.76	24.99	25.87	24.16	25.82	27.39	28.76	27.53	24.69	28.03
2003	31.91	35.20	32.59	25.59	26.19	29.35	29.17	30.22	27.09	28.55	29.11	30.67
2004	33.10	33.66	35.50	35.43	39.07	36.73	39.44	43.12	42.71	48.56	42.15	36.66
2005	41.12	43.59	50.63	49.75	46.77	53.67	56.67	62.40	63.47	60.37	56.11	57.17
2006	62.85	59.26	60.61	67.74	69.32	69.50	73.10	71.74	62.33	54.27	54.26	58.13
2007	51.52	57.00	59.01	63.92	64.76	69.11	75.93	73.83	79.72			

Source: Alaska Department of Revenue, Tax Division, November 2007,
http://www.tax.state.ak.us/programs/oil/prices/index.asp
Spot prices are unaudited and do not reflect Production Tax Settlement Values
Effective December 2003, the ANS west coast published price is the Department of Revenue's calculated ANS West Coast average spot price.

All of Alaska's oil production is delivered to refineries on the U.S. West Coast, including Alaska and Hawaii. Consequently, Alaska's royalty and production tax revenue depends in large part on the average market price of ANS crude oil at U.S. West Coast refining centers.

[12]Alaska Department of Revenue, Tax Division, Revenue Sources Book, 2007, p. 10.

III. Refining

Crude oil has to be refined to extract useful products. This section describes the refining process and the types of petroleum products produced; provides a list of the refineries that supply Alaska markets; examines the relationship between crude oil prices and refined product prices, including a comparison of refined product prices from different refineries; and describes some of the sources of refined petroleum product prices.

Refining process

Crude oil is a mixture of hydrocarbons that exists in liquid form in underground reservoirs. It may also include small amounts of gaseous hydrocarbons that are liquefied upon extraction, and some non-hydrocarbons such as sulfur and various metals.

Refining is the process of converting crude oil into various marketable petroleum products by separating component hydrocarbons. It can also involve chemical reactions and the blending of components and additives. The separation of hydrocarbons is most commonly achieved by fractional distillation. Fractional distillation is the process of heating a mixture to separate it into its component parts (fractions), each of which has a different boiling point. The mixture is boiled, transforming its components into vapor. Beyond the chamber in which the mixture is boiled is a distillation column with outlets at different heights, corresponding to where each fraction condenses after it rises and cools. The heavier fractions (those with higher boiling points) condense lower in the column, while the lighter fractions (those with lower boiling points) condense higher in the column. After condensation, the fractions exit the column in liquid form, each through a different outlet.

Types of refined petroleum products

After isolation, the various hydrocarbons may be mixed to produce a number of petroleum products, including motor gasoline, aviation gasoline, jet fuels, #1 distillate, #2 distillate, and asphalt, among many other potential products. Motor and aviation gasoline are difficult to produce and require complex refining equipment. Common petroleum products include:

- **Motor gasoline** is the type of fuel used in most vehicles with internal combustion engines. The production of the various grades of gasoline is complex, compared with other types of fuel, and requires expensive and sophisticated equipment. One 42-gallon barrel of crude oil produces about 20 gallons of gasoline.[13]
- **Aviation gasoline** is used in aircraft with reciprocating engines. It is subject to especially stringent specifications.[14]
- **Jet fuel** is a kerosene-based fuel used in aircraft with turbine engines. The two main types are Jet A and Jet B, which have the corresponding military designations JP-5 and JP-4. Jet-A is often sold in Alaska as fuel oil/heating oil at

[13] U.S. Energy Information Administration

[14] Keiser, Gretchen and Teal, David, House Research Agency, Alaska State Legislature. Fuel Consumption and Pricing in Alaska: A Regional Analysis. January 1984.

the price of #2 fuel oil. One reason why it is sometimes sold for heating fuel is that it has a low pour point—meaning that it won't gel until it reaches a very low temperature.[15]

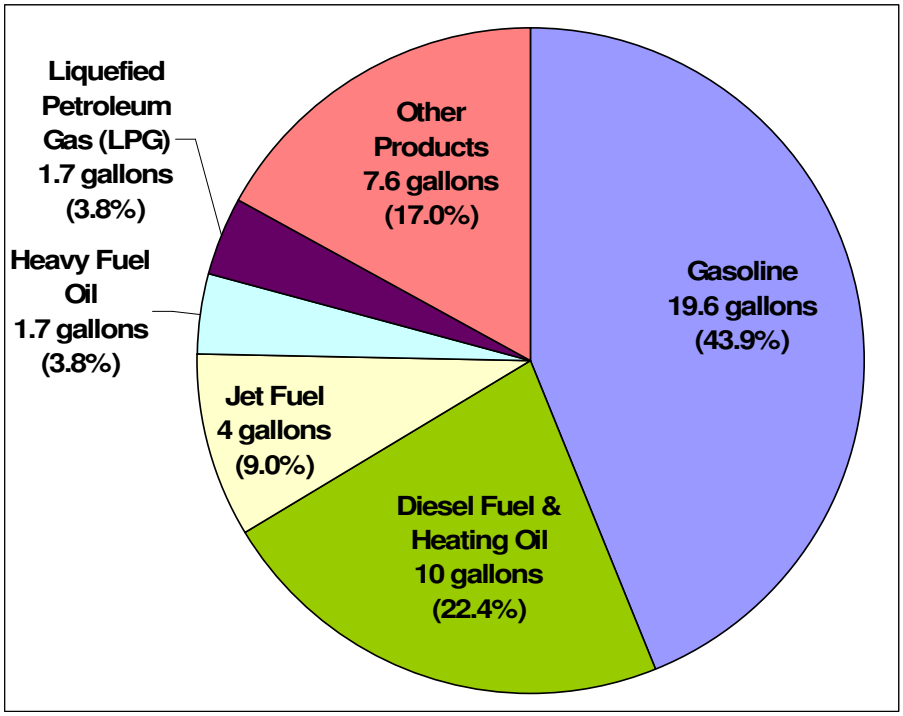
- **#1 distillate** can be used as fuel oil/heating oil or as a diesel fuel for high-speed diesel engines that operate at frequently changing speeds, such as city buses.[16] It is available at various sulfur levels: high sulfur, low sulfur, and ultra low sulfur.
- **#2 distillate** can be used as fuel oil/heating oil or as a diesel fuel for high-speed diesel engines operating at relatively constant speeds and loads—like locomotives. It must meet different specifications, depending on how it's used. It's available in various sulfur levels: high sulfur, low sulfur, and ultra low sulfur.

Figure 5 shows, in broad categories, how much of each type of product is extracted from a barrel of crude oil. You may note that while a barrel contains 42 gallons of crude oil, the total output volume of refined product according to this figure is 44.6 gallons. This chart is based on data from the Energy Information Administration. Another source, the California Energy Commission, gives 48.43 gallons as the total output volume, on average, from a barrel of crude. This increase is called *processing gain*, and is due to the addition of various additives, such as alkylates. Also worth noting is that the latter source gives 51.4% as the percentage of output that is gasoline, rather than the 43.9% indicated by the EIA numbers. This is due partly to the addition of ethanol to gasoline at a level of 5.7% by volume, as required in California, which brings the total output volume up to 49.59 gallons for California refineries.

[15] Communications with Craig Torgen at Crowley Maritime Corporation, October 2007. Also, Alaska Department of Environmental Conservation, Division of Air Quality. http://www.dec.state.ak.us/AIR/anpms/as/ulsd/ulsd-bkgrd.htm

[16] EIA, 2007.

Figure 5. Quantity of refined products yielded from one barrel of crude oil



Source: U.S. Energy Information Administration

Diesel fuel sulfur content regulations

Diesel fuels are subject to new regulations regarding sulfur content. The U.S. Environmental Protection Agency (EPA) finalized the Highway Diesel Rule in January 2001, and the Non-road Diesel Rule in June 2004, mandating the use of cleaner-burning ultra-low-sulfur diesel (ULSD)—diesel with no higher than 15 ppm sulfur content), for road and non-road uses, respectively. This cleaner-burning fuel, along with new equipment on tailpipes and exhaust stacks that require it, will "dramatically reduce particulate matter and nitrogen oxides in diesel exhaust."[17] The Highway Diesel Rule took effect in 2006, and the Non-road Diesel Rule in 2007. However, because of the unique characteristics of rural Alaska, including its geography, economy, air quality, and distribution challenges, the effective dates were extended for rural areas of the state. They will be allowed to use diesel with uncontrolled sulfur content for all uses until 2010 beginning the transition to ultra-low-sulfur diesel on January , and finishing by December 1, 2010. Urban areas of Alaska (those served by the Federal Aid Highway System) were required to adhere to the same implementation schedule as the other states.[18]

The ULSD regulations do not apply directly to fuel used for home heating or jet fuel.[19] However, there will be indirect effects on heating fuel prices, because most fuel used for heating will probably be ULSD. That's because for many communities, it would be impractical to separately store both a less expensive type of fuel to use for heating (higher

[17] Alaska Department of Environmental Conservation (DEC), Division of Air Quality. http://www.dec.state.ak.us/AIR/anpms/as/ulsd/ulsd-bkgrd.htm
[18] EPA. http://www.epa.gov/otaq/regs/fuels/diesel/420f06040.htm
[19] DEC. http://www.dec.state.ak.us/AIR/anpms/as/ulsd/ulsd-bkgrd.htm

sulfur Jet A, #1 fuel oil, #2 fuel oil) as well as ULSD for other purposes—so they will have to use only ULSD. According to the Alaska Department of Environmental Conservation (DEC), "The fuel storage and distribution infrastructure in rural Alaska is designed to handle a single grade of diesel fuel." In some communities, especially hub communities, there will be enough demand for Jet A for turboprop and turbojet aircraft that it may be purchased in large enough quantities to use for home heating as well.

The transition to ULSD will mean higher diesel and heating fuel prices for Alaska communities. It will also increase the cost of diesel-generated electricity, both because of the more expensive fuel and the more expensive equipment that will also be required by the regulations.

Sources of refined petroleum products sold in Alaska

Petroleum products consumed in Alaska come from refineries in Alaska and, to a smaller extent, out-of-state refineries. Table 5 lists Alaska's six refineries, along with their capacity, measured in barrels of crude oil input per day.

Table 5. Alaska petroleum refineries

	Total input capacity as of Jan. 1, 2007 (barrels/day)
Flint Hills Resources Alaska LLC (North Pole)	210,000
Tesoro Petroleum Corp. (Nikiski/Kenai)	72,000
Petro Star Inc. (Valdez)	48,000
Petro Star Inc. (North Pole)	17,500
ConocoPhillips Alaska Inc. (Kuparuk)	15,000
BP Exploration Alaska Inc. (Prudhoe Bay)	12,500
Total	375,000

Source: U.S. Energy Information Administration

Alaska crude oil production in 2006 was 741,000 barrels per day,[20] about twice the total input capacity of Alaska refineries. Also, Alaska refineries aren't currently producing at full capacity. Estimated total production from the Flint Hills, Tesoro, and Petro Star refineries in early 2008 was roughly 127,000 barrels per day.

The Flint Hills refinery in North Pole was originally built by Mapco in 1977 to coincide with the completion of the trans-Alaska oil pipeline and taps directly into the pipeline.[21] The refinery is the largest in Alaska with a current capacity of 210,000 barrels per day—more than half Alaska's total refinery capacity and more than three times the capacity of Tesoro's refinery in Nikiski. Flint Hills acquired the refinery in 2004. It produces gasoline, jet fuel, heating oil, diesel, gasoil, and asphalt. About 60 percent of its output is sold in the aviation market. It has terminals in Anchorage, to which fuel is transported by rail, and Fairbanks, to which fuel is transported by truck.[22]

[20] EIA. http://tonto.eia.doe.gov/dnav/pet/hist/mcrfpak1A.htm
[21] Keiser & Teal, 1984.
[22] EIA and Flint Hills Resources website, http://www.fhr.com/alaska/

A second refinery in North Pole along the oil pipeline was built by Petro Star in 1983. This refinery has a capacity of 17,500 barrels per day and produces commercial and military jet fuel, kerosene, diesel, and heating oil. Petro Star is owned by Arctic Slope Regional Corporation. It distributes its products to communities, military bases, and commercial customers in the Interior and the North Slope.[23]

Petro Star built another, larger refinery in Valdez that began operation in 1993. That refinery has a capacity of 48,000 barrels per day and produces commercial jet fuel, military JP-8 and JP-5 jet fuel, marine diesel, heating oil, and turbine fuel. Its primary market is in fuel for military and commercial aviation.

The Tesoro refinery in Nikiski was built in 1969 and was the second refinery built in Alaska, after Chevron's Nikiski refinery was built in 1963.[24] Chevron closed its refinery in 1991 due to "eroding profit margins and increasing liability risks."[25] These refineries were built to process crude oil discovered in Cook Inlet in 1957. The Tesoro refinery currently has a capacity of 72,000 barrels per day, making it the second largest refinery in Alaska.[26] With the completion of a diesel de-sulfurizer unit in May 2007, Tesoro became the first producer of ultra-low-sulfur diesel in Alaska. The unit has a capacity of 10,000 barrels per day.[27]

The ConocoPhillips refinery in Kuparuk and the BP refinery in Prudhoe Bay are topping plants that supply fuel to meet the North Slope oil producers' own needs and do not sell to the general public. ConocoPhillips recently cancelled a $300 million upgrade to its refinery that would enable the production of ultra-low-sulfur diesel, citing a lack of tax breaks under the new Alaska oil tax rules.[28]

Most of the fuel distributed to rural Alaska communities is produced by Alaska refineries, the exception being communities in Southeast Alaska, which receive a significant share of their fuel from refineries in Washington. Fuel distributed to Alaska customers in general also occasionally comes from refineries in Anacortes, Washington, and even places as distant as Korea and Russia. However, the cost of transporting the fuel over such long distances is usually greater than any savings from purchasing it from out-of-state refineries. For example, since 1983, adjusting for inflation, the average Alaska wholesale price for #2 distillate was only 4.4% higher than the average Washington price. Since 2000, the Alaska average was only 0.5% higher.[29] Table 6 ranks average wholesale prices for #2 distillate by region from 2000 to 2007.

[23] EIA and Petro Star, Inc. website, http://www.petrostar.com/
[24] Keiser & Teal, 1984.
[25] Richardson, Jeffrey. Alaska Business Monthly. *Refining rivalry.* June 1, 1991. http://www.allbusiness.com/north-america/united-states-alaska/165637-1.html
[26] EIA, 2007.
[27] Tesoro Corporation website. http://www.tsocorp.com
[28] Loy, Wesley. Anchorage Daily News. *Conoco cancels refinery upgrade on North Slope*. November 27, 2007.
[29] EIA, 2007.

Table 6. Average wholesale #2 price from refiners by region, 2000-2007 (in 2007 dollars)

Region	#2 price	% U.S.
Rocky Mountain (PADD 4)	$ 1.454	108.3%
West Coast (PADD 5)	$ 1.425	106.1%
Alaska	$ 1.418	105.6%
Washington	$ 1.412	105.1%
Midwest (PADD 2)	$ 1.361	101.4%
U.S.	$ 1.343	100.0%
East Coast (PADD 1)	$ 1.316	98.0%
Gulf Coast (PADD 3)	$ 1.298	96.7%

Source: U.S. Energy Information Administration

There are two refineries in Anacortes: Shell Oil Products U.S., with a capacity of 145,000 barrels per day of crude oil input, and Tesoro West Coast, with a capacity of 120,000 barrels per day, for a total of 265,000 barrels per day (bpd).[30] South Korea, while it produces no crude oil, has a total refinery capacity of 2,577,000 barrels per day, ranking it fifth in the world. North Korea has a capacity of 71,000 bpd. Russia has a total refinery capacity of 5,339,000 bpd, ranking it second in the world. The U.S. ranks first, with a total capacity of 17,397,000 bpd.[31]

Relationship between crude oil prices and refined product prices

In addition to the Energy Information Administration (EIA), the Oil Price Information Service (OPIS) provides petroleum product price information for various locations around the world. OPIS prices are often used as a benchmark price for fuel suppliers when making price quotes. When a fuel supplier quotes a price to a community, this price is typically based on an OPIS price for the day of the quote, plus an additional amount to cover the service of handling and transporting the fuel, although often only a single quoted amount (the sum) is provided.[32]

The price data from EIA used in the analysis below comes from Form EIA-782A, *Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report.* These data differ from the OPIS price data in several ways. The purpose of the EIA-782 survey, according to EIA, is to collect data "to fulfill legislative mandates from Congress and to provide comprehensive information for evaluating market behavior." OPIS is privately owned and is a paid subscription service, with historical data available for a fee, while EIA current and historical data is freely available to the public.

While EIA has broader coverage (the information is collected from a census of refiners, while OPIS data is collected from a sample), OPIS has much more detail and is a "real-time" service that serves a different purpose. OPIS updates prices daily, while EIA updates its data on a monthly basis. OPIS provides data by city, while EIA provides data by region (Petroleum Administration for Defense District, or PADD) and in some cases

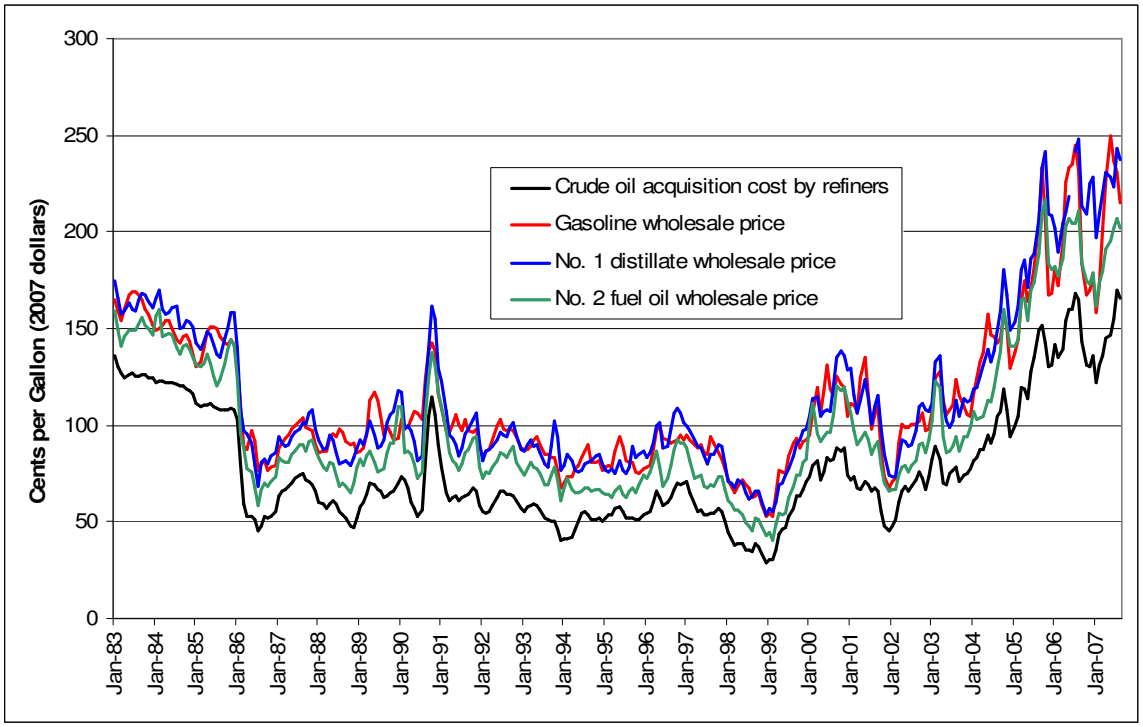
[30] EIA, 2007.
[31] EIA. Country Energy Profiles. http://tonto.eia.doe.gov/country/index.cfm
[32] Personal communications with Crowley and Matt Sweetsir at Ruby Marine, October 2007

by state. OPIS also takes into account many variables that define specific types of fuel, to break fuel out into more subcategories.

There are a number of other differences between OPIS and the EIA-782 methodologies and purposes, but the prices they report track each other closely.[33] EIA price data are used in this analysis because of the free availability of historical prices, accessible and comprehensive documentation, and less complex categorization of fuel types.

Figure 6 and Figure 7 show the relationship of refiner acquisition cost of crude oil[34] and refinery wholesale prices. Numbers are adjusted for inflation to 2007 dollars. The rapid increase in prices in the past few years is clearly visible, as is the close relationship of crude oil prices to the prices of refined petroleum products. The difference between the cost of crude oil and the wholesale price of the product is mostly constant, rather than a percentage.

Figure 6. U.S. crude oil acquisition cost and wholesale fuel prices

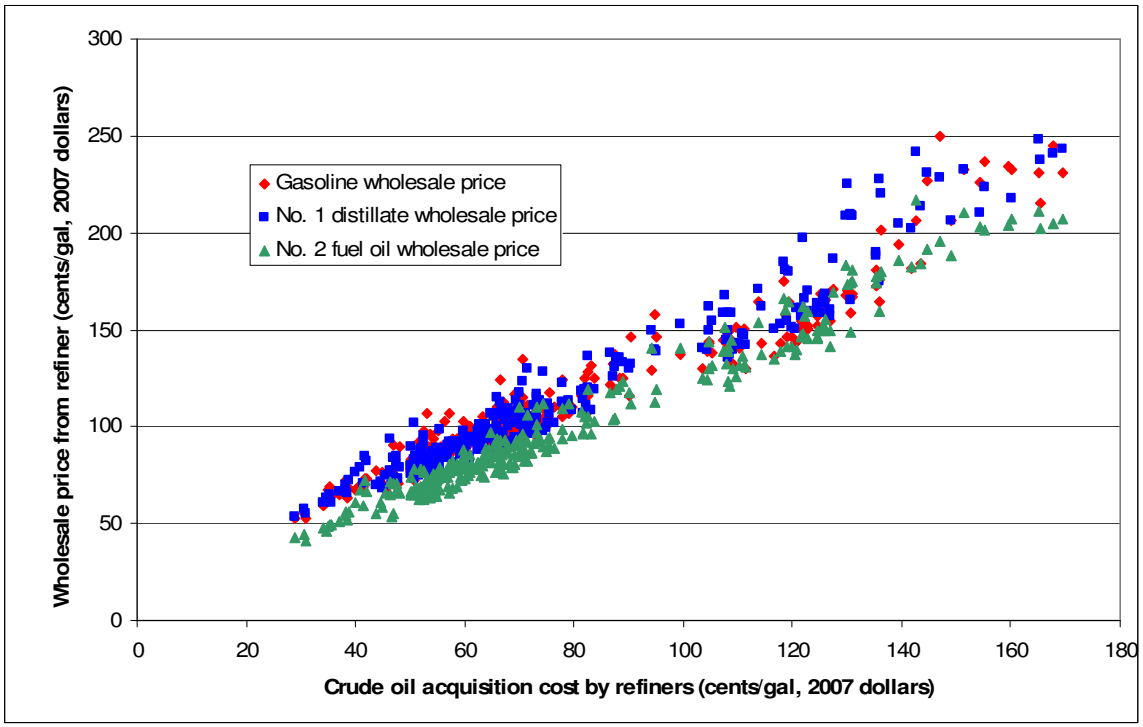


Source: U.S. Energy Information Administration

[33] Bournazian, Jacob. EIA. Comparison *of Selected EIA-782 Data with other Data Sources.* June 23, 2004. http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2004/comparison782/comparison782.htm

[34] The EIA's definition of "refiner acquisition cost of crude oil" is "The cost of crude oil, including transportation and other fees paid by the refiner. The refiner acquisition cost does not include the cost of crude oil purchased for the Strategic Petroleum Reserve (SPR)." The EIA provides costs for domestic and imported oil, as well as a composite cost. The composite cost is shown here.

Figure 7. U.S. crude oil acquisition cost vs. wholesale fuel prices



Source: U.S. Energy Information Administration

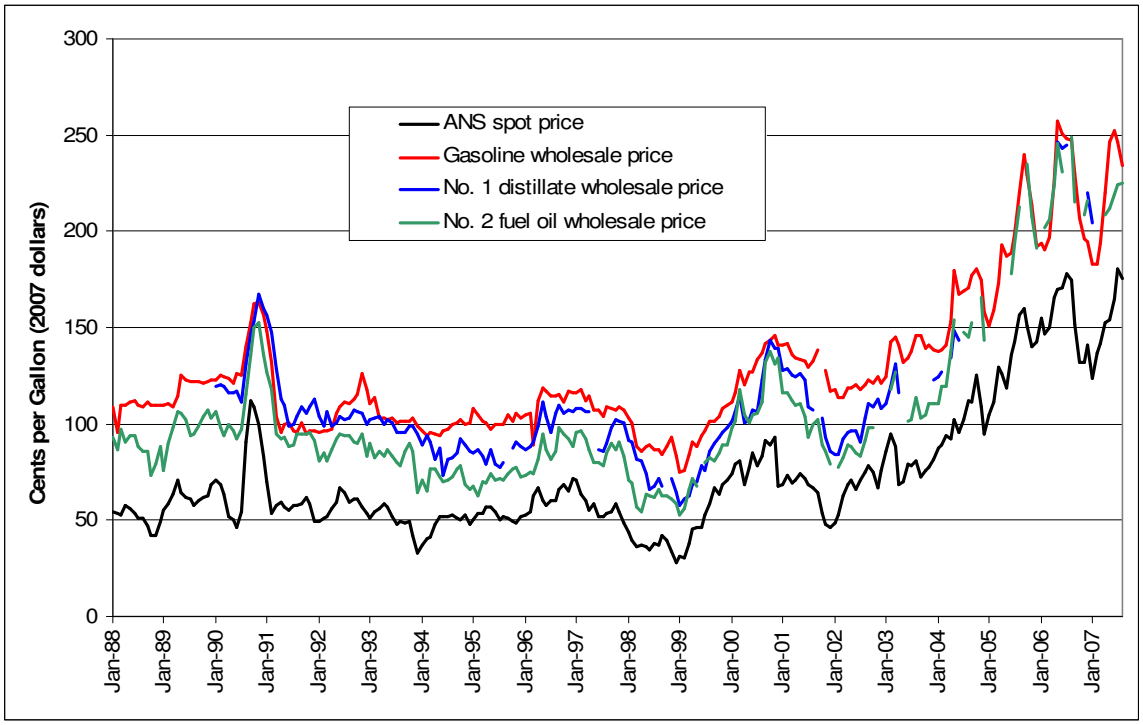
From these figures, it appears that the primary source of variance in the prices at which refineries sell their products is the cost of their crude oil feedstock. Linear regression results over the monthly data points for gasoline, #1 distillate and #2 fuel oil, shown in Table 7, seem to confirm this tight relationship. The regression uses refiner acquisition cost, in cents per gallon, as the independent variable.

Table 7. Results of regression of wholesale fuel prices on crude oil acquisition cost (U.S. refiners)

Fuel type	Slope	p-value	Intercept	p-value	R-squared
Gasoline	1.190	0.000	20.229	0.000	0.938
No. 1	1.317	0.000	12.855	0.000	0.943
No. 2	1.224	0.000	4.984	0.000	0.965

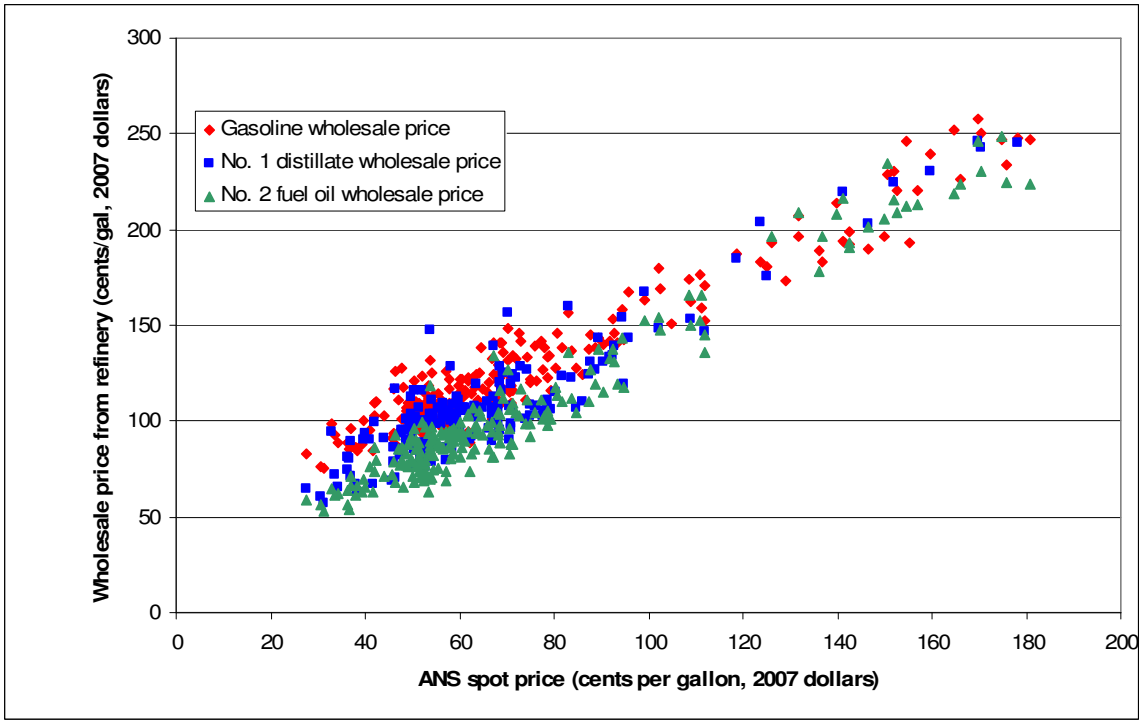
Figure 8 and Figure 9 show a similar relationship between Alaska North Slope (ANS) crude oil prices and wholesale prices from Alaska refineries. Here, the ANS spot price was used instead of the refiner acquisition cost of crude oil, which was unavailable from EIA for Alaska refineries before 2004.

Figure 8. Alaska North Slope crude oil spot price and Alaska wholesale fuel prices



Sources: Alaska Tax Division (ANS spot price), U.S. Energy Information Administration

Figure 9. Alaska North Slope crude oil spot price vs. Alaska wholesale fuel price



Sources: Alaska Tax Division (ANS spot price), U.S. Energy Information Administration

Table 8 shows the regression results (ANS spot price per gallon is the independent variable). Again, the results show a strong correlation between crude oil prices and refined product prices.

Table 8. Results of regression of wholesale fuel prices on Alaska North Slope spot price (Alaska refiners)

Fuel type	Slope	p-value	Intercept	p-value	R-squared
Gasoline	1.107	0.000	47.143	0.000	0.929
No. 1	1.193	0.000	30.401	0.000	0.849
No. 2	1.269	0.000	14.841	0.000	0.940

IV. Fuel Product Transportation

Fuel products in Alaska are transported in various ways, both from refineries to fuel terminals and from terminals to communities. Fuel is usually stored in communities before distribution to residents and businesses. This chapter describes fuel transportation (truck, barge, airplane), as well as storage and distribution methods, including how characteristics of each method influence fuel prices.

Refineries in Nikiski, Valdez, and North Pole make petroleum products that supply most of the Alaska market. (As discussed earlier, some products for Alaska also come from out-of-state refineries). Communities that are road accessible or connected via pipelines or railroad to these in-state refineries have lower costs of transportation than more remote locations. Anchorage is connected by pipeline and road to the refineries in Nikiski; Fairbanks is only a short truck trip from the North Pole refineries. In contrast, other Alaska communities are in remote locations, many without highway access and some even lacking navigable waterways. Transporting fuel to such communities is more complex and risky, and thus, more expensive. The widely differing circumstances of Alaska communities create widely varying fuel prices.

Refinery to terminals

The Tesoro refinery in Nikiski is able to ship refined product directly from its fuel terminal in Nikiski. It also transports refined product in a 72-mile long pipeline to Ted Stevens Anchorage International Airport and to its fuel terminal at the Port of Anchorage. From the Anchorage fuel terminal, heating fuel can be trucked to homes or regional fuel hubs. Gasoline is also trucked from the fuel terminal to gas stations.

Fuel from the Flint Hills refinery in North Pole is either trucked to the fuel terminal in Nenana, to be barged to communities on the Yukon River; trucked to Fairbanks and other neighboring communities; or carried on the Alaska Railroad to the fuel terminal at the Port of Anchorage. Most of the refined fuel that comes by rail to Anchorage from North Pole is jet fuel used at Ted Stevens International Airport.

The Valdez Petro Star refinery ships its fuel directly out of the Port of Valdez. Most of the refined fuel produced at the Petro Star refinery in North Pole is directly transported to Eielson Air Force base or nearby communities.

Table 9 summarizes the imports and outputs of refined petroleum products for the region's fuel terminals and fuel hubs. Fuel refined in Tesoro's Nikiski plant is shipped directly from the Nikiski Port, as well as piped to Anchorage where it is shipped from the Port of Anchorage.

Table 9. Shipments received and shipped from major fuel hubs and refineries (in gallons [1])

Community		Received[3]	Shipped[3]
Anchorage	Gasoline	**165,901,639**	**134,426,230**
	Distillate[4]	**2,816,901**	**45,633,803**
Valdez	Gasoline	**327,869**	**82,950,820**
	Distillate[4]	**-**	**14,366,197**
Ketchikan	Gasoline	**18,032,787**	**12,459,016**
	Distillate[4]	**8,450,704**	**15,492,958**
Nikiski[2]	Gasoline	**-**	**213,442,623**
	Distillate[4]	**-**	**289,295,775**
Dutch Harbor	Gasoline	**21,967,213**	**5,245,902**
	Distillate[4]	**44,788,732**	**9,014,085**
Juneau	Gasoline	**18,360,656**	**655,738**
	Distillate[4]	**11,549,296**	**845,070**

(1) Corps of Engineer data is reported in short tons. Gallon conversions assume gasoline weight of 6.1 pounds per gallon and distillate weight of 7.1 pounds per gallon.
(2) Assumes all fuel is shipped out of Nikiski and none is imported.
(3) ISER calculations to summarize in and outbound shipments.
(4) Distillates are primarily diesel #1 and #2.
Sources: U.S. Army Corps of Engineers, Waterborne Commerce Statistics, Pacific Coast, Alaska and Hawaii; ISER calculations. Bethel is also a major western Alaska fuel depot, but it is not shown here because shipments in and out are not segregated in Corps of Engineer data.

Refinery and terminals to communities

Truck

Of the most common methods of transporting fuel in Alaska, trucking is the least expensive and complex. All Alaska communities on the road system have fuel delivered by truck. Gasoline is generally delivered directly to gas stations. Heating fuel is delivered from the refinery to regional fuel hubs for distribution or by distributors directly to homes from refineries.

The transportation cost per gallon of fuel trucked is determined by the distance and the quantity of fuel delivered. Delivery prices vary with the quantity of fuel shipped because most of the delivery costs are fixed, regardless of the amount of fuel carried. So larger communities can order more fuel at a time, reducing delivery charges per gallon.

Having road access also lowers fuel costs, because communities have year-round access to fuel. Even the smallest road communities generally receive at least weekly fuel shipments. This reduces fuel storage and inventory costs.

Barge

Barging fuel to Alaska communities is an expensive, complex, and risky endeavor. Fuel transporters face a different set of delivery challenges and costs for each community. Thee are few fuel transport companies with the experience and capital needed to successfully deliver fuel to remote areas in Alaska. In addition to overcoming the physical challenges of barging fuel to Alaska communities, fuel transporters must correctly price their fuel transportation charges to fully recover the cost of delivery.

Barge Transportation Regions

For this analysis we divided Alaska into five regions: ice-free southern coast, Kuskokwim River, Yukon River, Northwest and Kobuk River, and Arctic. All these regions have some common factors that influence the cost of fuel delivery.

Ice-Free Southern Coast

This region extends from Southeast Alaska, along the Gulf of Alaska and out the Aleutian Island chain. The defining characteristic of this region is that it is ice-free year round and the communities are coastal. These characteristics allow year-round delivery of fuel. Crowley, Delta Western, and Petro Marine Services deliver fuel in this region.

Fuel for this region may be shipped from refineries in Valdez or Nikiski; from the fuel terminal at the Port of Anchorage; or from refineries in Washington or California. It is either shipped directly to communities or to larger hub communities, where it is reloaded onto smaller barges. Sometimes fuel will be lightered directly off the barge into a smaller barge for delivery to a community, thus bypassing the fuel hub.

Kuskokwim River

The Kuskokwim River Region includes all the communities on the Kuskokwim River and its tributaries, as well as coastal communities near the mouth of the river. Bethel serves as the regional hub, and almost all fuel delivered to the region is at least temporarily stored in Bethel. Fuel from Bethel storage tanks must be loaded into smaller barges to navigate the Kuskokwim River upstream of Bethel. Approximately four million gallons of fuel are shipped out of Bethel each year.

Fuel for this region is transported from Anchorage on large barges and must be lightered before being unloaded at the Bethel fuel depot. Once at the Bethel depot, the fuel is loaded onto barges for delivery upstream or to surrounding coastal communities. Both Crowley and Delta Western have tank farms in Bethel and deliver fuel to the surrounding areas.

Seasonal icing and the need to deliver all fuel into storage tanks in Bethel increases transportation costs for the Kuskokwim River and surrounding area—because the fuel has to be loaded and unloaded more times. Many of the communities that receive fuel from Bethel are located in remote locations on the Bering Sea coast or on tributaries of the Kuskokwim River. Barging fuel to these locations takes longer and includes additional risks. Bethel's distance from its primary fuel supply terminals in Cook Inlet also increases the cost of delivered fuel.

Yukon River

Nenana serves as the fuel hub for the Yukon River. Fuel arrives at the Nenana hub from refineries in North Pole, or is carried from Anchorage on the Alaska Railroad or by truck. From Nenana, fuel is barged both upstream as far as Fort Yukon and downstream to the mouth of the Yukon River. Crowley is the dominant fuel transporter in the region. Recently, Ruby Marine started competing on a small scale with Crowley.

Occasionally fuel is shipped from the mouth of the Yukon from the Bethel or Nome fuel hubs. Generally the more direct route from the Nenana fuel terminal is less costly, even for communities near the mouth of the Yukon.

Many communities served by the fuel terminal in Nenana are on smaller tributaries of the Yukon River that are remote and present navigational hazards. The difficulty of accessing many of these communities, the varying conditions of marine headers and moorage, and seasonal icing all affect the price of delivered fuel to the Yukon River region.

Northwest and Kobuk River

This region is defined as the area served by fuel hubs in Kotzebue and Nome and consists of Norton Sound, Kotzebue Sound and the Kobuk River. Nome's port can accommodate large barges and does not require lighterage, while Kotzebue's port is shallow and does require fuel lightering.

Kotzebue is the fuel hub for communities on the Kobuk River. The cost of barging fuel on the Kobuk is high because of difficult navigation and hazards. Most other communities in the Northwest region are coastal and present less navigational difficulty but have shallow ports. The long distance of this region from its primary fuel terminals in Cook Inlet further increases fuel costs.

Arctic

Fuel delivery in the Arctic region is subsidized by the North Slope Borough and is not investigated in this report.

Factors Contributing to Fuel Barging Costs

Distance from the refinery to the fuel hub. The further the hub is from refineries, the greater the cost. Also, proximity to multiple refineries allows for purchases at the cheapest rack price. For example, transporters delivering to Southeastern hubs such as Ketchikan and Juneau can buy fuel from refineries in Cook Inlet, Valdez, British Columbia, and Washington in order take advantage of the lowest prices.

Storage at fuel hub. A community that does not have its fuel delivered directly from the refinery typically gets fuel through a fuel hub community. When fuel is unloaded at the fuel hub and then later re-loaded, the costs increase. The wharfage fees charged by the hub port and additional transportation from the hub to the community also add to costs.

Small and shallow ports require lighterage. Fuel transported from a refinery or fuel hub in an ocean-going vessel to communities without deep draft ports require lighterage. Lighterage causes a significant increase in costs, because the fuel is handled an extra time and because smaller barges cost more to operate on a per gallon basis.

Quantity of fuel purchased. Communities that purchase more fuel receive a bulk discount, because the fixed costs of delivering fuel are spread over more gallons.

Regulations on fuel and transportation. Under the Oil Pollution Act of 1990 (OPA 90), all single-hulled fuel barges must be replaced with double hulled barges. The act also

made the fuel transporter and storage facility owners liable for any pollution resulting from spills. These regulations are reflected in growing transportation costs. Single-hulled barges are still allowed in Alaska waters west of 155 degrees west latitude (approximately the west side of Kodiak Island).[35]

Shallow drafts are required for river transportation. To transport fuel on Alaska's western rivers, barges cannot draft more than 3.5 feet of water. The barges must be custom built for these rivers, also increasing fuel costs.

Ice can prevent winter deliveries. For communities in northern and northwestern Alaska, fuel cannot be delivered during the winter ice-over months. Barges typically travel to these communities twice a year—in the spring when the ice melts and in the fall before the river freezes. The rivers in northern Alaska are typically frozen from November to April. The barges needed to deliver fuel sit idle through the winter, and the fuel transporters must recover their capital costs during the short shipping season. Icing also creates incentives to invest in more storage and disincentives to upgrade moorage and marine header conditions.

Deficient or missing moorage. Many communities lack proper moorage. To compensate, fuel barges are often forced to execute risky maneuvers to offload fuel. Either the barge is nosed into the bank and propelled forward against the current, or it is held in place in by the fuel hose that is unloading the fuel.

Deficient or missing marine header. A marine header is a series of piping, valves, and pumps that receives fuel from a barge and pumps it into a storage tank. The slower a marine header pumps, the longer the barge takes to unload, increasing costs and risks of spills. If a community is missing a marine header, the fuel must be trucked off the barge.

Tides delay barge movement. Some communities are only barge accessible at high tide. If a barge is forced to sit idle waiting for a tide change, the cost of fuel increases.

Navigational hazards. Many stretches of river are difficult and risky to navigate. Prices increase with the extra risk—because of longer running time per mile, higher insurance costs, and higher crew costs. Stretches difficult to navigate also require extensive local knowledge, making it difficult for new firms to compete.

Air delivery

Flying fuel is the most expensive method for transporting fuel to rural Alaska villages. Communities will generally only fly in fuel if they do not have access to navigable water, or in emergencies when the river is frozen and the barges are unable to deliver. This can happen if a community did not have the cash or credit available to purchase a full winter season of fuel before freeze-up, or when a community sells all its fuel before spring break-up when the barges are able to return.

When fuel is flown in larger planes, the delivery cost is approximately $1.00 per gallon. Smaller planes flying only a few hundred gallons at a time charge closer to $2.00 per gallon. The size of the plane flying fuel largely depends on local runway length and

[35] Crowley Maritime Corp – CWLM Amended Annual Report
http://sec.edgar-online.com/2006/04/14/0000950123-06-004668/Section2.asp

community population. One advantage of flying in fuel is that communities do not need to invest in large storage facilities, because fuel deliveries can usually be made year-round.

There are multiple commercial air services that fly fuel in Alaska. Everts Air Fuel is the largest. It operates four DC-6s and two C-46s equipped to carry 2,000 to 5,000 gallons of fuel per trip.[36]

Fuel delivery contracts

We examined publicly available fuel delivery contracts as one source of information about fuel transportation prices. A fuel delivery contract is an agreement between a fuel purchaser and a fuel supplier. Most fuel purchases involve a fuel contract. Fuel contracts are generally updated on a yearly or multi-yearly basis, in a competitive bidding process, with the contract being awarded to the lowest bidder. As a result of the competitive bid process, these contracts should provide a reasonable proxy for the costs of delivering fuel to specific ports with a reasonable return on investment and profits. The bids are generally broken into two components—the delivery cost and refinery price. The refinery cost component is the price paid at the refinery gate on the day the fuel is purchased at the refinery.

Table 10 shows the delivery cost component of 2003 and 2006 State of Alaska fuel contracts—that is, contracts for fuel for state-owned facilities. We combined the two fuel contract years and averaged costs for communities that received contracts in both years. For most communities with contracts in both years the delivery charge was similar.

It is clear the method of delivery is an important factor in determining transportation costs. Anchorage's delivery costs are negative, because the bidding transporter was expecting to be able to buy fuel at a lower cost than the indexed price.

Table 10. State of Alaska fuel contract delivery charges per gallon

Community	Delivery Charge	Transport Type
Anchorage	$ (0.01)	Truck
Delta Junction	$ 0.01	Truck
Chitina	$ 0.04	Truck
Nenana	$ 0.04	Truck
Circle	$ 0.09	Truck
Ketchikan	$ 0.13	Ice Free Barge
Kodiak	$ 0.16	Ice Free Barge
Homer	$ 0.18	Ice Free Barge
Klawock	$ 0.20	Ice Free Barge
Dutch Harbor/Unalaska	$ 0.31	Ice Free Barge
Tanana	$ 0.40	Seasonal Barge
Nome	$ 0.63	Seasonal Barge
Ruby	$ 0.70	Seasonal Barge
Koyukuk	$ 0.91	Seasonal Barge
Naknek	$ 0.93	Seasonal Barge

Sources: State of Alaska, Department of Administration State Fuel Contracts for 2003 and 2006 and ISER calculations.

[36] Everts Air Fuel, available from: http://www.evertsair.com/airfuel/default.htm

Setting Delivery Prices

Fuel transporters face significant risk when determining their delivery price. If they place their price lower than their costs turn out to be, they will lose money when delivering fuel. If they set their price too high, they might be accused of price gouging, or competitors might undercut them and win the delivery bid. The ability to accurately assess the delivery costs to individual communities can be as important and require as much experience as delivering the fuel.

The structure of the fuel delivery prices is the same for most transporters. It includes a delivery charge, in addition to a refined fuel cost that is tied to a fuel price index—such as the OPIS Anacortes price. The refined fuel cost is set at the level of the fuel index on the day the fuel is purchased from the refineries.

Crowley personnel told us that the bid prices are reviewed in relation to cost experience every spring and fall by a team of employees, including those who deliver fuel. Prices are determined for each community based on the time and risks Crowley faces when delivering fuel. Fixed costs are estimated on a per gallon basis and require an estimate of how much fuel will be delivered to a particular community.

The amount of experience and expertise needed to accurately price fuel delivery costs presents two potential problems. The first is that new firms entering the market may lack the knowledge necessary to accurately reflect costs in the delivery charges they bid. It also makes it difficult to evaluate whether the delivery charge component (the price) is reasonable and reflects actual delivery costs.

Storage and distribution

In communities across Alaska, fuels must be stored in holding facilities for distribution to customers. Fuel storage requires a substantial capital infrastructure investment. The cost of the storage facility is sometimes paid for by communities (either city governments or village corporations) or by private companies that either have significant investment in specific communities as major storage or distribution points (e.g., Crowley or Delta Western) or are significant users of fuel, such as Peter Pan Seafoods in False Pass.

The storage capacity of tanks in various communities depends on many factors. These include the location of a community, and whether ports are ice-free in the winter, allowing fuel to be delivered anytime—as compared with communities that can only get fuel deliveries once or twice a year. Also, communities with harsher weather need to have storage facilities that are able to withstand that weather. All storage facilities must meet state and federal environmental regulations pertaining to leak or spill prevention and mitigation—such as having adequate liners.

For publicly owned facilities, communities can obtain assistance from the bulk fuel storage program administered by the Denali Commission. A report prepared for the Denali Commission in 2002 reported the following unit costs per gallon of storage capacity for bulk fuel projects in Alaska (Table 11).

Table 11. Bulk fuel project costs

Capacity	Benchmark Unit Costs
0 – 50,000 gallons	$18.00 to $14.00 per gallon
50,001 – 100,000 gallons	$14.00 to $12.00 per gallon
100,001 – 200,000 gallons	$12.00 to $9.50 per gallon
200,001 – 300,000 gallons	$9.50 to $8.50 per gallon
300,001 – 400,000 gallons	$8.50 to $7.50 per gallon
400,001 to 500,000 gallons	$7.50 to $6.50 per gallon
Greater than 500,000 gallons	$6.50 to $2.50 per gallon.

Source: Denali Commission. Final Denali Commission Project Cost Containment Assessment Projects in Various Alaska Villages, April 2002.

To determine these values, unit costs were calculated as the total project budget, divided by the total design storage capacity. In essence, a larger capacity project should relate to the lower end of the cost range for each capacity level.

Delivery or the distribution of the product in a community is another important component of total cost. Some communities charge a "delivery fee" if the product is delivered to the home. Some provide discounts if households order fuel to be delivered in bulk. In some communities, customers can pick up their fuel on an as needed basis. In other cases, the fuel is always delivered to the home and the "delivery charge" is included in the final fuel price. In these cases, the distribution charge is unknown.

V. Alaska Oil Taxes and Royalties

All oil and gas production in Alaska, except the federal and state royalty share and a small amount used for production, is subject to the state's production taxes and hazardous release surcharges that are levied only on crude oil. Alaska receives revenue from oil and gas production from the state's royalty share, production tax, corporate income tax, and property tax. This section provides a brief overview of these taxes.

Crude oil taxes

Petroleum Profits Tax

The Petroleum Profits Tax (PPT) is the production tax that was signed into law in 2006 and was reconsidered by the Alaska legislature during fall 2007. The PPT is a net value tax with tax credits designed to encourage investment in Alaska's petroleum sector, increase production, and increase long-term revenues.[37] The PPT replaced the Economic Limit Factor (ELF) severance tax.

Petroleum Property Tax

An annual tax is levied on the full and true value of property taxable under AS 43.56. The tax on oil and gas property is the only statewide property tax. The valuation procedure is for three distinct classes of property—exploration, production, and pipeline transportation. The pipeline transportation property tax is shared with local communities. The state tax rate is 20 mills, minus the local mill rate.

Petroleum Corporate Income Tax

Alaska levies two types of corporate income tax—one on oil and gas corporations and the other on all other corporations. An oil and gas corporation's Alaska income tax depends on the relative size of its Alaska and worldwide activities and the corporation's total worldwide net earnings. The corporation's taxable Alaska income is derived by apportioning its worldwide taxable income to Alaska, based on the average of three factors as they pertain to the corporation's Alaska operations: (1) tariffs and sales, (2) oil and gas production, and (3) oil and gas property.

Historically, oil and gas corporate income tax revenue has varied with oil prices and oil industry profits. In FY 1982, revenue from this tax was $668.9 million. As recently as FY 1994, the oil and gas corporate income tax generated only $17.8 million. For the past three years, revenues from the oil and gas corporate income tax have risen along with oil prices and oil industry profits, generating $661.1 million in FY 2006. This is the highest level for collections since the early 1980s.[38]

[37] Alaska Department of Revenue, Tax Division, *Revenue Sources Book, Spring 2007*, p.2.
[38] Ibid, p. 38.

Oil royalties

Almost all Alaska oil and gas production occurs on state lands leased for exploration and development. As the land owner, the state earns revenue from leasing as: (1) upfront bonuses, (2) annual rent charges and (3) a retained royalty interest in oil and gas production.[39]

The State of Alaska receives a royalty of approximately 12.5 percent of the oil and gas produced from leases on state lands. The state may take its share of oil production "in-kind" or "in-value." When the state takes its royalty share in-kind (RIK), it assumes possession of the oil or gas. The commissioner of the Department of Natural Resources may sell the RIK oil or gas in a competitive auction or through a noncompetitive sale negotiated with a single buyer. When the state takes its royalty in-value (RIV), the producers market the state's share along with their own share of production. The lessees remit cash payments on a monthly basis for the state's RIV share.[40]

Over the last 30 years the state has taken about one-half its royalty oil as RIK. The state has sold nearly 800 million barrels of RIK oil during this time, most of it in-state. These in-state sales provide long-term supplies of oil to each of the state's four refineries.

Cook Inlet

In 1969 the commissioner of the Department of Natural Resources negotiated a sale of 100 percent of the state's royalty share from Cook Inlet to the Alaska Oil and Refining Company. Within months after that, Alaska Oil and Refining Company merged with the Tesoro Petroleum Company. Tesoro subsequently built a new refinery in Nikiski on the Kenai Peninsula, next to Chevron's refinery, built in 1964. Between 1969 and 1985 the state sold all its Cook Inlet royalty oil to the Tesoro refinery. By 1980, the production decline in Cook Inlet prompted Tesoro to negotiate the first of several sales contracts with the state for supplies of RIK oil from the North Slope. By the end of 1985 Tesoro had replaced its Cook Inlet RIK volumes with supplies of RIK from the North Slope.

In 1987 the state began to export Cook Inlet RIK oil to the Chinese Petroleum Company. These volumes were produced from fields on the west side of Cook Inlet, after the federal government exempted Cook Inlet production from export administration regulations. The state sold 97 percent of the royalty production from the McArthur River, Trading Bay, North Trading Bay, and Granite Point fields in a series of one-year competitive auctions. In 1991 deliveries under the last Chinese Petroleum contract were halted following the December 1989 eruption of the Mount Redoubt volcano. There have been no Cook Inlet RIK sales since that time.

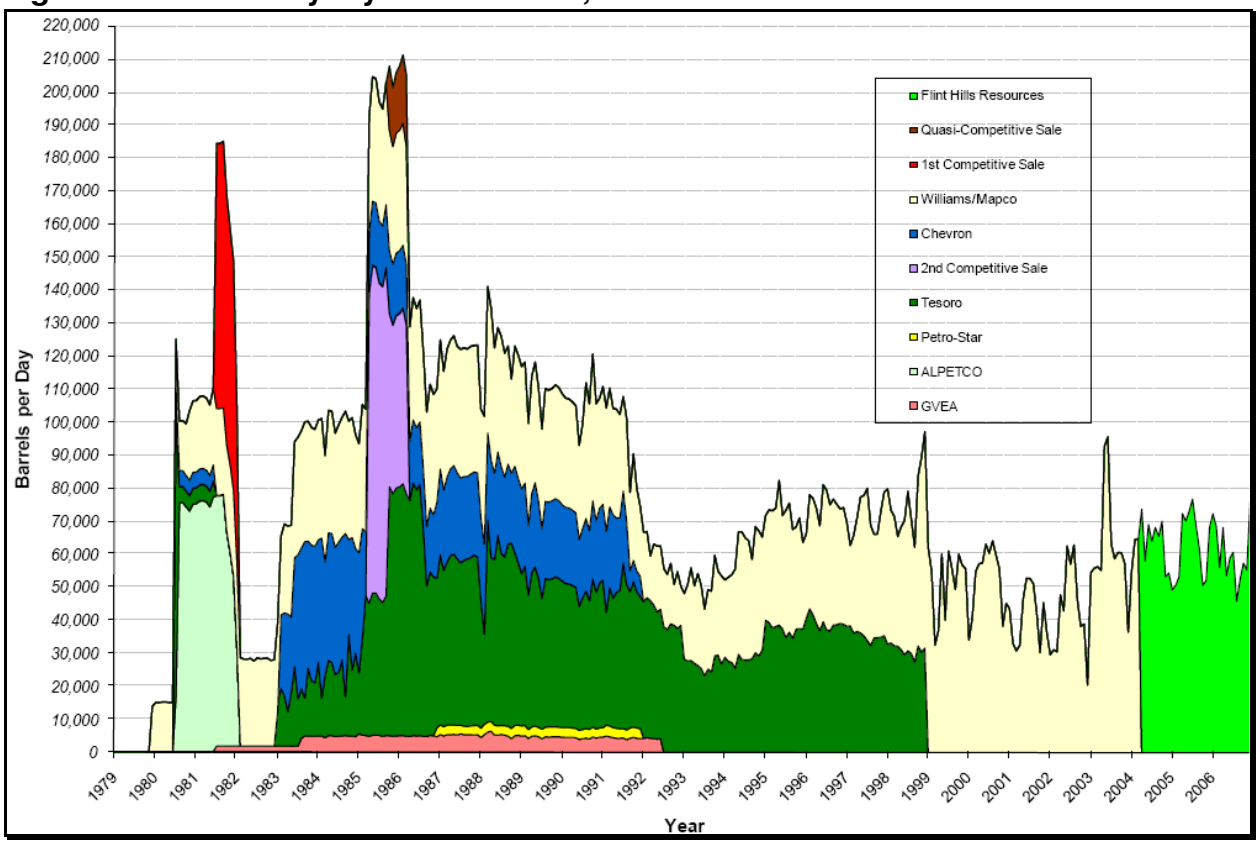
North Slope

Over the past 25 years, the state has held nine RIK sales involving portions of its Alaska North Slope (ANS) royalty oil production. These sales are summarized in Figure 10. For detailed information on royalty oil sales, see the Division of Oil and Gas Annual Report.

[39] Ibid, p. 29.
[40] Alaska Department of Natural Resources, Division of Oil and Gas, *2007 Annual Report*, p. 4-1.

What is significant for this study is that the State of Alaska has negotiated various terms into its royalty in-kind contract sales to Alaska refineries, including use of the Alaska Railroad to transport fuels and requirements to upgrade tank farms.

Figure 10. Alaska royalty In-kind sales, 1979 to 2006



Source: Alaska Department of Revenue, Tax Division, 2007, Revenue Sources Book, Spring 2007.

In addition to taxes collected to compensate the state for development of its publicly-owned oil resources, the state government also collects other oil-related taxes to offset the costs of specific programs. These include the Hazardous Release Surcharge assessed on crude oil production and motor fuel taxes assessed on refined products.

Hazardous release surcharge

The Oil and Hazardous Substance Release Prevention and Response Fund was created by the legislature in 1986 to provide a "readily available funding source to investigate, contain, and clean up oil and hazardous releases." An amendment in 1994 divided the fund into two separate accounts comprised of: (1) the Response Account, which is a surcharge on all oil production, except federal and state royalty barrels, that may be used to finance the state's response to an oil or hazardous substance release declared a disaster by the governor; (2) the Prevention Account, which is an additional surcharge on all oil production, except federal and state royalty barrels, that may be used for cleaning up oil and hazardous substance releases not declared a disaster by the governor; it can also be used to fund oil and hazardous substance release prevention programs in Alaska.

When the PPT was passed, the Response surcharge (AS 43.55.201) was changed from $.02 to $.01 and the Prevention surcharge (AS 43.55.300) was increased from $.03 to $.04. Both of these changes took effect April 1, 2006. The Response surcharge is suspended when the balance of the Response account is equal to or exceeds $50 million. As of February 28, 2007, the cumulative balance of the account was $42.4 million. The Response Surcharge was re-imposed effective April 1, 2007, by the Department of Revenue.[41]

Motor fuel taxes

For many years, fuel taxes and other revenues from highway users levied by the federal government and states have been a primary source of funds for federal and state highway programs. Nationally, a relatively small number of counties and municipalities also levy fuel taxes to finance road improvements, but these local governments rely primarily on general funds, property taxes, sales taxes, and other revenues unrelated to highway users to finance local road and street construction, maintenance, and operation.[42]

Federal fuel taxes, for the most part, are deposited in the Highway Trust Fund (HTF), which is used to fund highway construction projects. Alaska receives funds annually, and in excess of what Alaskans contribute to the fund, for road projects (Table 12). The Alaska fuel tax primarily pays for road operation and maintenance costs.

Historically, states and the federal government have viewed fuel taxes as an attractive revenue source for highway construction and maintenance programs for several reasons. First, the revenues from fuel taxes are linked, although imperfectly, with road use. In addition, fuel tax revenues historically have been relatively stable and predictable. Legislators or the electorate, in states other than Alaska, have been willing to increase the fuel tax rates when necessary to meet highway improvement needs. Fuel taxes are attractive revenue sources also because costs of administering the programs to collect fuel taxes are relatively low.

The Alaska motor fuel tax dates back to 1945, when the legislature imposed a tax of 1cent per gallon on all motor fuel. Over time, the legislature enacted separate tax rates for each of the fuel categories as they exist today.

Alaska levies the motor fuel tax on motor fuel sold, transferred, or used within Alaska. The Alaska Department of Revenue's Tax Division collects motor fuel taxes primarily from wholesalers and distributors who hold "qualified dealer" licenses. Current per gallon rates are 8 cents for highway use, 5 cents for marine fuel, 4.7 cents for aviation gasoline, 3.2 cents for jet fuel, and a rate of 8 cents or 2 cents for gasohol, depending on the season, location, and EPA mandate.

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[41] Ibid, p. 29.

[42] March, Jim, *The Future of Highway Financing*, Innovative Financing Series: Article 3, Federal Highway Administration, Turner-Fairbank Highway Research Center, Public Roads Magazine, November/December 2005.

In addition to sales between qualified dealers, the following sales and uses are exempt from motor fuel tax:

- Heating
- Federal, state, and local government agencies
- Foreign flights (jet fuel)
- Exports
- Power plants/utilities
- Charitable institutions
- Gasohol (only fuel containing at least 10% alcohol, derived from wood or seafood waste)
- Bunker fuel (residual fuel oil or #6 fuel oil)

Consumers may claim refunds for the full Alaska tax rate if they used the fuel for exempt purposes; or for the difference between the tax rate and 2 cents per gallon, if they used the fuel off-highway. Resellers, usually retailers, may claim refunds for the full tax if they paid the tax and then sold the fuel for exempt use and did not collect the tax.

Most of the excise taxes credited to the HTF are not collected directly from the consumer by the federal government. They are, instead, paid to the Internal Revenue Service by the producer or importer of the taxable product (except for the tax on trucks and trailers, which is paid by the retailer, and the heavy-vehicle use tax, which is paid by the heavy-vehicle owner). As a result, most of the federal fuel taxes come from a handful of states—those where major oil companies are headquartered—and most tire taxes are paid from Ohio, the home of the U.S. tire industry. These taxes become part of the price of the product and are ultimately paid by the highway user.[43]

Table 12. Federal highway user taxes

Fuel Type	Effective Date	Tax Rate (cents per gallon)	Distribution of Tax		
			Highway Trust Fund		Leaking Underground Storage Tank Trust Fund
			Highway Account	Mass Transit Account	
Gasoline	10/1/1997	18.4	15.44	2.86	0.1
Diesel	10/1/1997	24.4	21.44	2.86	0.1
Gasohol	1/1/2005	18.4	15.44	2.86	0.1

Source: Federal Highway Administration, 2007.

In some cases, the federal motor-fuel tax has already been paid by the producer/ distributor or retailer on motor fuel that will ultimately be used by an exempt user or for an exempt purpose. In such cases, the end user may purchases fuel at a price that includes

[43] Federal Highway Administration, Financing Federal-Aid Highways, The Highway Trust Fund, www.fhwa.dot.gov/reports/fifahiwy/fifahi05.htm

the tax and must apply for a refund of the tax. For sales of diesel fuel to state and local governments, and for tax exempt purposes such as heating, the wholesaler or retailer (the ultimate vendor) sells the fuel to the end user at a price excluding the tax and applies for the refund. The federal fuel tax refund is primarily done through the federal income tax process.[44]

Although fuel oil is not subject to state or federal taxes, diesel for motor fuel—a virtually identical product—is taxed. In other states, fuel oil is dyed to distinguish it from the taxable motor fuel. But because Alaska markets are so small, Alaska is not required to dye fuel oil, and the two products can be shipped together. Because the taxable and non-taxable fuels are typically mixed for shipment, it is possible that at times households may in fact pay taxes on fuel oil—because the taxes have been levied at some earlier point. In that case, households can apply for refunds on those taxes. But our research indicates that in most cases households do not pay federal and state taxes on fuel oil. Instead, wholesale or retail sellers (depending on the circumstances of the sale) determine which sales are exempt from federal and state taxes, and apply for refunds of any such taxes they paid on fuel ultimately sold for home heating.

Local Taxes

In addition to state and federal fuel taxes, some Alaska communities charge local sales taxes, and fuel taxes on a percentage or cents per gallon basis. Communities with these types of taxes are shown in Table 13 below. Specific sales tax revenues attributable to fuel sales are not reported or broken out.[45] According to Steve Van Sant, Alaska's state assessor, when a city or borough has a general sales tax, it is typically applied to all sales, including fuel, unless specifically exempted. He is not aware of any communities that have exempted fuel from their general sales tax.

Specific fuel taxes (note for example Bettles, Cold Bay, and Sitka in Table 13) are usually a fuel transfer tax that occurs when the fuel is transferred into or out of a city. The fuel transfer tax is not linked to final sales to households. Any new community fuel taxes would most likely be on bulk sales and are unlikely to be added in communities that already have a general sales tax on the books.[46] The places with specific fuel taxes appear to primarily be those that have large commercial users of fuel such as fishing boats or cruise ships . In addition to local sales taxes and fuel taxes, some communities may charge wharfage fees for port deliveries, including fuel deliveries. These charges most likely are included in the final retail prices charged to consumers and are not a tax per se. Fuel transfer taxes would be included in the final sales price charged to consumers by the retailer who paid the fuel transfer tax.

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[44] Generally, diesel fuel and kerosene are taxed in the same manner as gasoline. However, special rules (discussed later) apply to dyed diesel fuel and dyed kerosene, and to undyed diesel fuel and undyed kerosene sold or used in Alaska for certain nontaxable uses and undyed kerosene used for a feedstock purpose.
Internal Revenue Service, Publication 510. http://www.irs.gov/publications/p510/ch01.html#d0e1299

[45] Van Sant, Steve, 2007, Alaska Department of Commerce, Community and Economic Development, Division of Community Advocacy, Alaska Taxable 2006, Table 2.

[46] Van Sant, Steve, State Assessor, personal communication, November 19, 2007.

Table 13. Local sales and special taxes and tax revenues

Municipality	Sales Tax	Revenues	Special Tax	Revenues
Alakanuk	4%	$92,532	No	
Aleknagik	5%	$80,358	5% Bed Tax	$3,390
Anderson	No		8% Utility Tax	$43,141
Aniak	2%	$47,465	No	
Bettles	No		$.02/gal. Fuel Transfer Tax	$3,416
Brevig Mission	3%	$29,000	No	
Buckland	6%	$71,469	No	
Chefornak	2%	52,788	2% Raw Fish Tax	
Cold Bay	No		10% Bed Tax/$.04/gal. Fuel Tax	$20,150/$46,735
Cordova	6%	$2,469,977	6% Bed Tax/6% Vehicle Rental Tax	$84,091/$17,080
Craig	5%	$1,394,532	6% Liquor Tax	$96,067
Deering	3%	$13,396	No	
Denali Borough	No		Sev.Tax $.05/yd grvl-$.05 ton-coal; Bed Tax 7%	$87,958/$2082882
Dillingham	6%	$2,206,634	10% Bed & Liquor Tax/6% Gaming Tax	$249,839/$111,160
Diomede	3%	$9,015	No	
Eek	2%	$24,000	No	
Elim	2%	$28,738	No	
Emmonak	3%	$148,000	NR	
False Pass	3%	$22,382	6% Bed Tax	
Fort Yukon	3%		No	
Gambell	3%	$68,810	No	
Gustavus	2%	$188,537	4% Bed Tax	$52,091
Haines Borough	5.5%	$1,973,088	4% Bed Tax	$56,650
Homer	4.50%	$5,809,399	No	
Hooper Bay	4%	$200,679	No	
Houston	2%	$172,484	No	
Hydaburg	4%	$25,856	No	
Juneau, City & Borough of	5%	$34,587,598	7% Bed Tax/ 3% Liquor Tax/ $.30/pack Tobacco	$955,000/$715,000/$473,922
Kake	5%	$167,354	No	$5,686
Kenai	3%	$4,404,148	No	
Kenai Peninsula Borough	2%	$16,701,322	No	
Ketchikan	3.5%	$9,101,177	7% Bed Tax	$395,074
Ketchikan Gateway Borough	2.5%	$6,412,198	4% Bed Tax	$42,834
King Cove	4%	$1,636,507	2% Fisheries Tax/Business impact tax-flat rate	Fisheries tax incld in sales tax
Klawock	5.5%	$555,074	6% Bed Tax	$7,690
Kodiak	6%	$7,814,820	5% Bed Tax	$105,992
Kodiak Island Borough	No		10.25 mill Severance Tax/5% Bed Tax	$1,186,908/$47,645
Kotlik	3%	$78,313	No	
Kotzebue	6%	$2,727,047	6% Bed Tax/ 6% Alcohol Tax	$37,514/$43,574
Koyuk	2%	$25,776	NR	
Kwethluk	5%	$111,456	No	
Lake & Peninsula Borough	No		2% Raw Fish Tax/Guide Fees/6% Bed Tax	$943,747/$22,473/$165,883
Larsen Bay	3%	$6,163	No	
Manokotak	2%	$6,938	No	
Marshall	4%	$54,006	No	

Table 13. Local sales and special taxes and tax revenues, continued

Municipality	Sales Tax	Revenues	Special Tax	Revenues
Mekoryuk	2%	$170,502	No	
Mountain Village	3%	$120,172	No	
Napakiak	3%	$42,147	No	
Nenana	4%	$129,687	Motor Vehicle Tax	$7,225
Newhalen	2%		The City does not collect any sales tax	
Nome	5%	$3,669,606	4% Bed Tax	$83,310
North Pole	4%	$218,282	No	
Nunam Iqua (Sheldon Point)	4%	$1,364	No	
Nunapitchuk	3%	$100,384	No	
Old Harbor	3%	$19,904	5 %Bed Tax	$729
Ouzinkie	3%	$10,108	No	
Palmer	3%	$3,829,234	No	
Pelican	4%	$58,501	10% Bed Tax	$4,537
Petersburg	6%	$2,431,614	4% Bed Tax	$40,489
Pilot Station	4%	$60,420	No	
Point Hope	3%	$104,421	No	
Port Alexander	4%	$24,683	6% Bed Tax	No revenue reported
Quinhagak	3%	$79,618	No	
St. Mary's	3%	$100,997	NR	
Saint Paul	3%	$366,581	Fish Tax 3%	$562,490
Sand Point	3%	$633,862	7% Bed Tax/2% Raw Fish Tax	$17,003/$605,291
Savoonga	3%	$40,925	No	
Saxman	3.50%	$50,914	No	
Scammon Bay	2%	$30,034	No	
Selawik	5%	$114,833	No	
Seldovia	2%/4.5%	$122,090	No	
Seward	4%	$3,413,087	4% Bed Tax	$284,656
Shungnak	2%	$11,522	No	
Sitka, City & Borough of	5%/6%	$9,277,571	6% Bed Tax/ $.02/gal Fuel Tax	$355,870/$5,121
Skagway	4%	$4,866,950	8% Bed Tax	$157,691
Soldotna	3%	$6,348,529	No	
Stebbins	3%	$47,190	No	
Tanana	2%	$21,461	No	
Teller	3%	$15,211	No	
Tenakee Springs	2%	$13,092	Bed Tax 6%	$521
Thorne Bay	5%	$226,917	No	
Togiak	2%	$98,069	2% Raw Fish Tax	$35,396
Toksook Bay	2%	$37,566	No	
Unalakleet	3%	$143,988	5% Bed Tax/5% Alcohol Tax/Baler 2%	$5,106/$5,381/$95,200
Unalaska	3%	$6,049,831	2% Raw Fish Tax/1% Capitol Sales Tax/ 5% Bed	$4,193,082/$3,004,035/$162,072
Wasilla	2.5%	$10,433,805	Alcohol tax, Aviation fuel tax	$100,725/$17,500
White Mountain	1%	$14,176	No	
Whittier	3%	$248,256	3% Passenger Trans. Tax/3% Fuel Tax	$126,181/$17,147
Wrangell	7%	$2,104,741	$4 per night Bed Tax	$24,380
Yakutat, City & Borough of	4%	$748,490	1% Raw Fish Tax/8% Bed & Car Rental Tx	$20,540/$165,477

Source: Van Sant, Steve, 2007, Alaska Department of Commerce, Community and Economic Development, Division of Community Advocacy, *Alaska Taxable 2006*.

VI. Subsidies and Assistance Programs

The cost of living is higher in Alaska, according to conventional wisdom. In fact, a report in the October 2007 issue of *Alaska Economic Trends* found that energy costs in Alaska posted one of the sharpest increases in 2006, at 13.9 percent. From 2002 to 2006, energy prices rose 51 percent.[47] In response to the increased cost of energy (including fuel prices), the State of Alaska created or increased funding for a number of energy financial assistance programs. These programs were developed to help communities and individuals pay for mounting fuel and energy costs. This includes the following energy assistance programs:

- Municipal Energy Assistance Program
- Bulk Fuel Revolving Loan Fund
- Power Cost Equalization (PCE)
- Low Income Energy Assistance Program
- Bulk Fuel Upgrades
- Rural Alaska Fuel Services (RAFS) program
- Citgo Program

These programs are discussed below.

Municipal Energy Assistance Program

Funding for the Small Municipality Energy Assistance Program[48] is a result of a special appropriation request by then-Governor Murkowski to address historically high fuel costs that created significant financial hardship for small municipalities and their residents. During the fiscal years 2006, 2007, and 2008, the program administered funds to numerous communities across Alaska. Funds are distributed to small villages, municipalities of various sizes, boroughs, and village and tribal councils. The grant funds must be used in the following order:

1. To repay any indebtedness of the city or borough to the Bulk Fuel Revolving Loan Fund, administered by the Alaska Energy Authority
2. To repay any indebtedness of the city or borough to a fuel company or fuel vendor
3. For the purchase of fuel by the city or borough.

Over $6.5 million was distributed among communities in fiscal year 2006, $48 million in 2007, and $48.7 million in 2008. Energy Assistance distributions to the ten case study communities are shown in Table 14.

[47] Fried, Neal and Dan Robinson, "The Cost of Living in Alaska," *Alaska Economic Trends*, October 2007.
[48] For more information about the Small Municipality Energy Assistance Program please see website: http://www.commerce.state.ak.us/dca/energy_assist.htm

Table 14. Small Municipality Energy Assistance Program Payments, FY 06 to FY08

Community Name	FY 06 Funds	FY 07 Funds	FY 08 Funds
Allakaket/Alatna	$44,791	$36,944	$79,416
Angoon	$44,791	$43,326	$97,644
Bethel	$0	$223,971	$348,039
Chitina	$0	$0	$31,152
False Pass	$22,395	$40,000	$77,537
Fort Yukon	$44,791	$25,309	$102,999
Lime Village	$0	$0	$26,326
Mountain Village	$67,187	$66,053	$112,395
Unalakleet	$67,187	$50,253	$109,153
Yakuat	$67,187	$17,496	$279,784

Source: Bill Rolfzen, Program Administrator, Small Municipality Energy Assistance Program.

Bulk Fuel Revolving Loan Fund

The Bulk Fuel Revolving Loan Program is administered by the Alaska Energy Authority. The fund was created to "assist communities, utilities or fuel retailers in small rural communities in Alaska in purchasing emergency, semi-annual or annual bulk fuel supplies." Loans are for the purchase of new fuel and are not provided for fuel already purchased, in the process of being used, or already consumed. An organized municipality or unincorporated village with a population under 2,000, or private individuals, corporations, or cooperatives, are eligible to apply as long as the applicant does not have any outstanding AEA bulk fuel loans. The bulk fuel loan may be used for:

- Municipal electrical power generators; municipal heavy equipment
- Heating fuel for the municipality, residents, and businesses
- Municipal, business and residential motor vehicles and for subsistence purposes

The fund does not cover the purchase of aviation fuel or other non-fuel related supplies. The loan is expected to be repaid within one year, and the terms of the loan are generally nine equal monthly installments. No interest is charged on the first bulk fuel loan and 5% interest is charged on the second loan. The third or subsequent loans are charged an interest rate equal to the average weekly yield of municipal bonds for the proceeding year.

Bulk fuel loans funded from 2006 to 2007 covered the purchase of diesel #1, diesel #2, and gasoline in various communities. Mountain Village was the only one of the ten case study communities to receive a bulk fuel revolving loan during fiscal year 2006 or 2007.

Power Cost Equalization (PCE)

The Power Cost Equalization program (PCE) was created to provide economic assistance to customers in rural areas of Alaska where the kilowatt-hour charge for electricity can be three to five times higher than the charge in more urban areas of the state. The program attemptss to equalize the power cost per kilowatt-hour statewide.

The PCE program is administered by the Alaska Energy Authority. Participating utilities must register with the Regulatory Commission of Alaska (RCA). The RCA sets the PCE level for each utility, based on cost of electric generation. An eligible residential customer may receive PCE credit on the first 500 kWh consumed each month. The community also receives credit toward electricity used in community facilities, based on the population of the community.

Low Income Energy Assistance Program

The Low Income Energy Assistance Program was created with funds from the State of Alaska to help low-income households offset the high price of home heating. The grant program is administered by the Division of Public Assistance in the Department of Health and Social Services, and it's known as the Heating Assistance Program (HAP). The funds are available to any residents or households with incomes below the poverty level. The funds may be used to:

- Conduct outreach activities and provide assistance to low income households in meeting their home energy costs—"heating assistance"
- Intervene in energy crises—"crisis assistance"
- Provide low-cost residential weatherization and other cost-effective, energy-related home repair—"weatherization assistance"

The program provides funds on a household basis rather than on a community basis. Households in all ten case study communities received assistance in fiscal year 2007.

Bulk Fuel Upgrades

The Denali Commission and the Alaska Energy Authority (AEA) are working together to reduce the cost of energy by funding bulk fuel upgrades across Alaska. The Denali Commission funds the Bulk Fuel Upgrade while AEA does the planning and construction of the storage facilities. This benefits communities, because they then have more storage capacity and can order more fuel in bulk. And because the facilities are made compliant with environmental standards, they are more reliable and less prone to spills or leaks—which helps reduce the cost of fuel in rural villages.

The bulk fuel program does not provide funds to communities which are part of the Alaska Village Electric Cooperative (AVEC), are within the North Slope Borough, or are connected by roads. Among the ten case study communities, five are currently receiving or have received funds in the past for bulk fuel upgrades. The communities of Yakutat, Chitina, Bethel, Mountain Village, and Fort Yukon did not receive funds for bulk fuel upgrades. Mountain Village is an AVEC community; Chitina is on the road system; and Yakutat, Bethel, and Fort Yukon have bulk fuel facilities provided by large distribution companies such as Crowley or Delta Western. The communities of Allakaket/Alatna,

Lime Village, False Pass, and Angoon have completed bulk fuel upgrades through this program. Unalakleet is currently in the final construction phase of its bulk fuel facility.

Rural Alaska Fuel Services Program

Rural Alaska Fuel Services (RAFS) was created in 2004 as a non-profit corporation, organized to contract for operating and maintaining rural Alaska bulk fuel storage facilities construct by the Denali Commission and the Alaska Energy Authority. All bulk fuel facilities in Alaska must be maintained and operated in accordance with all applicable state and federal regulations. RAFS also offers the following services to rural communities in Alaska:

- Business planning
- Operations and management services
- Testing and inspections
- Operational training for employees
- Facility oversight
- Record-keeping and reporting
- Sustainability

One of the most important roles RAFS plays is advising communities on developing fuel pricing structures. RAFS helps communities determine the correct price, so they can recover their costs and avoid financial crises. RAFS has found that meeting with community residents to explain the components of fuel costs makes them more understanding about why they need to pay higher prices.

In the three years since RAFS was established, it has helped 30 Alaska communities. Of the ten case study communities, none of them have so far worked with RAFS.

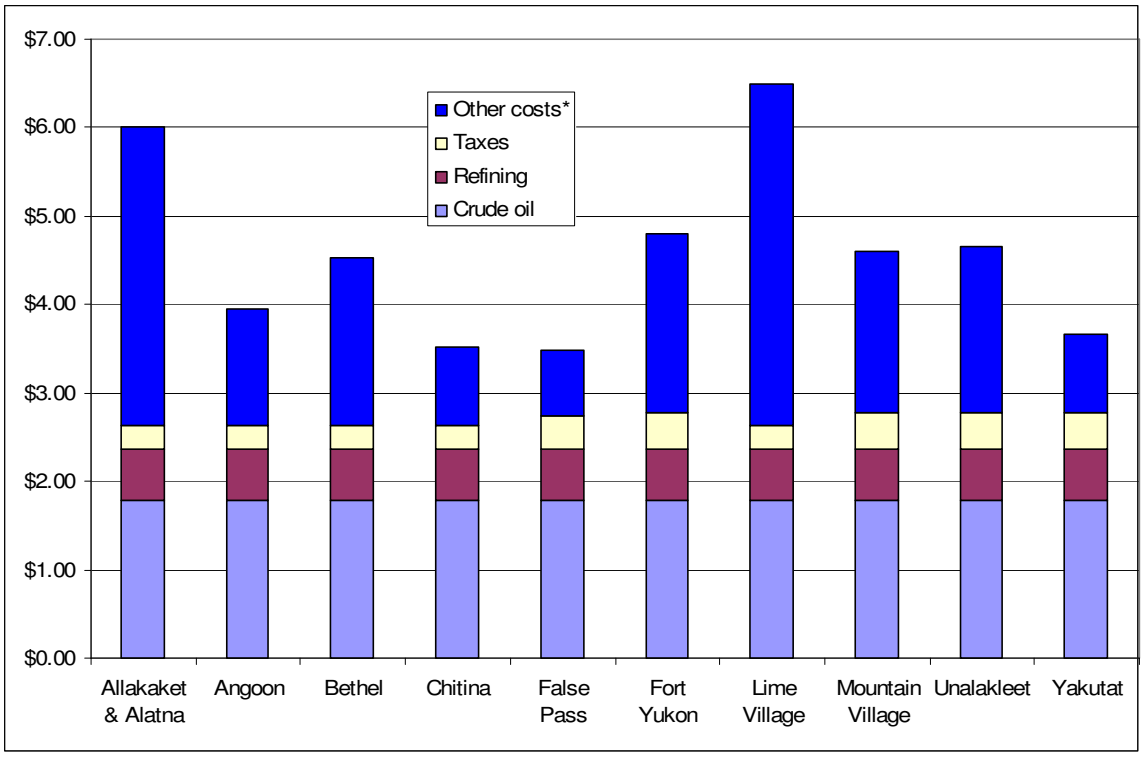
Citgo

A Venezuelan owned oil company, Citgo, donated fuel to many rural Alaska villages during the winters of 2006 and 2007. The company paid for 100 gallons of fuel for every household in 151 villages in Alaska. This fuel was worth roughly $5 million—equating to a savings of more than $700 in fuel costs for each recipient household during the 2006 and 2007 winters.

VII. Comparative Case Study Results

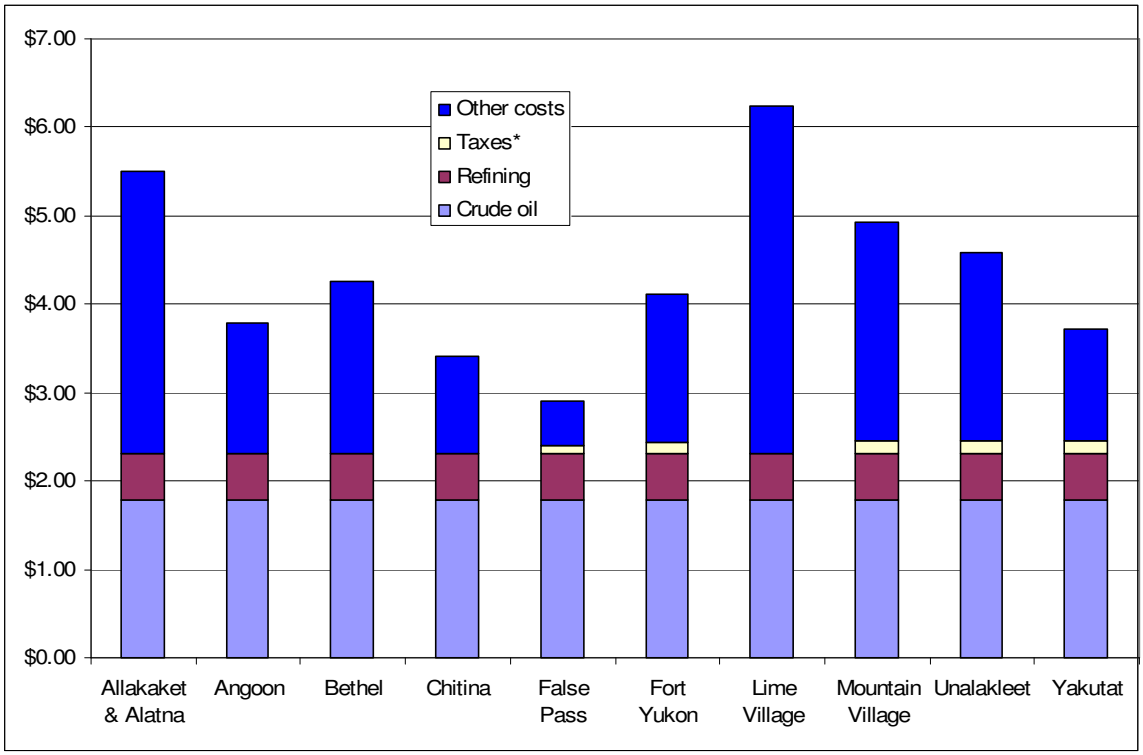
Figures 11 and 12 summarize the components of gasoline and heating fuel prices in our ten case study communities. After that we look at the communities individually.

Figure 11. Components of gasoline prices in case study communities



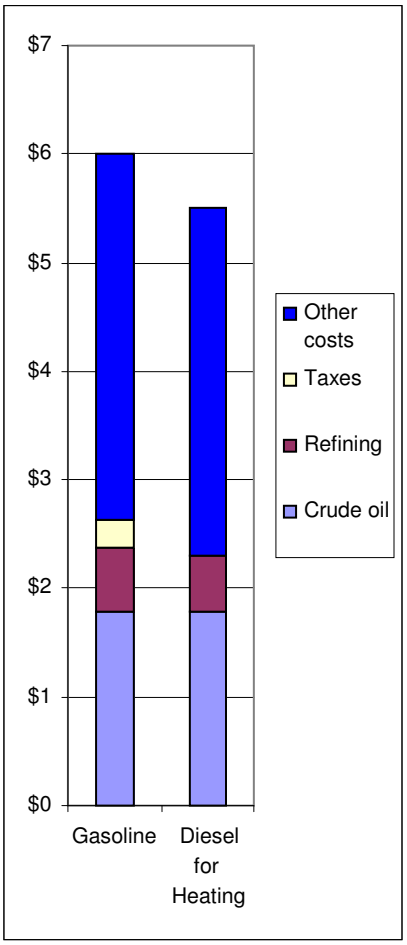
* Other costs include transportation, storage, and retailer markup
Crude oil: EIA's Refiner Acquisition Cost of Crude Oil, PADD 5 (West Coast), Sept. 2007, composite (domestic & international)
Not available for Alaska alone, http://tonto.eia.doe.gov/dnav/pet/pet_pri_rac2_dcu_r50_m.htm
Refined price: EIA's Refiner Petroleum Product Prices by Sales Type, Alaska, Sales for Resale, Sept. 2007
http://tonto.eia.doe.gov/dnav/pet/pet_pri_refoth_dcu_SAK_m.htm

Figure 12. Components of diesel for heating prices in case study communities**



* Taxes include only local sales tax.
** Communities identified their heating fuel as #1, but Alaska refinery prices from EIA were only available for #2.

Allakaket/Alatna



Together, the neighbor communities of Allakaket and Alatna (across the Koyukuk River from each other) have a total population of about 125. They are in northern Alaska, above the Arctic Circle. They receive their fuel by airplane, because fuel barges can't navigate the upper Koyukuk River.

In November 2007 gasoline retailed for $6.00 per gallon and diesel for heating was $5.50 per gallon in Allakaket/Alatna. There is no local sales tax in either community. The "other" costs" for fuel in Allakaket/Alatna amounted to roughly $3.37 per gallon for gasoline and $2.95 for fuel oil in late 2007. Several factors tend to increase or ameliorate the "other" fuel prices in these places:

⇧ Only method of transportation is by air.

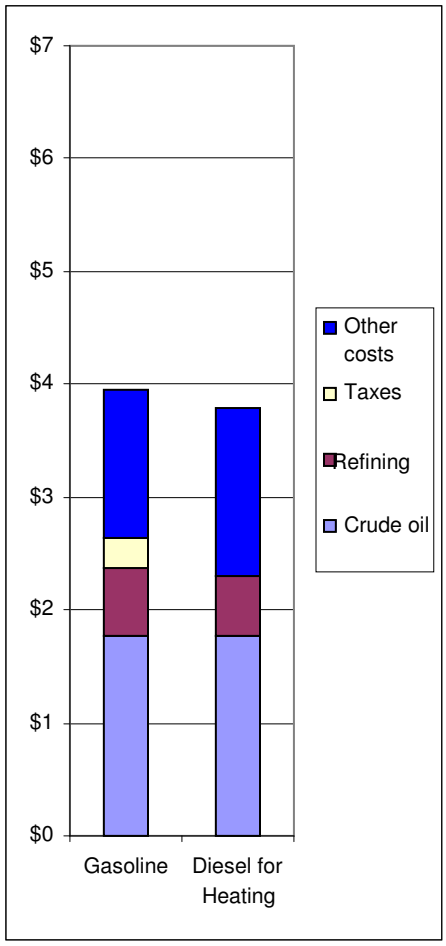
⇩ Long runway that could support larger airplanes carrying more fuel.

⇧ However, because of small population, delivered quantities are small and so delivery charge is higher per gallon.

⇔ Storage capacity is only 16,000 gallons, but this does not seem to be a constraint on deliveries, because quantity delivered in 2007 was only 7,500 gallons.

⇩ There are at least two suppliers to the community, and barriers to entry in air transportation are low compared with those in barging—so there is potential for competition.

Angoon



Angoon is located on Admiralty Island in Southeast Alaska; south of the capital city of Juneau. Angoon has a current population of 497; the population has decreased over the past few years. All fuel is barged to Angoon by Petro Marine.

In November 2007, gasoline retailed for $3.96 per gallon and fuel oil for $3.79 per gallon. There is no local sales tax in the community. The "other" components of fuel prices in Angoon were roughly $1.33 for gasoline and $1.24 for fuel oil. Factors tending to increase or ameliorate these "other" costs include:

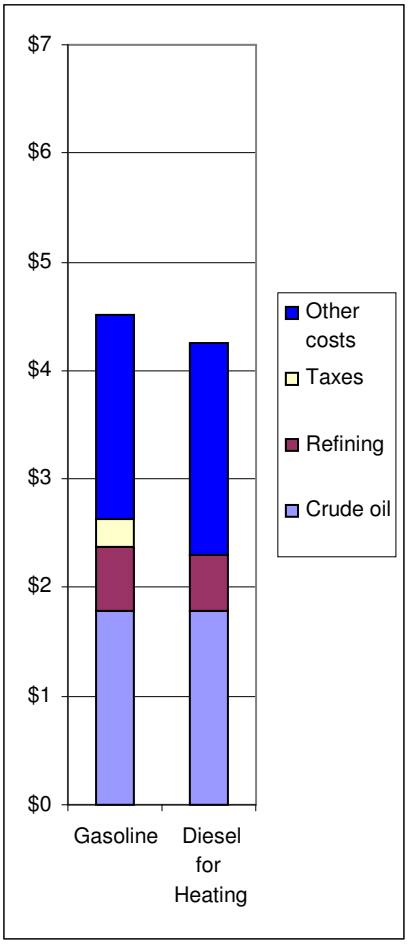
⇧ Only fuel delivery method is by barge.

⇩ Ice-free port in Southeast Alaska, roughly 900 miles from both Anacortes and Anchorage.

⇧ Fuel has to be lightered to community, typically from Ketchikan.

⇩ Fuel can be delivered any time; typically there are eight deliveries per year.

Bethel



Bethel is located at the mouth of the Kuskokwim River and has a population of 5,812. All fuel for Bethel is barged on the Kuskokwim River. It is a regional fuel distribution hub and has a storage capacity of 14 million gallons.

In November 2007 gasoline retailed for $4.52 per gallon and diesel for heating for $4.25 per gallon. There is no local tax on fuel in the community. The "other" costs for fuel in Bethel in late 2007 were roughly $1.89 for gasoline and $1.70 for fuel for heating. Factors affecting those extra costs include:

⇧ Only method of transportation is barge.

⇩ Large fuel hub community.

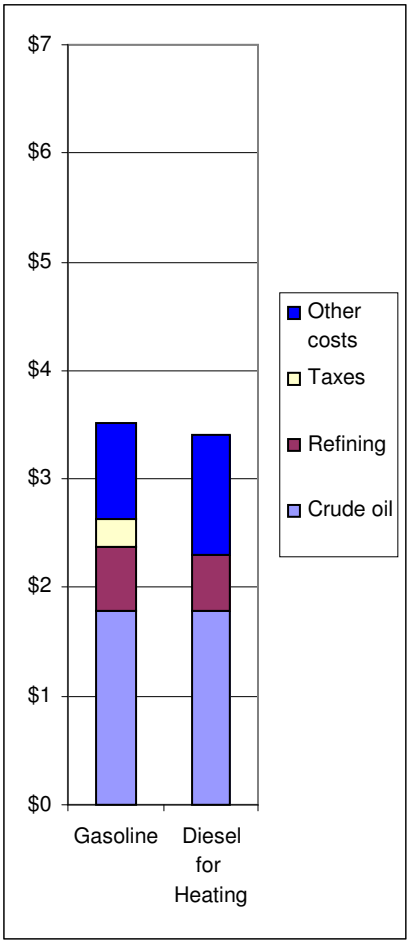
⇧ Port and river both freeze up in winter.

⇧ Fuel has to be lightered into community.

⇩ Can receive multiple shipments (10+) per year when river is not frozen.

⇧ Large storage facility owned by Crowley Marine. We don't know how much fuel stored in the community is distributed to other regional communities and how much goes to Bethel residents.

Chitina



Chitina is on the road system in southcentral Alaska. Chitina and has a population of 110. All fuel in Chitina is transported by road from Anchorage.

Gasoline retailed for $3.52 per gallon and diesel for heating is $3.41 per gallon in November 2007. There is no local tax on fuel in the community. The "other" costs contributing to fuel prices in Chitina in late 2007 were roughly $0.89 for gasoline and $0.86 for fuel for heating. Various factors tend to increase or decrease those other costs:

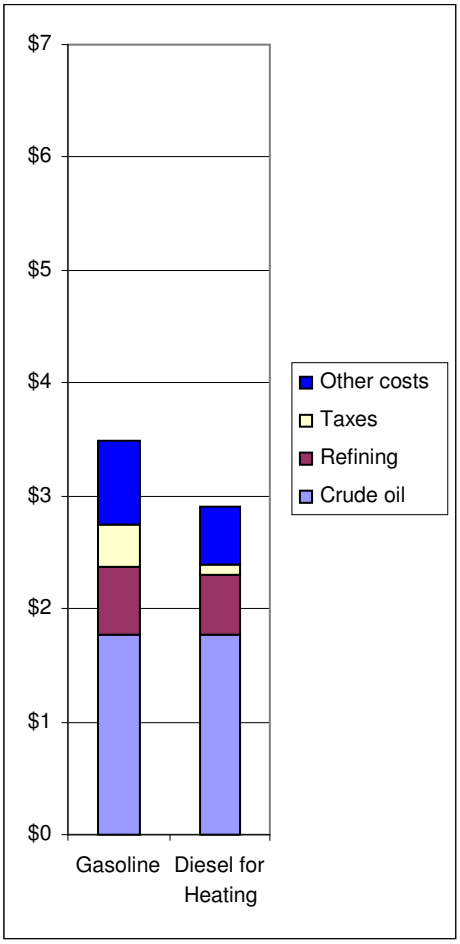
⇩ On the road system only 247 miles from Anchorage.

⇩ Can receive fuel any time; not weather dependent.

⇩ Fuel usually comes by truck.

⇩ Storage facility is publically owned; There are many companies that could potentially deliver fuel, with relatively low cost of capital, skill and experience.

False Pass



False Pass is on Unimak Island in the Aleutian Chain. It has a year-round population of about 54, the population increases when fishermen and fish processors arrive for the fishing season. All fuel for False Pass is barged in.

In November 2007 gasoline retailed for $3.49 per gallon and fuel oil for $2.90 per gallon. The community has a 3% sales tax that applies to fuel sales. The "other" fuel costs in late 2007 were roughly $0.75 for gasoline and $0.26 for fuel oil. Several factors tend to increase or hold down those other costs:

⇧ Can only receive fuel by barge.

⇩ Relatively close to large ports (Dutch Harbor and Anchorage).

⇧ Ice-free port.

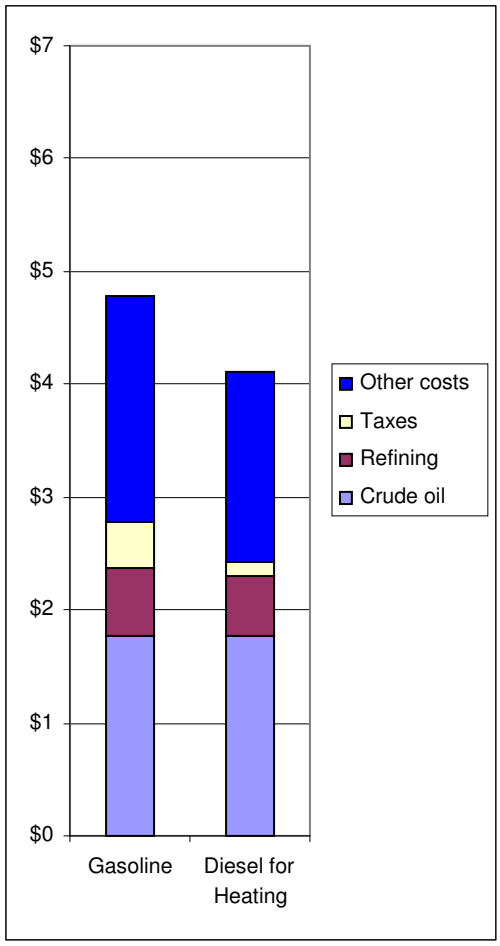
⇧ Fuel has to be lightered to community.

⇩ Small marine distance from larger facilities.

⇩ Only receives one delivery per year but has a large storage capacity to serve many commercial fisherman and fish processors in the area.

⇩ Storage Facility is owned by Peter Pan Seafood, a private company. Large throughput due to fishing fleet and location near multiple fishing grounds.

Fort Yukon



Fort Yukon is on the upper Yukon River northeast of Fairbanks and has a population of about 570. All fuel for Fort Yukon is barged upriver from Nenana by Crowley Marine.

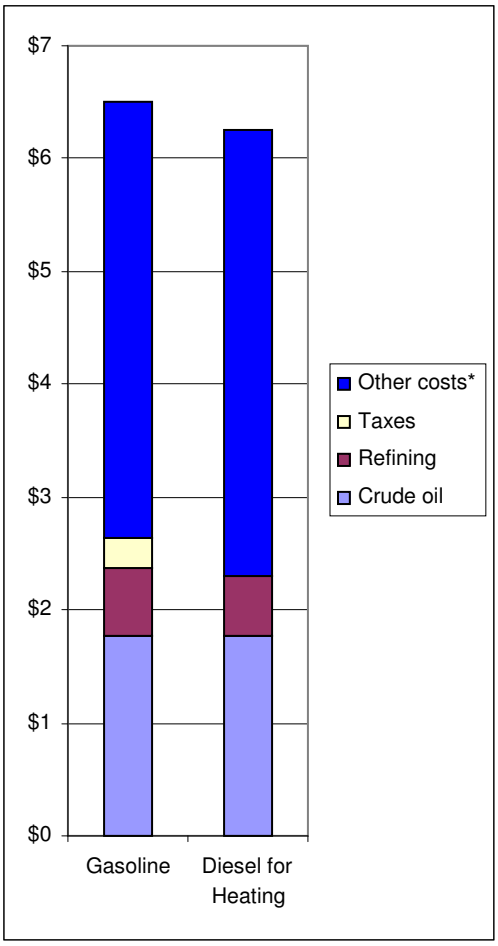
Gasoline retailed for $4.79 per gallon and fuel oil for $4.12 per gallon in November 2007. Ft. Yukon has a 3% local sales tax that applies to fuel sales. Other costs adding to fuel prices, in addition to costs of crude oil and refining, were roughly $2.01 for gasoline and $1.44 for fuel oil in late 2007. Those other costs can largely be attributed to several factors:

⇧ Fuel barged 400 river miles upriver from Nenana.

⇧ River and port freeze up during winter.

⇧ Fuel has to be lightered to community.

Lime Village



Lime Village is on the Stony River in the Kuskokwim Delta of western Alaska. It has a total population of just about 25; the population has declined over the past few years due to lack of jobs and the school closing. All fuel for Lime Village is shipped by air.

In November 2007 gasoline retailed for $6.50 per gallon and fuel oil for $6.25 per gallon. There is no local tax on fuel in the community. The "other" costs adding to the price of fuel in Lime Village in late 2007 were roughly $3.87 per gallon for gasoline and $3.70 for fuel oil. Several things make those other costs high:

⇧ All fuel has to come by air, because barges can't navigate the Stony River to Lime Village

⇧ Very short runway for airplanes; can only handle small shipments per trip.

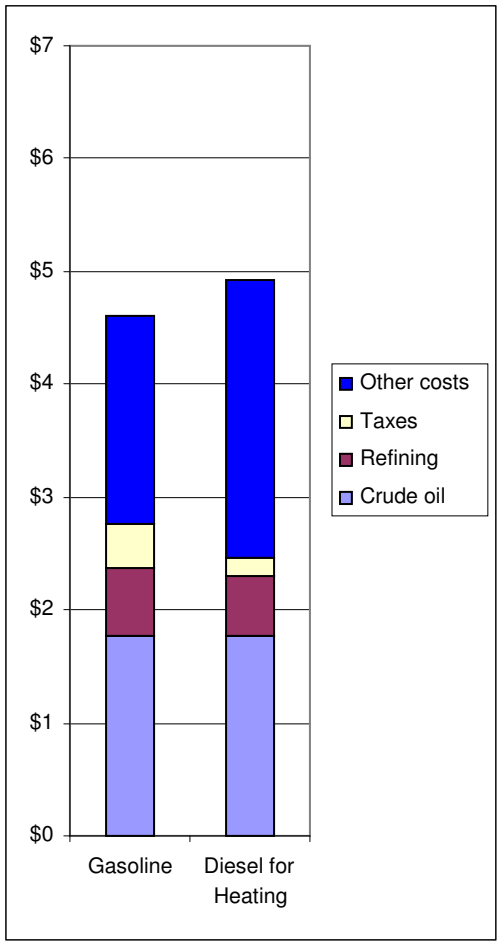
⇧ Fuel is barged from Bethel to Sleetmute and then transferred to planes for delivery to Lime Village.

⇧ Can receive fuel shipments any time of the year but is very expensive.

⇧ Storage facility is publicly owned, but is very small (only 1,800 gallon capacity for the community).

⇧ Small population means delivery charges are spread over fewer gallons.

Mountain Village



Mountain Village is on the Yukon River in Northwest Alaska, close to Norton Sound and the Bering Sea. About 786 people live there. Most fuel for Mountain Village is barged down the Yukon River from Nenana, but occasionally deliveries are lightered from ocean-going vessels at the mouth of the Yukon and shipped upstream.

In November 2007 gasoline retailed for $4.60 per gallon and fule oil for $4.92 per gallon. The community has a 3% sales tax. The "other" costs of fuel in Mountain Village in late 2007 were roughly $1.83 for gasoline and $2.22 for fuel oil. Several things tend to increase or hold down those other costs:

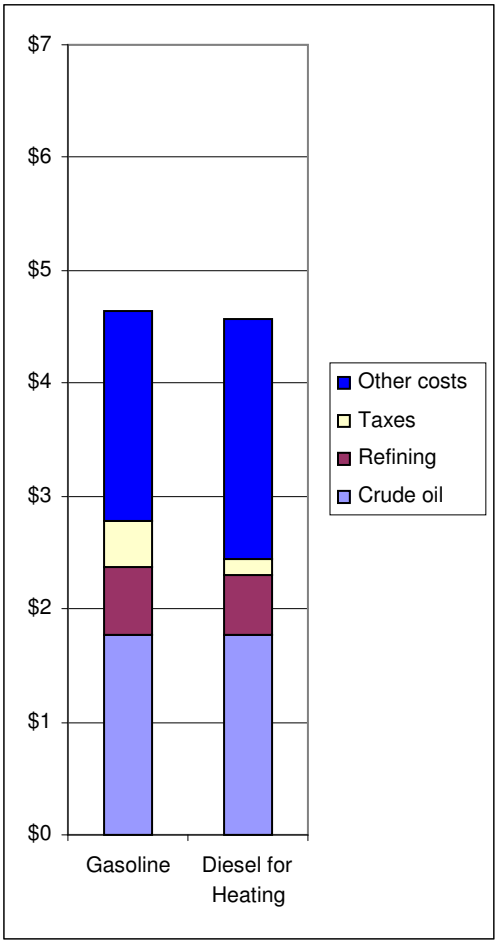
⇧ Barging on the lower Yukon River is the only method of transportation.

⇧ Can only deliver during times of the year when river is not frozen.

Fuel has to be transported in a shallow draft barge; Nenana is main hub port, roughly 1,200 miles upriver.

⇩ Publicly owned storage facility, with a capacity of 200,000 gallons.

Unalakleet



Unalakleet is in northwestern Alaska, on Norton Sound. Unalakleet has about 710 residents. All fuel is first barged to Nome in a line-haul vessel and then transported to Unalakleet in a shallow draft lighterage vessel.

Gasoline retailed for $4.65 per gallon and fuel oil for $4.58 per gallon in November 2007. There is a 3% local sales tax that applies to fuel. The "other" costs, beyond crude oil and refining costs, for fuel in Unalakleet in late 2007 were roughly $1.88 for gasoline and $1.89 for diesel fuel. Several things tend to add to or hold down those other costs:

⇧ Barge is the only method of fuel delivery.

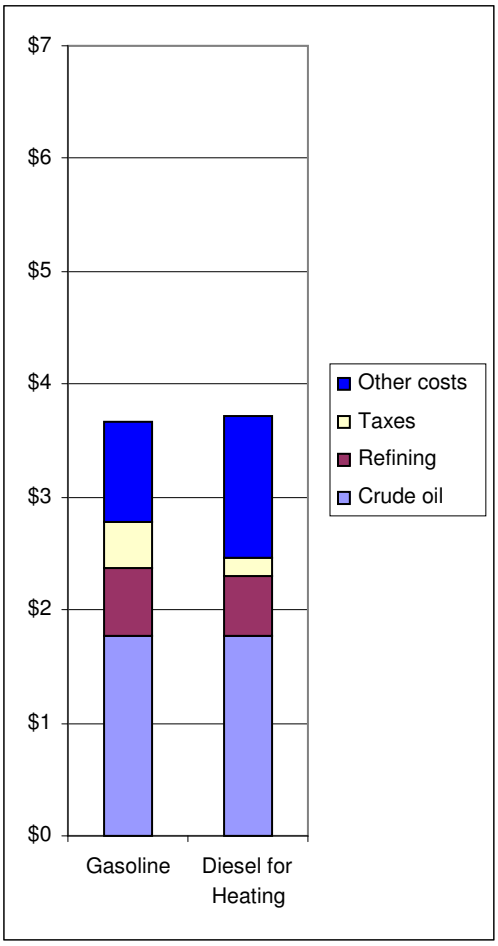
⇧ Norton Sound freezes in winter; deliveries only during certain months.

⇧ Fuel is transported from Nome in a lighterage vessel and pumped directly to a storage facility.

⇩ Community receives three or more shipments per year during ice-free months.

⇩ Publicly owned storage facility with a capacity of 420,000 gallons.

Yakutat



Yakutat is in Southeast Alaska, on the Gulf of Alaska north of the capital city of Juneau. Yakutat has about 619 residents. All fuel is barged to Yakutat by Delta Western, which also owns a 6.5 million gallon storage facility in the community.

In November 2007 gasoline retailed for $3.67 per gallon and fuel oil for $3.72 per gallon. There is a 4% local sales tax on fuel. The "other" costs in Yakutat are roughly $0.89 for gasoline and $1.02 for fuel oil. Fuel is less expensive in Yakutat than in many other places in Alaska because:

⇩ Fuel transportation method is by barge, but no river barging is required and Yakutat can receive shipments from Anchorage and Seattle.

⇩ Ice-free port and fuel deliveries can be made year round.

⇩ Deeper harbor accessible by larger shipments.

⇧ Work on the dock limited shipments to only four in 2007. As a result, fuel in late 2007 was priced higher than it would have been otherwise.

⇩ Large storage facility maintained by one transportation company. Large volume of fuel throughput due to Alaska Airlines' twice daily service to the community.

VIII. Summary and Policy Implications

Table 15 provides a summary matrix of the factors affecting fuel prices in the ten case study communities. The table makes it clear that many factors contribute to widely varying fuel prices.

Table 15. Summary matrix of community case study results

	Community									
	Allakakat & Alatna	Angoon	Bethel	Chitina	False Pass	Fort Yukon	Lime Village	Mountain Village	Unalakleet	Yakutat
Population	87	497	5812	110	54	570	25	786	710	619
Retail Price										
gasoline	6.00	3.96	4.52	3.52	3.49	4.79	6.50	4.60	4.65	3.67
diesel # 1	5.50	3.79	4.25	3.41	2.90	4.12	6.25	4.92	4.58	3.72
Crude price	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78
Refinery										
gasoline	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
#2 diesel	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Taxes										
Federal/gal.										
gasoline	0.184	0.184	0.184	0.184	0.184	0.184	0.184	0.184	0.184	0.184
#2 diesel										
State/gal.										
gasoline	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
#2 diesel										
Local (%)	0%	0%	0%	0%	3%	3%	0%	3%	3%	4%
All transportation										
State contract delivery price	0.57	**0.21**		0.04		**0.40**			**0.63**	0.53
Transfer points	4	4	4	2.5	4	4	8	4	5	2.5
Deliveries per year	2	8	10+	52	1	2		2	3	4
Quantity per year	7500	88,000		132,600	300,000		1,800	200,000	270,205	
Number of suppliers	2+	1	2	2	1	1	2	2	2+	1
Market contestability	*y*	*y*	*y*	*y*	*y*	*n*	*y*	*y*	*y*	*y*
Storage										
Capacity	16000	34,000	14,830,000	100,000	330,000	660,000	5,000	200,000	421,200	6,468,000
Owner	public	public	private	public	private	private	public	public	public	private
Financing	y	n	n	n	n	n	y	y	y	n
Annual O&M + R&R costs	*4,150*	*8,820*	*3,846,902*	*25,940*	*85,602*	*171,204*	*1,297*	*51,880*	*109,259*	*1,677,799*
per gallon throughput	*0.55*	*0.10*		*0.20*	*0.29*		*0.72*	*0.26*	*0.40*	
Construction cost	*$326,583*	*$693,989*	*$42,041,925*	*$1,360,764*	*$3,180,785*	*$4,864,730*	*$102,057*	*$2,154,542*	*$3,582,210*	*$18,336,289*
Transportation Method	Air	Barge	Barge	Road	Barge	Barge	Barge/Air	Barge	Barge	Barge
Air										
Runway	Long						Short			
Flight time (hours)	2						2			
Price/gal	1.5						1			
Barge										
Ice-free	n/a	y	n	n/a	y	n	n	n	n	y
Moorage/header	n/a	y	y	n/a	y	y	n/a	y	y	y
Tides	n	n	n	n	n	n	n	n	n	n
Lighterage	n/a	y	y	n/a	y	y	y	n	y	n
Navigational risk	n	n	n	n	n	n	n	n	n	n
Wharfage fee	n	y	y	n	y	n	y	n	y	y
Barge distance		990	1,800		850	440		750	1,880	680
Road distance				247		415		415		
Road+Barge distance		990	1,800	247	850	855		1,165	1,880	680
Reported markup				0.05			0	1.06	0.85	0
Notes: Italic = estimate										
Bold = proxy from similar communities with state fuel contracts										

Businesses consider a number of the costs that contribute to the final retail price of fuel proprietary, making it difficult to accurately quantify the components of fuel costs. In addition, there is limited competition is some markets; more competition tends to push prices down. And the number of businesses getting into the market may be limited due to the costs involved and skills required, or because the market size can only support a limited number of suppliers. Despite these limits, our analysis tells us a number of useful things about fuel prices.

- World and Alaska crude oil prices are set in the global market and reflect both crude oil supply and demand and international global events that influence the real and perceived stability of oil supplies.
- Alaska can do little (or nothing) to influence world crude oil prices. Therefore, these are a relative fixed component of overall fuel costs. In late 2007, costs of crude oil made up approximately $1.78 per gallon of final fuel prices.
- A significant portion of fuels used in Alaska are refined by in-state refineries. The balance is refined mostly in Washington.
- While the costs of fuel from Alaska refineries might be somewhat higher than from West Coast refineries, the additional transportation costs from West Coast refineries to Alaska appear to balance out the costs of in-state feedstock. As a result, the combined crude oil and refinery components tend to total the same amount, regardless of fuel refinery source.
- Refinery wholesale prices tend to closely track crude oil prices. The difference tends to be constant rather than a percentage, which suggests it is based on actual costs.
- The average refinery component for gasoline in September 2007 was about $0.59 and for #2 diesel was $0.53.
- State and federal taxes are a relatively constant component of fuel prices. Some communities charge local sales taxes, which increase final consumer prices.
- The mechanisms for charging federal fuel taxes are complex and obtaining refunds for federal taxes on exempt fuels is cumbersome for consumers.
- The “other costs” component of Alaska fuel prices is the most variable and reflects the wide variations among Alaska communities in distance from refineries, delivery methods, and many other factors.
- Communities closer to refineries and with road, pipeline, or railroad access enjoy the lowest fuel prices. Variations in prices in those locations tend to reflect market competition.
- Communities that rely on air delivery of fuel face the highest prices, with fuel delivery charges of $1.00 to $2.00 per gallon of fuel, depending on the community’s population and runway length—which determines the gallons flown in per delivery.
- In general, distance and population are major factors in final fuel prices, because a number of the costs of delivering fuel are relatively fixed. Larger deliveries mean that fixed costs can be spread across more gallons.

- Communities that effectively enlarge their populations or increase their market size through fishing fleets or airline traffic offset the higher prices caused by

small market sizes. Case study communities that strongly illustrate that point are False Pass and Yakutat.

- Barge fuel delivery tends to cause the most variability in fuel prices and reflects in part the complexities of delivery, with seasonal ice being a major component.
- Seasonal ice that limits deliveries also increases the need for storage capacity and the costs of maintaining inventories.
- In addition to seasonal ice that limits the number and timing of deliveries, the depth and characteristics of ports dictate the type of barge that can deliver to communities. The need for custom-built barges for deliveries to communities on shallow stretches of river that freeze up in the winter also increases delivery costs. The short season during which transporters need to recover the capital costs of these barges also increases fuel costs.
- It is unclear whether the lack of competition in fuel delivery shows that markets are too limited to support addition suppliers or that the cost of entry—in capital and skills—is too high. The information we would need to distinguish costs from profits is proprietary.
- The wide variation in final prices to communities suggests that prices at least in part reflect the differing costs of delivering and storing fuel.

Policy implications

Policy can't influence many of the components that go into final fuel prices. Butthere are a number of actions that may be able to influence prices. These include:

- The State of Alaska could provide crude oil feedstock to Alaska refineries through royalty oil sales at reduced prices, to lower the crude oil component of fuel prices. But without continued control of "downstream" cost components, it is not clear whether the lower crude oil feedstock prices would be passed on to final consumers or be taken in higher profits by all the "handlers" between the refinery and the end user. It is also unclear whether direct assistance to the communities and households with the highest fuel costs would be a more efficient and fairer practice, since state revenues to fund such programs also increase with the price of crude oil.
- Fuel prices tend to reflect market size, so cooperative buying to increase deliveries should reduce prices. It is unclear the extent to which communities coordinate deliveries, or whether entities within communities—such as electric utilities, schools, and others—coordinate their fuel purchases.
- The availability of cash to purchase fuels tends to be a limiting factor. The ability of a non-profit broker to coordinate and fund collective fuel purchases could further reduce prices.
- The equipment and infrastructure for fuel delivery—such as docks, moorages, and marine headers—influence the costs of delivery. Ownership of these facilities links a responsible party to fuel spills. Facilities tend to be lacking in some communities, in order to limit liability—but that results in higher delivery costs and inceased risks of spills. Addressing this issue could lower both prices and environmental risks.

References

Adrangi, Bahram, Arjun Chatratha, Kambiz Raffieeb and Ronald D. Ripplec, "North Slope crude oil price and the behavior of diesel prices in California," *Energy Economics*, Volume 23, Issue 1, January 2001, Pages 29-42.

Alaska Department of Environmental Conservation, Division of Air Quality. *Alaska 's Diesel Strategy.* Retrieved December, 2007. http://www.dec.state.ak.us/AIR/anpms/as/ulsd/ulsd-bkgrd.htm

Alaska Department of Natural Resources, Division of Oil and Gas, *2007 Annual Report*.

Alaska Department of Revenue, Tax Division, 2007, *Revenue Sources Book, Spring 2007*.

Bournazian, Jacob. Energy Information Administration. Comparison *of Selected EIA-782 Data with other Data Sources.* June 23, 2004. http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2004/comparison782/comparison782.htm

Bradner, T. Alaska Journal of Commerce. *Alaska Utilities Question Merger Plans.* 2005. http://www.highbeam.com/doc/1G1-119546085.html

Crowley Maritime Corp – CWLM Amended Annual Report http://sec.edgar-online.com/2006/04/14/0000950123-06-004668/Section2.asp

Denali Commission. Final Denali Commission Project Cost Containment Assessment Projects in Various Alaska Villages, April 2002.

Energy Information Administration, *Annual Energy Review 2006*. June 2007, http://www.eia.doe.gov/aer/

Energy Information Administration. *Country Energy Profiles.* Retrieved December 2007. http://tonto.eia.doe.gov/country/index.cfm

Energy Information Administration, State-*Level Energy Consumption, Expenditures and Prices, 2004.* June 2007. http://www.eia.doe.gov/emeu/aer/txt/ptb0106.html

Energy Information Administration, *Energy Basics 101, Petroleum Basics 101*. November 2007, http://www.eia.doe.gov/basics/petroleum_basics.html

Energy Information Administration. *Energy Kids Page*. April 2007, http://www.eia.doe.gov/kids/energyfacts/sources/non-renewable/oil.html

Energy Information Administration. Gasoline and Diesel Components. Gasoline Components History. 2006.
http://tonto.eia.doe.gov/oog/info/gdu/pump_methodology.html

Energy Information Administration, *Oil Markets Basics*, November 2007, www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/default.htm

Energy Information Administration, *International Energy Outlook 2005*, Table A2.

Energy Information Administration. Petroleum Navigator. Alaska Crude Oil Production. November 2007. http://tonto.eia.doe.gov/dnav/pet/hist/mcrfpak1A.htm

Energy Information Administration. Refiner Acquisition Cost of Crude Oil. September 2007. http://tonto.eia.doe.gov/dnav/pet/pet_pri_rac2_dcu_r50_m.htm

Energy Information Administration. Refiner Petroleum Product Prices by Sales Type. September 2007. http://tonto.eia.doe.gov/dnav/pet/pet_pri_refoth_dcu_SAK_m.htm

Everts Air Fuel, http://www.evertsair.com/airfuel/default.htm

Federal Highway Administration, Financing Federal-Aid Highways, The Highway Trust Fund, www.fhwa.dot.gov/reports/fifahiwy/fifahi05.htm

Flint Hills Resources. Alaska information. Retrieved November 2007.
http://www.fhr.com/alaska/

Fried, Neal & Robinson, Dan. Alaska Economic Trends. *The Cost of Living in Alaska.* October 2007.

Grant, Kenneth, David Ownby, Steven R. Peterson, 2006, *Understanding today's crude oil and products markets*, prepared for the American Petroleum Institute.

Internal Revenue Service. Publication 510, Excise Taxes. Chapter 1: Fuel Taxes. Retrieved November 2007. http://www.irs.gov/publications/p510/ch01.html#d0e1299

Keiser, Gretchen and David Teal. January 1984, *Fuel Consumption and Pricing in Alaska: A Regional Analysis.* House Research Agency Report 83-C. Prepared by the House Research Agency, Alaska State Legislature.

Loy, Wesley. Anchorage Daily News. *Conoco cancels refinery upgrade on North Slope*. November 27, 2007.

March, Jim, *The Future of Highway Financing*, Innovative Financing Series: Article 3, Federal Highway Administration, Turner-Fairbank Highway Research Center, Public Roads Magazine, November/December 2005.

Northern Air Cargo, http://www.nacargo.com/index.php

Petro Star, Inc. Retrieved November 2007. http://www.petrostar.com/

Power and Interest News Report, 29 October 2007, "Record Oil Prices and Washington's Desire for Energy Independence".

Power and Interest News Report, 09 August 2006, "Economic Brief: Alaska Pipeline Shutdown and the Rise of Oil Prices".

Richardson, Jeffrey. Alaska Business Monthly. *Refining rivalry.* June 1, 1991. http://www.allbusiness.com/north-america/united-states-alaska/165637-1.html

State of Alaska, Division of Community Advocacy – Report to the Commissioner. *Current Community Conditions: Fuel Prices Across Alaska.* December 2005.

State of Alaska, Department of Administration. Contract Award Manual. Land Based Diesel Fuel and Heating Oil. 2007

Tesoro Corporation. *About Tesoro: Company History*. Retrieved December 2007. http://www.tsocorp.com/TSOCORP/AboutUs/CompanyHistory/061236

United States Census Factfinder. *Population of Alaska*. December 2006, http://factfinder.census.gov/

USDA Rural Development. *News Release: Grant to help Remote Alaskan Communities secure adequate fuel supplies.* September 2001. http://www.rurdev.usda.gov/rd/newsroom/2001/ak_energy.html

U.S. Army Corps of Engineers, Waterborne Commerce Statistics, Pacific Coast, Alaska and Hawaii. http://www.iwr.usace.army.mil/ndc/wcsc/pdf/wcuspac05.pdf

U.S. Environmental Protection Agency. *Regulatory Announcement: EPA Finalizes Alternative Low-Sulfur Diesel Fuel Transition Program for Alaska.* May 2006. http://www.epa.gov/otaq/regs/fuels/diesel/420f06040.htm

Van Sant, Steve, 2007, Alaska Department of Commerce, Community and Economic Development, Division of Community Advocacy, *Alaska Taxable 2006*.

Appendix. Community Case Study Summaries

Allakaket/Alatna

Alatna and Allakaket are located directly across from each other on the Koyukuk River. The two have a combined population of about 125. A state-owned 3,500 foot runway is accessible year-round in Allakaket. There is no barge service due to shallow water. The Koyukuk River is ice-free from June through October.

Fuel is delivered only by air to Allakaket. Both communities have fuel storage capabilities. Fuel is pumped directly from the plane into the communities' fuel tanks. Fuel is flown to the communities as needed year-round. Brooks Air is capable of flying 3,000 gallons of heating fuel, or 3,300 gallons of gasoline, at a rate of $2,400 per hour. Both Brooks Fuel and Everts Air compete to deliver fuel to these communities.

Brooks Fuel purchases its fuel from Alaska Aero Fuel in Fairbanks. As of November 2007, the company paid $3.01 per gallon for #1 heating fuel. On November 13, 2007 Brooks Fuel delivered 3,000 gallons of heating fuel at a landed price of $4.51 per gallon. The retail price for this fuel was $5.50, with a reported $40 per barrel, or $0.95 per gallon, charge for fuel delivery. Everts Air delivered 4,462 gallons of gasoline on November 6 at a landed price of $4.52 per gallon. This gasoline retailed at $6.00 per gallon. The price at which Everts Air purchased its gasoline is not known, but Brooks Fuel reports purchasing its gasoline from Alaska Aero fuel at $2.99 per gallon.

Angoon

Petro Marine Fuel Services delivers fuel to Angoon by barge. Angoon receives deliveries about every one and a half months. Angoon is in Southeast Alaska, and its port is ice-free year round. This allows year-round fuel delivery—which can be in smaller quantities, so Angoon requires fuel storage capacity.

Fuel is delivered to Angoon from two sources. Some fuel is loaded on a barge in Vancouver, British Columbia or Anacortes, Washington and transported to Petro Marine's storage tanks in Ketchikan. It is stored there until it is unloaded into smaller barges that take the fuel to Angoon. Petro Marine also purchases and transports fuel out of the Nikiski Tesoro refinery on the Kenai Peninsula. This fuel is generally carried directly to the Ketchikan fuel tanks. Occasionally it is unloaded from the barge out of Nikiski into smaller barges and delivered directly to Angoon. The path of fuel depends on refinery rack prices and the location of barges with the cheapest and easiest supply route being used.

In November 2007, heating fuel retailed for $3.40 per gallon in Ketchikan and $3.79 per gallon in Angoon. The $0.39 difference in price consisted primarily of the cost of transporting fuel from the tank farms in Ketchikan in small barges to Angoon. Lesser but significant costs are attributable to an increased proportion of overhead costs associated with selling smaller amounts of fuel.

Angoon Oil and Gas is the primary distributor of fuel in Angoon. It has capacity to store approximately 15,000 to 20,000 gallons of #1 heating fuel and 12,000 to 14,000 gallons

of unleaded gasoline. The fuel tanks are owned by Angoon Oil and Gas. The Denali Commission had planned to finance a bulk fuel upgrade in Angoon, but during the initial phases of the project Angoon Oil and Gas decided to independently upgrade.

Gasoline is available for purchase directly at the Angoon Oil and Gas facility, and #1 heating fuel can be delivered by fuel trucks directly to the end users' tanks. Fuel delivery costs $0.10 per gallon. Angoon does not use a significant amount of diesel #2 for heating, because the Tlingit and Haida Central Council upgraded most households to high-efficiency furnaces that burn only #1 fuel oil.

Angoon faces higher delivered fuel prices than neighboring communities because of its small size, which prevents it from purchasing large amounts of fuel at a time. The lack of a "bulk discount" is increasing because Angoon's population has declined in recent years.

Angoon was selected to participate in the Citgo heating fuel program. Each household was given 100 gallons of heating fuel by the state-owned Venezuelan oil company. The fuel was purchased by the household and rebates were distributed by the Tlingit and Haida Central Council.

Bethel

Bethel is at the mouth of the Kuskokwim River, 40 miles inland from the Bering Sea. It has a population of 5,812 and is the regional fuel hub for communities along the Kuskokwim River and coastal communities near the outlet of the Kuskokwim River.

Crowley is the primary fuel supplier in Bethel. Crowley's Bethel tank farm holds a combined 14,830,000 gallons of petroleum products. Bethel serves as Crowley's fuel terminal for the Kuskokwim River region. In 2005 Crowley purchased Yukon Fuel, its major competitor in Bethel. This purchase doubled Crowley's presence in the region and allowed it to take advantage of increased economies of scale, but also raising concerns about potential monopoly market power.[49]

Fuel for the entire region usually goes into Bethel's tanks before being delivered to individual communities. It must be lightered off larger ocean-going barges in order to travel up the Kuskokwim River. Fuel is pumped directly from lighter barges into Bethel's two tank farms. The Port of Bethel levies a $0.04 wharfage fee per gallon on all fuel that enters its port. This wharfage fee increases the cost of fuel in Bethel and surrounding communities.

In November 2007 Crowley sold gasoline from its tanks at $4.52 per gallon and #1 heating fuel at $4.25. There are also multiple fuel truck companies in Bethel that transport fuel from Crowley's tanks for $0.25 to $0.35 per gallon. Crowley both transports the fuel and sells it in the community. It is not possible to break out the transportation and distribution component of fuel to Bethel, because the fuel does not change hands after transportation.

[49] Alaska Journal of Commerce, Alaska Utilities Question Merger Plans. December 7, 2003. http://www.highbeam.com/doc/1G1-119546085.html

Chitina

Chitina is at the confluence of the Copper and Chitina rivers. Most important for fuel transportation costs, Chitina is located on the Edgerton Highway. Its 2006 population was 106. Chitina is the only one of our ten case study communities that is on the road system. Transporting fuel to Chitina on the highway via fuel truck is inexpensive, when compared with fuel transportation costs to the more remote case study communities.

Chitina 1 Stop is the primary seller of gasoline in Chitina. In the past it purchased fuel from Service Oil and Gas in Glennallen. Service Oil and Gas has since been purchased by Crowley. Most services have remained the same since the purchase. Chitina 1 Stop receives one delivery of gasoline per week and purchases as much as 2,500 gallons a week during the peak of the summer season. As of November 2007, Chitina 1 Stop was selling unleaded gasoline for $3.52 per gallon and reports a $0.05 mark up per gallon of gasoline that remains the same regardless of time of year.

Heating fuel is delivered to Chitina by Crowley and Fisher Fuel. Heating fuel #1 is delivered directly to homes in Chitina from fuel trucks. There is no heating fuel company in Chitina. Fisher Fuel operates out of Big Lake and Crowley out of Glennallen. Both companies deliver fuel to communities throughout the region. As of November 2007 Fisher fuel reported selling #1 heating fuel for $3.41 a gallon. This price includes a $0.25 to $0.30 a gallon delivery charge from the fuel's source in Anchorage. Communication with Crowley indicates it charges similar amounts.

Both companies primarily purchase fuel in Anchorage and truck it throughout the region. Chitina tends to face higher delivered fuel costs than other road-connected communities in the region, because its small size means fuel deliveries are also small, raising the fixed overhead costs per unit of fuel.

False Pass

False Pass is in the Aleutians, on the eastern shore of Unimak Island on the straight connecting the Pacific Ocean to the Bering Sea. It has a population of 54. It gets its name from the shallow waters on the Bering Sea side of the straight that prohibit large ships from passing.

This shallow water means large fuel barges can't deliver directly to False Pass. Instead fuel must be lightered onto smaller barges for delivery. Peter Pan Seafoods has a fish processing plant in False Pass that purchases and distributes fuel directly to local residents. Peter Pan generally sells 20,000 gallons of gasoline, 30,000 gallons of #1 heating fuel, and 200,000 gallons of #2 diesel annually. The #2 diesel is sold primarily to the commercial fishing fleet.

Fuel is pumped directly from the fuel barge into Peter Pan's fuel tanks via marine header. Fuel is delivered once a year, in September. Community residents purchase their fuel directly from the pump at the fuel tanks. There is no fuel delivery service within the community. Our contact with Peter Pan Seafoods was not able to reveal the retail markup on the delivered fuel price, other than to say it was determined by the home office in

Seattle. In November 2007 gasoline was selling for $3.49 in False Pass and #1 heating fuel for $2.90.

Fuel is delivered by Crowley barges once a year to Peter Pan. Crowley also delivers about 30,000 gallons of #2 diesel to the City of False Pass for use in its electric generation plant. The Denali Commission built 60,000 gallons of bulk fuel storage for the electric generation plant. A stipulation of the Denali Commission's project is that the bulk fuel farm cannot be a retailer of fuel as long as private competition exists in the market. This prevents the city from entering the market as a seller of heating fuel or gasoline.

Fort Yukon

Fort Yukon is at the confluence of the Yukon and Porcupine rivers, about 145 air miles northeast of Fairbanks. It has a population of 596, and is accessible by barge during the summer months. There is a barge off-loading area, but no dock. Fort Yukon serves as a fuel terminal for Crowley.

Crowley delivers fuel during the summer months. It is barged from Crowley's fuel terminal in Nenana. Crowley owns 660,000 gallons of fuel storage capacity in Fort Yukon that is used to supply the community of Fort Yukon as well as other upper Yukon communities.

Number 1 heating fuel is delivered via truck to households. During November 2007, heating fuel sold for $4.12 per gallon, including the cost of delivery. Diesel #2 sold to the Gwitchyaa Zhee Utility for $3.65 per gallon. Gasoline is only sold by the barrel; the price was $4.79 per gallon in late 2007. The Gwitchyaa Zhee Utility also sells gasoline, with the November 2007 price at $5.10 per gallon. A local tax of 3% is also added to the price of fuel.

Breaking the cost of fuel into components is difficult for Fort Yukon, because Crowley is the transporter and seller of fuel and does not sell the fuel to itself at a "landed price". This lack of a landed price leaves us with only the retail price.

Lime Village

Lime Village is on the Stony River, 50 miles from its junction with the Kuskokwim River. Lime Village's estimated 2006 population was 25, but local residents indicate the number spending the winter in Lime Village was about 6. The population decline is attributed to the closing of the local school and the increasing cost of living—due primarily to rising energy costs.

Lime Village faces the highest fuel costs of the ten case study communities. As a result, wood has become the primary energy source for home heating. Lime Village has the highest fuel prices because it is not accessible by barge, its airstrip is too short to allow large planes to land, and its small population means it makes small fuel purchases.

Fuel is flown into Lime Village in two ways. In the past, almost all fuel was flown in by Henry Hill, a private fuel transporter in Sleetmute. That community gets fuel by barge

from Bethel. Henry Hill would then fly fuel from Sleetmute into Lime Village, in a Cessna 206 with the capacity to carry four barrels of fuel (200 gallons) at a time. Henry Hill charges $425 an hour for flying fuel—so there is a $425 charge to transport 200 gallons of fuel, at a cost of $2.125 per gallon.

Last year Henry Hill was unable to deliver fuel to Lime Village because he was out of compliance with environmental fuel transport regulations. Lime Village's alternative was to contract Everts Air to fly fuel in from the Tesoro refinery in Kenai to the nearby Osprey Lodge. The Osprey Lodge airstrip is able to accommodate larger fuel planes. After the fuel was unloaded at the hunting lodge, the lodge owner, Gary Pogany, flew the fuel 200 gallons at a time the 15 miles into Lime Village. Pogany charged $1.00 a gallon and delivered his fuel for $5.90 per gallon during fall 2007.

Lime Village recently received a bulk fuel storage upgrade from the Denali Commission. It received two new fuel tanks and had old fuel tanks refurbished. These tanks had been used by the school, but were moved to the powerhouse after the school closed. Fuel is unloaded at the airfield and pumped into a holding tank. From there it is pumped to the powerhouse.

In November 2007, Lime Village reported gasoline priced at $6.50 per gallon and #1 heating fuel at $6.25 per gallon.

Mountain Village

Mountain Village is on the Yukon River and has a population of 796. In the summer it is connected to St. Mary's, Andreafsky, and Pitka's Point by a road.

Crowley transports fuel in a shallow draft barge down the Yukon River into Mountain Village, from Crowley's tank farm in Nenana. Rarely will fuel be transported up the Yukon River to Mountain Village, despite the fact that Mountain Village is located much nearer the mouth of the Yukon than it is to Nenana. Nenana serves as Crowley's Yukon River hub, because it is close to North Pole refineries.

Mountain Village generally receives a spring and fall fuel shipment. Azachorak Village Corporation owns the fuel tanks and sells fuel to the community. The corporation reports purchasing 80,000 to 100,000 gallons of both #1 heating fuel and gasoline. Mountain Village's electric utility is operated by AVEC and purchases over 180,000 gallons of #1 diesel to power its generators. The #1 diesel used for electric generation is the same product as #1 heating fuel, but is referred to as #1 diesel by electric utilities.

The community has a 90,000 gallon capacity for #1 heating fuel and 100,000 gallon capacity for gasoline. Azachorak holds a moose-hunt fuel sale every August. This sale serves two purposes. It gives discounts for up to 110 gallons of heating fuel and 165 gallons of gasoline to subsidize fall moose hunts, and it frees up storage capacity before the final barge of the season delivers fuel. For the 2007 moose hunt sale, #1 heating fuel prices were dropped by $0.50 per gallon and gasoline prices were dropped by $0.60 per gallon.

Residents of Mountain Village can pay $0.25 per gallon to have fuel trucked to their homes. If they purchase over 100 gallons they receive a $0.05 discount on the delivery

price. In November 2007 Mountain Village reported a #1 heating fuel price of $4.92 and a gasoline price of $4.60. This includes a 30% mark-up on the delivered price.

Unalakleet

Unalakleet is a community of 727 on Norton Sound in Western Alaska. Its waters are generally ice free from May to October.

Unalakleet's fuel is usually delivered from Nome. Nome's deep-water port allows line haul barges to unload directly into the tank farms without lightering. The City of Nome charges $0.04 per gallon for fuel that passes through the Port of Nome. The fuel is pumped from Nome tank farms into lightering barges for delivery to Unalakleet. The fuel on the barge is pumped directly from the marine header into Unalakleet Native Corporation's tank farm.

Unalakleet Native Corporation is the primary fuel seller for the community. Two fuel deliveries were made to Unalakleet in 2007, totaling 155,696 gallons of #1 heating fuel and 104,509 gallons of gasoline. The landed price of #1 heating fuel was $2.83 per gallon and $3.08 for gasoline in November 2007, while the retail price for #1 heating fuel was $4.58 per gallon and $4.65 per gallon for gasoline. Fuel is not available for purchase at the tank farm. Instead it is trucked to households. The delivery charge is included in the retail price.

Fuel was delivered in 2007 by Delta Western and was financed through the Norton Sound Economic Development Corporation (NSEDC) as part of a project to supply fuel for communities in the area. NSEDC acts as an agent on behalf of the participants, to coordinate the order, issue a Request for Proposal (RFP) to fuel suppliers, evaluate the proposals, award a contract, and act as a single point of contact for the supplier and communities. No interest or fees are charged to the participants for administration of the program.

Yakutat

Yakutat is a community of 634 people on the Gulf of Alaska, 225 miles northwest of Juneau and 220 miles southeast of Cordova. It is at the mouth of Yakutat Bay, one of the few refuges for vessels along this stretch of coast. Yakutat is ice-free year round. It gets fuel from Delta Western. Fuel comes either from Tesoro's Nikiski refinery, through the hub community of Anchorage, or from refineries in Anacortes, Washington. Delta Western has 6,480,000 gallons of fuel storage capacity in the community; much of that is used for fueling Yakutat's twice daily jet service. Delta Western delivers fuel four times per year and owns a fuel delivery dock that is currently being rebuilt.

As of November 2007, the price before tax for a gallon of unleaded gasoline was $3.678, #1 heating fuel was $3.729, and #2 diesel was $3.599. If 50 gallons or more are purchased there is a $0.10 per gallon discount. Heating fuel is delivered to homes in trucks and is not available directly from the fuel tank. The delivery charge is included in the price of fuel.