Alaska Petrochemical Development Study

Presented to

The Anchorage Economic Development Corporation (AEDC)
and
Alaska Natural Gas Development Authority (ANGDA)

November 2009

www.cmaiglobal.com

CMAI Ref: SL-003472

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INTRODUCTION

The Anchorage Economic Development Corporation (AEDC) in conjunction with the Alaska Natural Gas Development Authority (ANGDA) are seeking to promote petro-chemical investment in Alaska based upon the proposed availability of 1.4 billion cubic feet per day of methane, ethane, propane, butane and pentane delivered to the region via the proposed ANGDA pipeline project. AEDC and ANGDA have planned a 'trade delegation' trip to the Asia region to meet with potential investment companies. This conference will offer the opportunity to gain a comprehensive overview of the issues while providing an opportunity to global value-added manufacturers to receive intensive on-the-ground information in a compact period of time. It will also allow for rapid development of relationships and identification of resources necessary for making critical analysis of risk and reward potential.

A key driver of this conference is the impending open season processes for the Denali-The Alaska Gas Pipeline and TransCanada Alaska Pipeline projects. These open seasons are both currently scheduled for 2010 and are focused on securing enough committed volumes to justify construction to terminus locations in Alberta and beyond. It is vital that any purchaser of North Slope natural gas or natural gas liquids secure capacity in any successful pipeline project in 2010, even though delivery of natural gas won't begin until 2018 at the earliest.

This is a white paper presentation aimed at increasing awareness and disseminating interest in petrochemical investment for use during their trade mission trip to Asia.

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EXECUTIVE SUMMARY

THE ALASKA ADVANTAGE

From a global perspective, recent trends in crude oil and natural gas prices have created a new dynamic in feedstock pricing. Historically, crude oil and natural gas commodity pricing have trended in similar patterns with generally only modest divergences in pricing for short periods of time. However, that pattern has seen a dramatic break over the last year or two. Crude oil prices are now tracking at much higher levels in the $70/bbl range, up nearly 100% in the last 9 months. At the same time, natural gas prices have collapsed to below $3.00/mmbtu. This break in trends is creating very significant effect on the global chemical industry and is having impacts on the competitiveness of Pacific Rim and North American chemical companies. As a general rule, the cost of feedstock (ethane,methane, naphtha) accounts for 60% of the cost of a finished product in the chemical industry. Previously, this has been a negligible competitive issue as the cost of crude oil based feedstock such as naphtha tracked fairly closely to the cost of natural gas based feedstock such as ethane and methane. Pacific Rim companies tended to develop competitive advantages over their North American competitors through lower capital and operating costs. Recently though, with the divergence of crude oil and natural gas based feedstock pricing, Pacific Rim chemical companies have found themselves at a distinct disadvantage for the cost of feedstock. Most Pacific Rim companies use naphtha as a feedstock, which is now costing as much as 60% more than what North American companies are paying for ethane. This has caused them to look outside Asia for lower cost growth options. Alaska could offer a significant opportunity to Pacific Rim chemical companies to diversify their manufacturing portfolio with new facilities based in Cook Inlet that take advantage of access to as much as 100,000 barrels a day or more in ethane feedstock delivered via a spur pipeline or bullet line from the North Slope.

THE ALASKA NATURAL GAS PIPELINE

The Alaska North Slope Producers (BP, ConocoPhillips, Exxon/Mobil, and Alaska) will decide in 2010 on where and to whom they each will sell their share of 35 TCF of natural gas & NGL's. Firm financial commitments will be made during the Federal "open season" (FERC) process for gas pipeline capacity determination and allocation – this will conclude in mid 2010.

PROPOSED PIPELINE PROJECTS

Proposed competing pipeline projects seeking to bring ANS natural gas to market outside of Alaska include:

- Denali- The Alaska Gas Pipeline Project (BP & ConocoPhillips): ANS to

Alberta/Chicago hubs with 4.5 Billion Cubic Feet (BCF) per day volume. 48 inch, 2,500 psi pipeline. Estimated cost - $25 to $30 Billion.

- TransCanada Alaska Pipeline Project: ANS to Alberta/Chicago Hubs with 4.5 Bcf per day volume. 48 inch, 2,500 psi pipeline. Estimated Cost – $25 to $30 billion.
- Alaska Gasline Port Authority (AGPA) Project: ANS to Valdez with 2.7 Bcf per day volume for export. Estimated cost - $23 billion.

Proposed competing pipeline projects seeking to bring ANS natural gas to market inside of Alaska include:

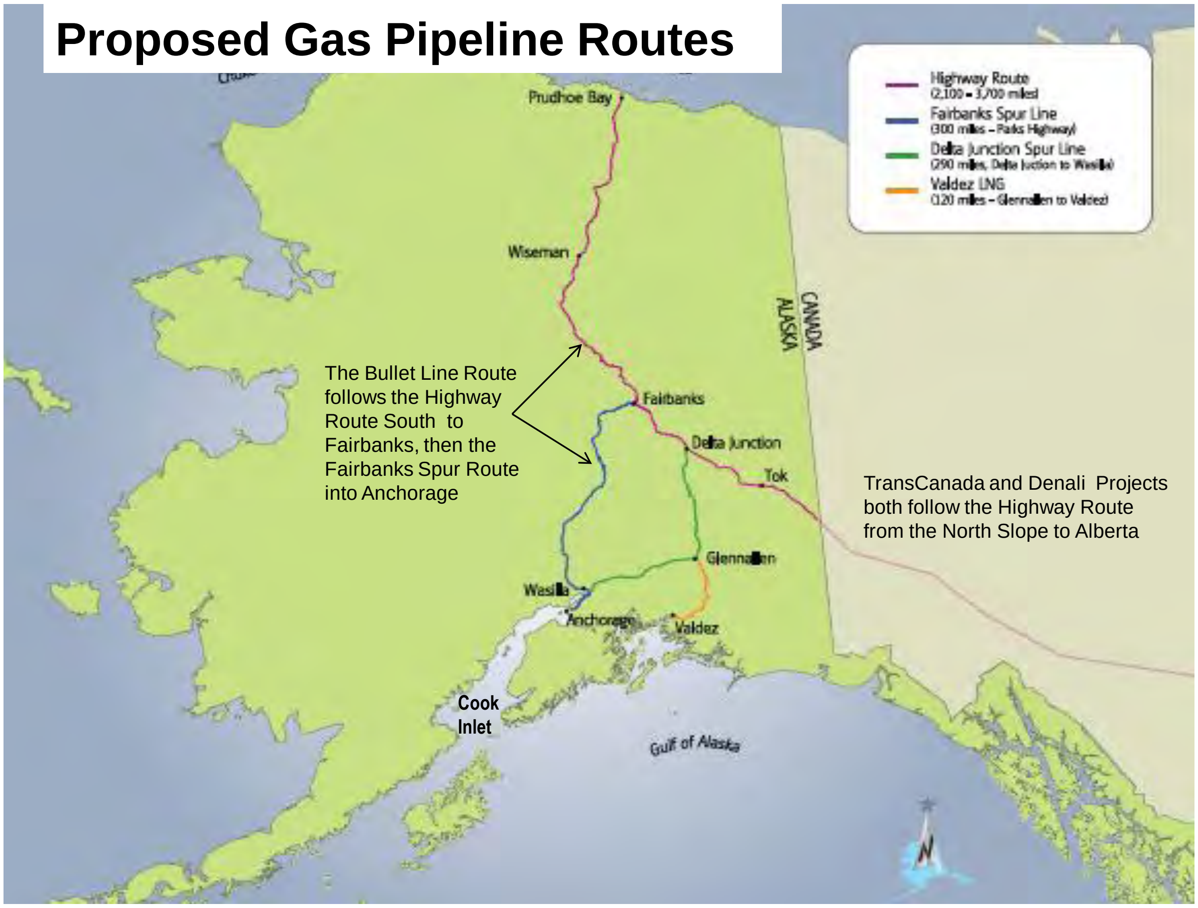
- Alaska Natural Gas Development Authority (ANGDA) Project: Spur line from the other three proposed out-of-state projects. From Delta Junction to Cook Inlet with up to 1.3 billion cubic feet per day volume of "wet" natural gas. 20 to 24 inch, 2,500 psi pipeline. Estimated cost - $1.5 to $3.0 billion.

- Enstar "bullet line" project: 20 inch pipeline from Foothills region of the North Slope to Cook Inlet. 500 million cubic feet per day volume of "dry" natural gas, 2,500 psi pipeline. Estimated cost - $3.5+ billion.

These pipelines are expected to be in service by 2018. Opportunities for utility and industrial demand for up to 1.4 Bcf per day of natural gas and natural gas liquids has been profiled as follows by the Alaska Natural Gas Development Authority:

- 300 million cubic feet per day (MMcf) for power and heating utilities.
- 390 MMcf per day for Gas-to-Liquids facility (methane)
- 375 MMcf per day for LNG facility (methane)
- 145 MMcf per day for fertilizer facility (methane)
- 78 MMcf per day for LPG facility (propane & butane)
- 120 MMcf per day for petrochemical facility (ethane)

This paper focuses on petrochemical projects in the Cook Inlet area of South Central Alaska. Such facilities would utilize feedstocks supplied from the North Slope through any of these pipelines, since those taking Natural Gas to markets outside Alaska would also be used to supply feed to the spur line to Cook Inlet (See map below)



THE 2010 FERC OPEN SEASONS

An open season is an event during which a pipeline project sponsor offers terms to potential shippers who seek to reserve capacity in a pipeline. Shippers can include gas producers, utilities, and end users. In North American markets, open seasons help determine the need for new pipeline capacity, and are required for Federal and state regulatory approval.

An Open Season includes a sealed bid auction of volumetric shipping capacity in gas pipeline. The process is open to any company, foreign or domestic, that wishes to participate. Tariffs to delivery points are known, and the shipper makes a firm multi-year commitment in a "ship or pay" contract. The creditworthiness of shippers is essential since their committed capacity becomes the basis for the pipeline design. Results of process are public & regulators hear complaints before certification of the project plans.

If a manufacturer is to seek in-state use of North Slope natural gas via off-take points in either the Denali or TransCanada projects, they must begin now to prepare for the 2010 Federal open season. Any manufacturer pursuing this resource must immediately begin evaluating locations for facilities and project costs for any in-state pipeline that will service that facility. They must also analyze advantages or disadvantages of locating operations in Alaska.

The following activities may also be pursued in 2010 for in-state supply:

- Negotiate for gas supply before Federal open season (Purchase point may be North Slope or local delivery area)
- Bid on Spur Line capacity during Intra-State open season
- Bid on In-Alaska capacity for "Main 48-inch Line" during Federal open season
- Negotiate a shipping contract on either inter-state and/or intra-state gas pipelines before or during the open season

TransCanada expects to have a firm estimate of the construction costs and details for the main line early in 2010, and expects to begin their open season in May, and complete it by the end of July, 2010. The Denali project sponsors expect to hold their open season later that same year.

PETROCHEMICAL FEEDSTOCK SITUATION AT COOK INLET

Alaska has enough natural gas resources to fill the TransCanada Alaska pipeline for 25 years and for decades longer. This gas contains significant volumes of liquids.

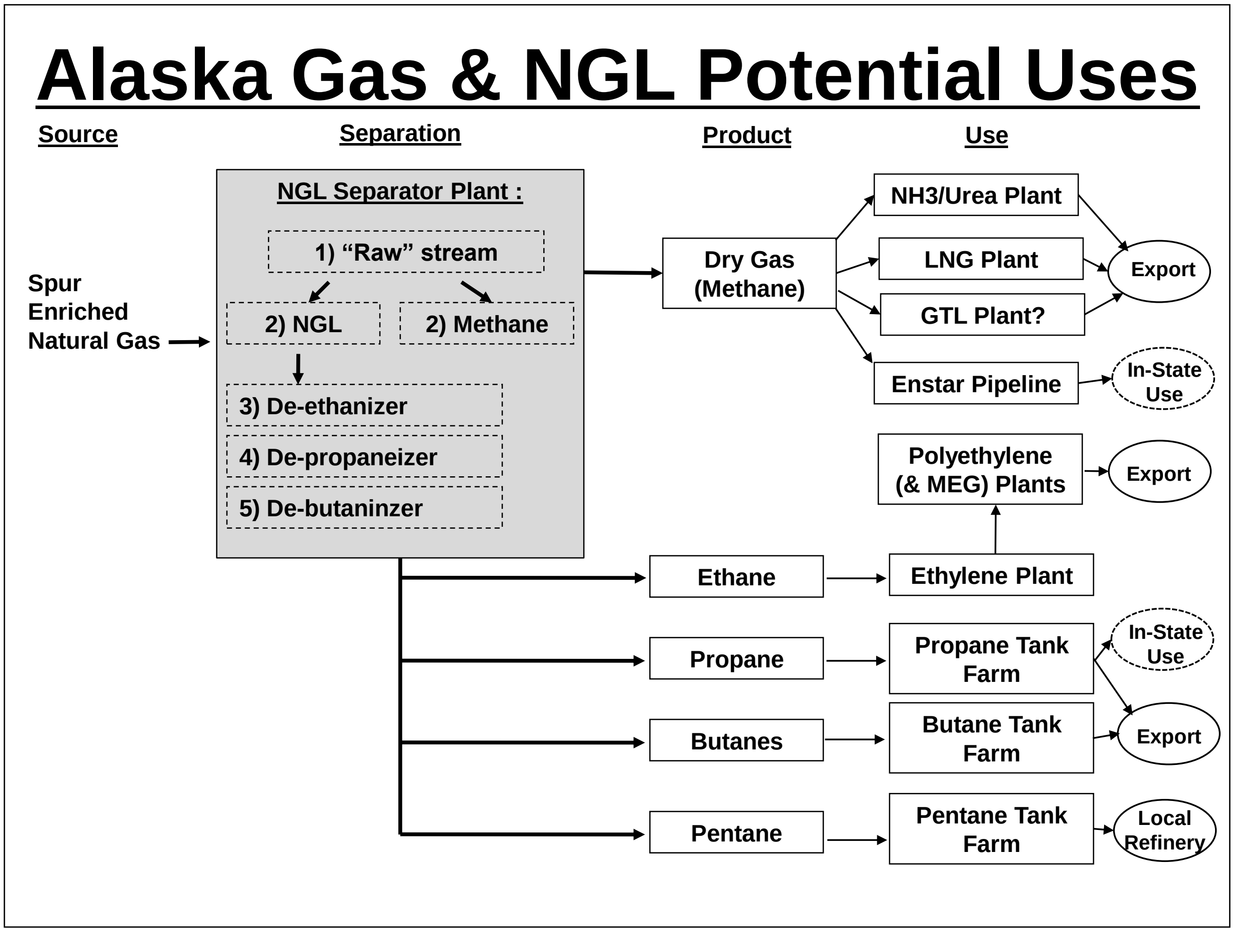
LPG's & NGL's in North Slope Pipeline

North Slope Gas Pipeline Flow --- 4.5 BCFPD

Component		Mole Percent	Bbls/Day	Thousand Tonnes Per Year
C2	Ethane	7.23	206,000	4,250
C3	Propane	3.76	110,250	3,250
C4	Butane	0.76	26,250	900
C5+	Pentanes	0.03	1,250	45

Composition Based on ANGTS – Alaska ROW Application (June 1, 2004) – Page 9 of 34

The opportunity for a high NGL concentration spur line to Cook Inlet would provide the various feedstocks required for many different chemical fuel uses, in addition to local power and home heating fuels. These potential uses include Liquified Natural Gas (LNG) and Liquified Petroleum Gas (LPG) for export, as well as feedstocks for Ammonia/Urea, GTL, and Ethylene, as shown in the flow chart below.



The theoretical ethylene and propylene capacity of a Cook Inlet petrochemical plant can be calculated, as shown in the following table:

Feedstock Based Cracker Production Estimate

		C2	C3	C4	C5
Carbon Number		**C2**	**C3**	**C4**	**C5**
Product Name		**Ethane**	**Propane**	**Butane**	**Pentanes**
Concentration	**Mole Pct**	**7.23**	**3.76**	**0.76**	**0.03**
Volume of Feedstock	**Bbbls/Day**	**206,000**	**110,250**	**26,250**	**1,250**
Total Available Feedstock	**KTA**	**4,250**	**3,250**	**900**	**45**
After Liquids Separation	**KTA**	**1,934**	**1,479**	**410**	**21**
Feed Used/MT of Ethylene	**MT/MT**	**1.29**	**2.38**	**2.50**	**3.25**
Ethylene Capacity	**KTA**	**1,500**	**621**	**164**	**6**
Propylene/MT of Ethylene	**MT/MT**	**0.04**	**0.40**	**0.43**	**0.53**
Propylene Capacity	**KTA**	**54**	**248**	**71**	**3**

As shown above, there should be enough Ethane for a world scale 1,500 KTA ethane cracker, and three world scale 500 KTA Polyethylene (PE) plants (or two PE + one Mono Ethylene Glycol (MEG) plant), but there would not be enough other feeds to provide enough propylene for even one world scale Propylene derivative plant, even if all of the propane and butane were used as petrochemical feed. Current world scale Polypropylene plants, for example, are in the 400 KTA to 500 KTA capacity range. Note: the small amount of Propylene produced by the cracker using just the Ethane feedstock can either be sold to the local refinery for alkylation feed, or perhaps go into LPG for exports.

Estimated capital costs for facilities constructed in South Central Alaska by industry total $8.5 billion (in 2005$) of potential capital projects including:

- LPG facility, $844 million
- GTL facility, $3.112 billion
- LNG facility, $880 million
- Ammonia/fertilizer facility, $257 million
- Petrochemical facilities, $3.396 billion

This paper focuses on the petrochemical facility potential, and provides a comparison of an ethane based complex in Cook Inlet to similar facilities in other regions, specifically:

- The Middle East
- Alberta, Canada

- United States Gulf Coast (USGC)
- China
- South Korea

CRITICAL SUCCESS FACTORS

Every petrochemical project needs the following critical factors to succeed:

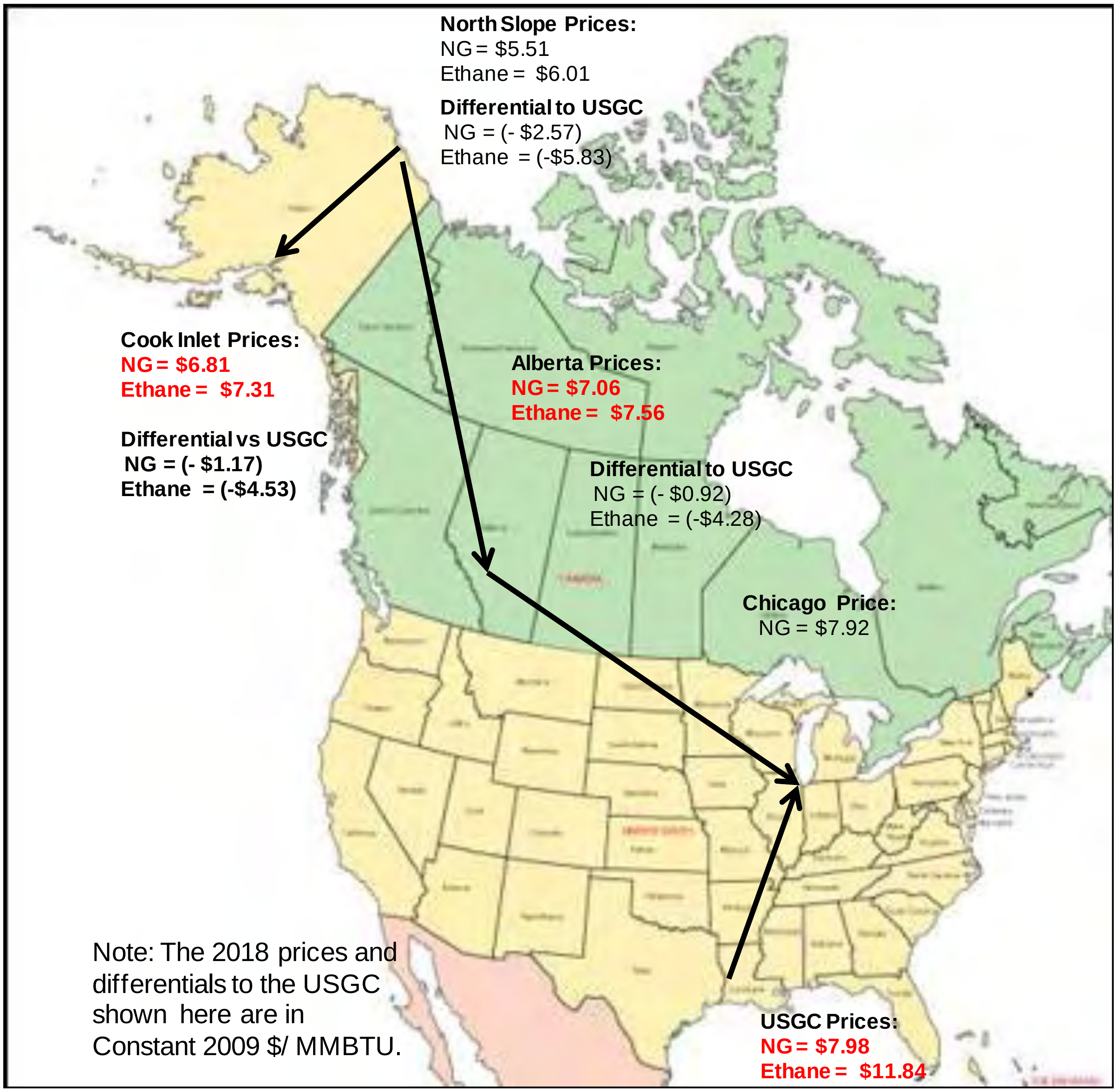
- Low Cost of Production
  - Driven by availability & cost of feedstocks & energy
- Low Capital Investment Versus Other Locations
  - includes site & logistics capital
- Low Logistics Costs for RM's & Finished Products
  - Proximity to feedstocks and end use markets
  - Infrastructure availability and quality
- Channel to Market (Commercial Strengths)
- Good, Stable Investment Climate
  - Taxes, cycle timing, regulations, incentives, etc.

COST OF PETROCHEMICAL PRODUCTION AT COOK INLET

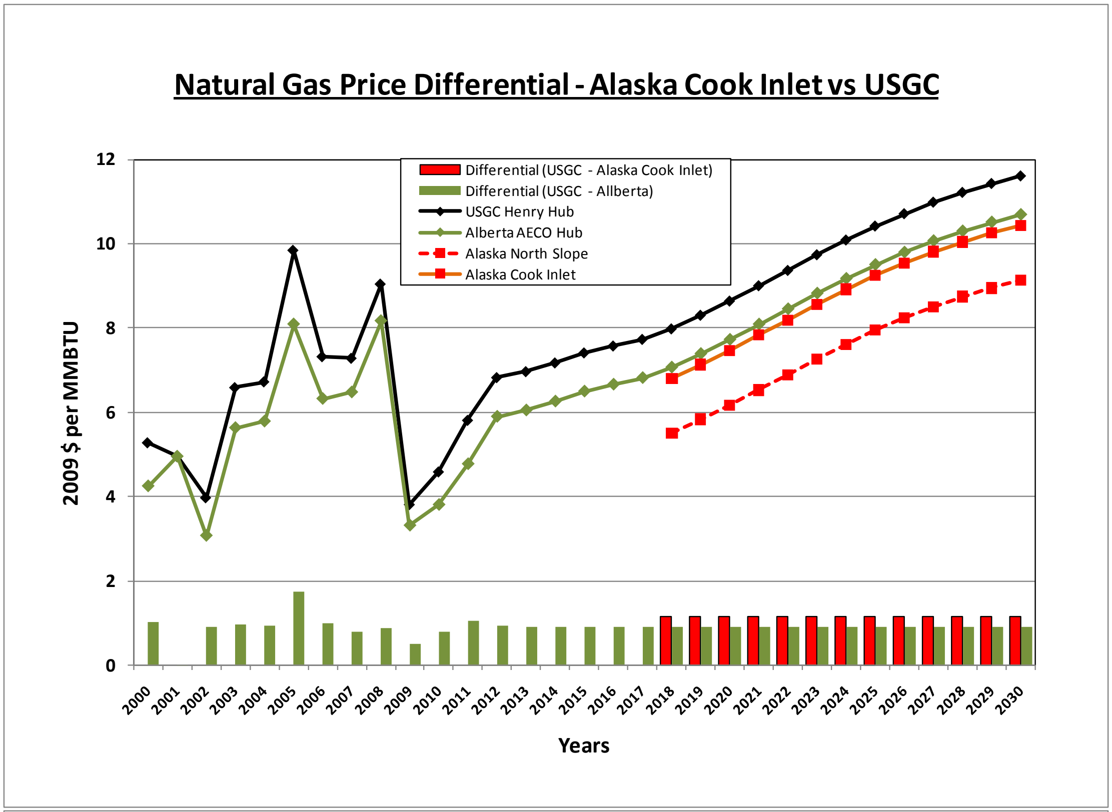
The price of Natural Gas and Ethane on the Alaskan North Slope will be related to its sales value in its end use market, minus the cost of transportation through the pipeline. The Natural Gas price in Alberta is usually priced lower than the Chicago price, based on its cost of pipeline shipment, since Alberta is long on gas, (as is the US Gulf Coast). Although North Slope gas and ethane will be priced based on their netback after pipeline shipments to Alberta, Cook Inlet prices will be the North Slope price plus tariff.

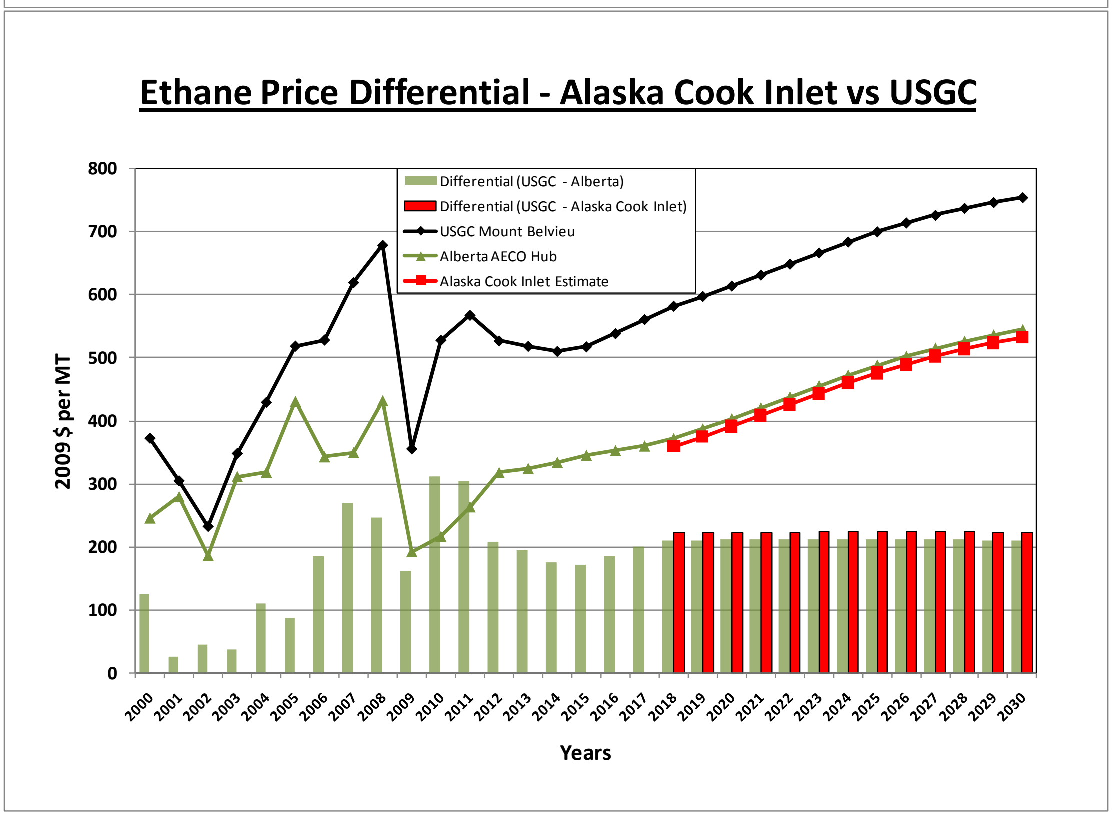
Ethane prices in Alberta are based on its BTU value in its only alternative use, as natural gas shipped to the US. However, US ethane has to compete against crude oil based cracker feedstocks on the USGC, so its price is higher than its BTU value there when crude oil is high relative to gas (as it is now). Ethane at Cook Inlet will have a greater discount to the USGC than natural gas will.

As you can see in the graphic below, the price of Ethane at the Cook Inlet in 2018 is expected to be about $4.50 per MMBTU below the USGC price, and about $0.25 per MMBTU below the Alberta Ethane price, in constant 2009 dollars. Cook Inlet's Natural gas, however, is only expected be around $1.00 per MMBTU below the USGC price, and $0.25 per MMBTU below Alberta.



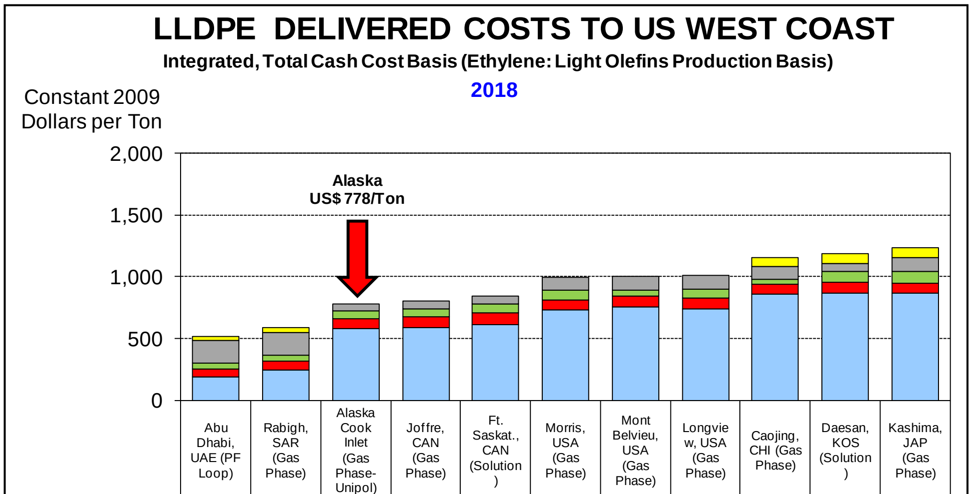
These differentials over time are shown in the following two graphs.
(Note: the Ethane graph units have been converted from $ per MMBTU into $ per MT .)


Natural Gas Price Differential - Alaska Cook Inlet vs USGC
Differential (USGC - Alaska Cook Inlet)
Differential (USGC - Allberta)
USGC Henry Hub
Alberta AECO Hub
Alaska North Slope
Alaska Cook Inlet
2009 $ per MMBTU
Years

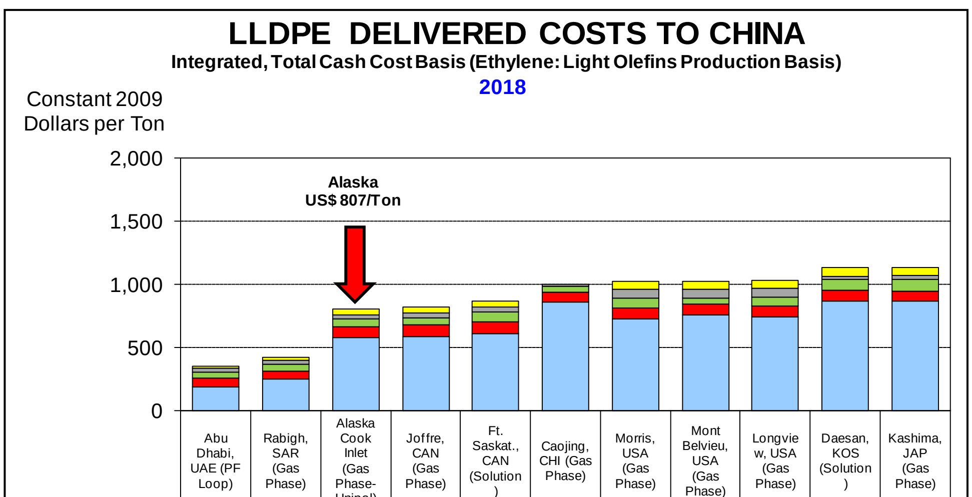

Ethane Price Differential - Alaska Cook Inlet vs USGC
Differential (USGC - Alberta)
Differential (USGC - Alaska Cook Inlet)
USGC Mount Belvieu
Alberta AECO Hub
Alaska Cook Inlet Estimate
2009 $ per MT
Years

The following chart shows the site delivered cash cost to the US West Coast and China for ALASKA LLDPE versus numerous other units. As the chart below shows, the project retains a competitive advantage versus most other regions on a delivered to China basis as well as a delivered to US West Coast basis.

HDPE competitiveness in a swing reactor will be comparable to that of LLDPE shown below.



	Abu Dhabi, UAE (PF Loop)	Rabigh, SAR (Gas Phase)	Alaska Cook Inlet (Gas Phase-Unipol)	Joffre, CAN (Gas Phase)	Ft. Saskat., CAN (Solution)	Morris, USA (Gas Phase)	Mont Belvieu, USA (Gas Phase)	Longview, USA (Gas Phase)	Caojing, CHI (Gas Phase)	Daesan, KOS (Solution)	Kashima, JAP (Gas Phase)
Total Cost	519	586	778	805	849	995	1005	1010	1156	1187	1236
Duty	33	37	0	0	0	0	0	0	74	76	79
Packaging & Logistics	182	182	49	66	66	100	110	110	99	67	113
Fixed Cost	48	50	67	60	75	79	50	70	46	89	97
Variable Cost	70	68	84	88	94	87	87	87	75	85	75
Feedstock Cost	186	249	577	591	614	730	758	743	863	870	872



	Abu Dhabi, UAE (PF Loop)	Rabigh, SAR (Gas Phase)	Alaska Cook Inlet (Gas Phase-Unipol)	Joffre, CAN (Gas Phase)	Ft. Saskat., CAN (Solution)	Caojing, CHI (Gas Phase)	Morris, USA (Gas Phase)	Mont Belvieu, USA (Gas Phase)	Longview, USA (Gas Phase)	Daesan, KOS (Solution)	Kashima, JAP (Gas Phase)
Total Cost	355	422	807	825	872	1003	1029	1029	1034	1133	1138
Duty	22	26	49	50	53	0	63	63	63	69	69
Packaging & Logistics	30	30	29	36	36	20	71	71	71	20	25
Fixed Cost	48	50	67	60	75	46	79	50	70	89	97
Variable Cost	70	68	84	88	94	75	87	87	87	85	75
Feedstock Cost	186	249	577	591	614	863	730	758	743	870	872

The cost competitiveness for the other types of Polyethylene, as well as for Mono Ethylene Glycol coming from the Alaska facility are included in the main body of the report. The results are similar, showing a distinct advantage for an Alaskan plant.

Cook Inlet offers a number of logistics advantages as well. South Central Alaska is nearly 1,000 miles closer to North Slope natural gas reserves than the nearest existing petrochemical manufacturing facilities in Alberta. If in-state volume demand is large enough, this could offer a pricing advantage over Alberta through lower pipeline tariffs, thus reducing the delivered price of natural gas shipped to in-state users versus those users taking delivery in Alberta.

Cook Inlet advantages also include logistical advantages for petrochemical companies with downstream customers located in China, Korea, Japan and Taiwan.

These include:

- Tidewater sites that do not require long-distance delivery of product via railroad or highway to tidewater from manufacturing facilities in the U.S. Midwest or Alberta.
- An advantage of two days less sailing time to Asian markets than ports in British Columbia and Washington State via the Great Circle Route
- The ability to take advantage of available back haul capacity returning from U.S. and Canadian West Coast ports to Asian countries via the Great Circle Route.

Comparisons to Cook Inlet for specific routes include:

- Favorable logistics costs versus Alberta production for Asian markets
- Favorable logistics costs versus Asian production for US West Coast markets
- Competitive logistics costs versus USGC for US West Coast markets
- Somewhat disadvantaged logistics costs vs Alberta for US West Coast markets

POTENTIAL COOK INLET PLANT SITES

Several possible locations for manufacturing facilities by tidewater have been found in the Cook Inlet region, with large, level land tracts suitable for building a petrochemical plant.

Four Cook Inlet locations have been studied for plant sites:

- Port MacKenzie, Matanuska-Susitna Borough, near Anchorage (Greenfield Site)
- Fire Island near Anchorage (Greenfield Site)
- Tyonek (Greenfield Site)
- Nikiski, Kenai Peninsula Borough (Brownfield Site)

The Cook Inlet sites offer the following advantages for petrochemical manufacturing:

- Available resources including water and power generation
- Existing support industry base for pipeline and manufacturing operations and maintenance
- Existing skilled workforce
- Existing training infrastructure for expanded workforce needs
- Strong, mature regional economies able to better absorb and support growth through new manufacturing facilities and related infrastructure

PORT MACKENZIE SITE ATTRIBUTES

- Port MacKenzie is opposite the port of Anchorage on Cook Inlet, with its own deep water port and surface road connections to Anchorage and the communities to the north of it.
- A rail spur is to be built in the next couple of years, connecting it to the container ship port at Anchorage and the rail barge port at Whittier, which provides weekly rail service to the US West coast.
- The site has good access to power, and is located at a central location within the natural gas pipeline grid, although the pipeline is nine miles from the plant site.
- An improved surface road is also being built into the site, which is within commuting distance of the suburban communities north of Anchorage, where large numbers of well trained former military and oil industry workers live.

FIRE ISLAND SITE ATTRIBUTES

- Fire Island is a totally green field 4,300 acre island site with no residents, sitting three miles out from the city of Anchorage in the Cook Inlet.
- It was at one time a military radar and Nike missile site, but the facilities have all been demolished. Fire Island is now owned by Cook Inlet Region Inc. with access by permission only.
- Various uses have been suggested for the island since its abandonment in 1980, including an expansion of the Port of Anchorage, a replacement for Anchorage International Airport, and a power generating windmill farm.
- It has no natural gas supply, practically no buildings, no paved roads, railroads or docks, but it does have a small airstrip. The only access currently is by airplane or helicopter, and by barge in the summer.

TYONEK SITE ATTRIBUTES

- Tyonek is a 10,000 acre green field industrial site on Indian corporation land, with a deep water port facility .
- It has significant power generation nearby, and the natural gas pipeline to Nikiski runs through it.
- There are no surface roads out of the area to Anchorage, nor any railroad connections.
- A ferry from Anchorage will begin operation next year, but the trip is three hours one way. Workers in the area are currently flown in daily.
- There is an existing village nearby, and the Indian Corporation is building a new community near there with 800 home sites, which have been sold but only 200 people live there now.

NIKISKI SITE ATTRIBUTES

- Nikiski is a brown field site, with several existing gas fed industrial plants:
  - LNG export plant built in 1969 that is still operating, with its license recently renewed through 2011.
  - Agrium Ammonia/Urea plant, built in 1968, which was shut down in 2007 due to lack of affordable local natural gas.
  - BP Gas to Liquids pilot plant is still in operation.
- A Tesoro refinery, built here in 1969, is still the most sophisticated one in Alaska as the others are crude topping facilities. There is also a former Chevron refinery site there, which was closed down years ago.
- This area was chosen by Dow Chemical for a potential petrochemical plant in the 1980's, but the land was never purchased by them, and the project died.
- The site has a cogeneration power plant that doesn't utilize the steam section.
- It also has significant natural gas infrastruture and a port facility, with surface roads to Anchorage, but no railroad.

GENERALSUMMARY OF SITE CONSIDERATIONS

All of the sites except Fire Island are on or within a few miles of the existing natural gas pipeline infrastructure, and have good access to electric power. The two sites having existing access to surface roads and a pool of labor within easy commuting distance are Nikiski and Port MacKenzie. Port Mackenzie has the added benefit of a planned rail link, which would allow rail shipment of products to the Anchorage container ship port and the US West Coast by rail barge. The Nikiski site has the benefit of additional existing infrastructure, including a cogeneration steam generator, which would result in a reduced capital investment requirement. It is the location of the current LNG export facitlity on Cook Inlet, and it is also the location of the Tesoro refinery, which would be the likely customer for several cracker byproducts, as well as for the pentane component of the gas liquids in the pipeline.

The map below shows the location of the four sites relative to the route of the natural gas pipeline network around the Cook Inlet.

CHANNEL TO MARKET ISSUES

The following channel to market issues have been identified, which should be considered by a company considering a petrochemical investment in Alaska:

- An Asian company would be considered a domestic supplier in the US market if it has production capacity in Alaska, which could help in marketing to customers and in its dealings with the government.
- An Alaskan plant would not only have duty free access to the entire US market, but would also be able to participate in the North American Free Trade Agreement with Canada and Mexico, as well.
- The first mover on petrochemical investment in Alaska will understand the local situation better than latecomers will, and is better positioned for additional future petrochemical and downstream investments.
- Partnering with or buying a US company could facilitate market development activities for an Alaskan plant's foreign owner (IPIC bought Nova, and SABIC bought GE Plastics).

INVESTMENT CLIMATE ISSUES

The following investment climate issues have been identified, which should be considered regarding an Alaskan petrochemical investment:

- The political stability of the US government and tax system is one of the best in the world. However, the Alaska state corporate income tax rate, at 9.4%, is one of the highest in the country.
- Intellectual property rights are well protected.
- A weak dollar could favor a US investment that is based on domestic capital, operating costs and raw materials.
- Environmental permitting can be difficult, but this will be eased somewhat by sharing work done for the pipeline, and the state of Alaska wants the pipeline to be built.
- Cycle timing is favorable for manufacturers looking to build petrochemical facilities in Alaska. The Open Season negotiations will be taking place at the absolute bottom of the chemical cycle trough, occurring in 2010.
- Investment in productive assets now is a way to put funds that might currently be underperforming in financial investments to good use for the long term.
- The state of Alaska is expected to be an ally in this Open Season/investment process. This is not an acquisition of an existing company, but rather the establishment of a new presence/company in Alaska. Alaska will strongly support that endeavor.

TARGET COMPANY COMPARISON

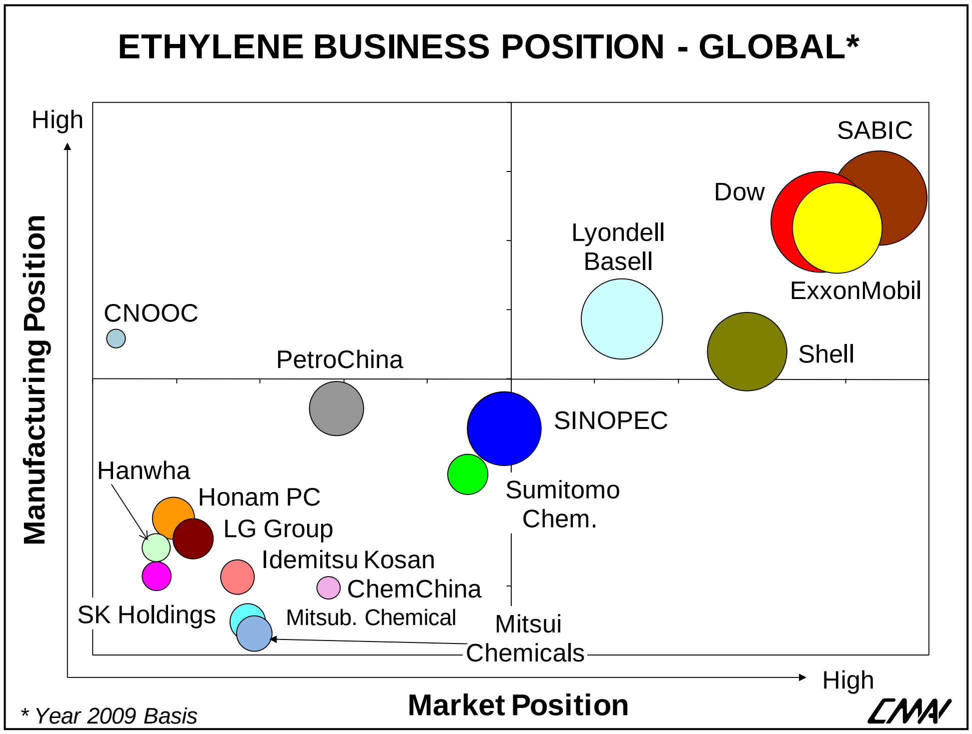
The following Asian companies were selected to be evaluated with respect to their potential interest in investing in Alaskan petrochemicals:

- China
    - China Petroleum & Chemical Corporation (Sinopec)
    - China National Offshore Oil Corporation (CNOOC)
    - Sinochem
    - ChemChina
    - PetroChina
- South Korea
    - LG Chemical
    - SK Energy
    - Hanwha Chemical Corp
    - Honam
- Japan
    - Mitsubishi
    - Mitsui
    - Sumitomo
    - Idemitsu Kosan
    - Itochu

In this section of the report, the key success factors in manufacturing and marketing have been prioritized and weighted for each of the companies targeted. The companies are then compared to each other and to the market leaders on a single bubble chart for each product with potential for Alaskan production.

The industry leaders are not the same across all of the ethylene based products, which may be surprising. Shell is a leading producer of MEG, but not Polyethylene, having sold that to LyondellBasell. ExxonMobil and LyondellBasell are leading companies in Ethylene and Polyethylene, but not in MEG. Dow is the only company that appears on the right half of every bubble chart, although SABIC is close, and generally has the best manufacturing position over all. SABIC is only the sixth largest HDPE and LDPE producer, so it does not appear as a Top 5 industry leader in the charts for those markets, but it is close, and it is growing rapidly. It will be a Top 5 industry leader in all of these markets in the next couple of years. Of the Asian companies, SINOPEC is by far the largest in this markets, and is growing rapidly. It will also be in the Top 5 list for every one of these products within the next few years.

The ethylene competitiveness bubble chart is shown below as an example. The bubble charts for the rest of the products examined can be seen in the main body of this report.



A company profile and a discussion of critical success factors for each company with respect to Cook Inlet petrochemical investments are included at the end of this report.

ALASKA NATURAL GAS PIPELINE

The North Slope Producers (BP, ConocoPhillips, Exxon/Mobil, and Alaska) will decide in 2010 on where and to whom they each will sell their share of 35 TCF of natural gas & NGL's.

Firm financial commitments will be made during the Federal "open season" (FERC) process for gas pipeline capacity determination and allocation – this will conclude in mid 2010.

A purchase agreement with a producer & for Alaska royalty volumes could provide at least 50,000 bpd of ethane & NGLs and 7 mtpa of LNG.

PROPOSED PROJECTS

Proposed competing pipeline projects seeking to bring ANS natural gas to market outside of Alaska include:

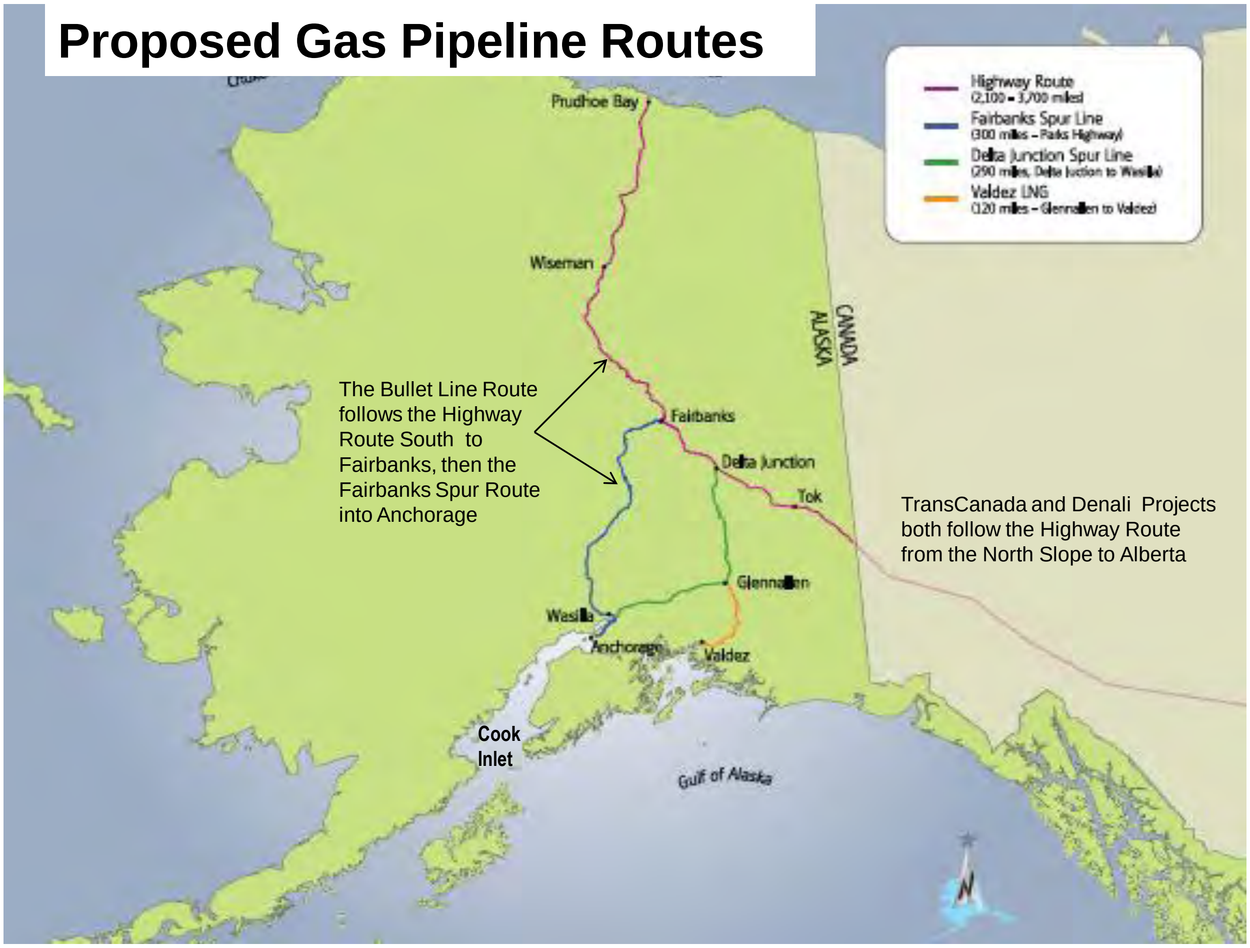
- Denali- The Alaska Gas Pipeline Project (BP & ConocoPhillips): ANS to Alberta/Chicago hubs with 4.5 Billion Cubic Feet (BCF) per day volume. 48 inch, 2,500 psi pipeline. Estimated cost - $25 to $30 Billion.
- TransCanada Alaska Pipeline Project: ANS to Alberta/Chicago Hubs with 4.6 Bcf per day volume. 48 inch, 2,500 psi pipeline. Estimated Cost – $25 to $30 billion.
- Alaska Gasline Port Authority (AGPA) Project: ANS to Valdez with 2.7 Bcf per day volume for export. Estimated cost - $23 billion.

Proposed competing pipeline projects seeking to bring ANS natural gas to market inside of Alaska include:

- Alaska Natural Gas Development Authority (ANGDA) Project: Spur line from other three proposed out-of-state projects. From Delta Junction to Cook Inlet with up to 1.3 billion cubic feet per day volume of "wet" natural gas. 20 to 24 inch, 2,500 psi pipeline. Estimated cost - $1.5 to $3.0 billion.

- Enstar "bullet line" project: 20 inch pipeline from Foothills region of the North Slope to Cook Inlet. 500 million cubic feet per day volume of "dry" natural gas, 2,500 psi pipeline. Estimated cost - $3.5+ billion.

This paper focuses on petrochemical projects in the Cook Inlet area of South Central Alaska. Such facilities would utilize feedstocks supplied from the North Slope through any of these pipelines, since those taking Natural Gas to markets outside Alaska would also be used to supply feed to the spur line to Cook Inlet (See map)



TransCanada Alaska proposes to build a 48-inch diameter, high-pressure pipeline capable of carrying between 3.5 and 5.9 billion cubic feet per day (bcf/d). The project would run 1,715 miles from a natural gas treatment plant at Prudhoe Bay on the North Slope to interconnect with the Alberta Hub in Canada. This is the second largest natural gas trading center in North America, which interconnects with pipelines that carry more than 10 bcf/d of gas into U.S. markets. The Alaska section will be approximately 750 miles long with six compressor stations at startup and five natural gas delivery points in Alaska.

FERC OPEN SEASON PROCESS

WHAT IS AN OPEN SEASON?

An open season is an event during which a pipeline project sponsor offers terms to potential shippers who seek to reserve capacity in a pipeline. Shippers can include gas producers, utilities, and end users. In North American markets, open seasons help determine the need for new pipeline capacity.

An Open Season includes a sealed bid auction of volumetric shipping capacity in gas pipeline. The process is open to any company, foreign or domestic, that wishes to participate. Tariffs to delivery points are known, and the shipper makes a firm multi-year commitment in a “ship or pay” contract. The creditworthiness of shippers is essential since their committed capacity becomes the basis for the pipeline design. Results of process are public & regulators hear complaints before certification of the project plans.

Open seasons can be either binding or non-binding. Non-binding open seasons are held early in a project’s development to gauge potential interest. In contrast, in a binding open season, bids are contractually binding once they are accepted by the project sponsor. A binding bid will generally specify a date by which the parties must enter into a “precedent agreement” and, ultimately, a contract reserving capacity on the pipeline. These contracts are called “Firm Transportation Commitments,” “FTs” or “Ship or Pay Contracts.” The precedent agreement contains the terms and provisions describing the price of the capacity, volume of capacity reserved, and length of the contract.

A “successful” open season is one in which enough potential shippers commit to enter into firm transportation contracts to enable the project to obtain financing. By contrast, an “unsuccessful” open season is one in which the sponsors fail to obtain sufficient commitments for capacity for the project to move forward to detailed design, engineering, and construction. An unsuccessful open season does not necessarily equate to a failed project. Rather it demonstrates the market is unable or unwilling at that time to accept the proposed terms. In this case, negotiations will likely continue in the future to seek a common, mutually beneficial agreement.

There are no restrictions on the number of open seasons that can be conducted for any particular project. In the Lower 48, it is not uncommon for sponsors proposing new pipeline capacity to hold two or more open seasons before the proposed project’s design and shipping terms are fully coordinated with the interests of potential shippers.

PIPELINE REGULATION

Gas pipelines are regulated by different agencies depending on where they begin and end. Transportation of gas within the State of Alaska (intrastate) is regulated by the Regulatory Commission of Alaska (RCA), while transport between states (interstate) is regulated by the Federal Energy Regulatory Commission (FERC). The FERC's counterpart in Canada is the National Energy Board. State access rules apply to facilities used solely for in-state transport, and the state regulatory process needs to operate within the federal process timelines.

Under both Regulatory Commission of Alaska and FERC jurisdiction, any gas pipeline project sponsor must first obtain a Certificate of Public Convenience and Necessity (CPCN). A CPCN is the primary certification issued by the regulatory agency which verifies that the project sponsor is able to construct and operate a gas pipeline, and that the project is in the best interest of the public.

In filing for a CPCN, the pipeline project sponsor provides the required details of the proposed gas pipeline and sets forth its proposed rates and all of the other terms and conditions of service. The rate and terms of service materials are contained in a document known as the pipeline company's "tariff." (Frequently, though, the term "tariff" refers to the rates to be charged for particular services.) FERC review of the sponsor's application for a CPCN includes a review of the environmental aspects of the project. This is one of the most time consuming aspects of the regulatory process. To expedite the certification process, FERC has established a "pre-filing" process to allow the environmental work to start even before the certificate application is filed. During the "pre-filing" process the FERC staff works with the project sponsor and interested parties to establish the scope of the necessary environmental review and may select an independent contractor to perform the environmental review.

FERC also reviews the design of the project, the route, the proposed rates and any other aspects that interested parties identify in their filings with the agency. In a project that involves a new pipeline such as an Alaska natural gas pipeline project, the FERC will review and set the initial tariff for the project during the CPCN proceeding.

Under the Natural Gas Act and FERC regulations, rates have to be "just and reasonable." This generally means that the rates are based on the actual or projected costs of the project and earn a reasonable return on the company's investment. Rates set in this manner are referred to as "recourse rates" and any shipper (or potential shipper) has the right to obtain capacity and service on the pipeline at those recourse rates if there is available capacity on the pipeline.

FERC rules also allow for "negotiated rates." Negotiated rates on new pipeline projects are often lower than the recourse rates for several reasons. First, the recourse rates that are set in the CPCN are based on initial projected costs, not actual costs, so the sponsor will typically estimate costs on the high rather than the low side. Second, negotiated rates frequently involve innovative concepts such as “levelized” rates or “term-differentiated” rates.

Levelized rates are established for long periods of time and are lower in the early years and higher in the later years than would be achieved through conventional rate making. Levelization is accomplished by deferring recovery of depreciation expenses by the pipeline company from the early years to the later years. Term-differentiated rates fluctuate according to the duration of the transportation contract: rates are generally higher for shorter term contracts and lower for longer term contracts. This reflects the fact that the sponsor has more time to recover its initial investment (and associated returns) and has less risk of not being able to sell capacity when it has long term contracts than when it is under short term contracts. This translates into a somewhat lower rate for longer term contracts. Most recent pipeline projects in the Lower 48 are fully or mostly subscribed under negotiated rather than recourse rates.

The US Congress enacted the Alaska Natural Gas Pipeline Act (ANGPA) in 2004. ANGPA created a clear and expedited process for acting upon a pipeline certificate application, provided FERC with limited authority to require expansions, created a central coordinator for the issuance by other federal agencies of permits necessary for a pipeline, prohibited an “Over-the-Top” route from Prudhoe Bay through the Beaufort Sea to Canada’s Mackenzie River delta, confirmed the jurisdiction of the Regulatory Commission of Alaska over an in-state lateral pipeline, gave the state specific rights with respect to the shipment of royalty gas for in-state needs, and authorized a Federal Loan Guarantee of up to $18 billion (escalating with inflation) for an Alaska gas pipeline project that serves the North American market. The additional assurance that the loan guarantees provide to potential lenders should allow the project sponsor to borrow at a lower interest rate, thus improving the project’s economics and lowering the transportation rate. To help expedite the review process, ANGPA included a provision requiring the FERC to presume a need for the project and to presume that there will be adequate downstream capacity to move Alaskan gas to markets.

In the Alaska Gasline Inducement Act (AGIA) of 2007, the Alaska legislature offered a package of inducements. These include: reimbursement of up to $500 million of the costs incurred to obtain a regulatory approval from the Federal Energy Regulatory Commission (“FERC”) to construct a pipeline; an AGIA project coordinator to facilitate the process; and a stable production tax rate for ten years and fixed royalty valuation methods to anyone who committed to purchase capacity to ship natural gas on the AGIA gasline during its first binding open season. The legislature recognized the state’s vital interests in encouraging exploration and development of Alaska’s natural gas resources by ensuring a genuine open access pipeline and the lowest reasonable transportation rates. AGIA license applicants were required to commit to a tariff structure that would assure the lowest possible transportation rates and expansion terms to encourage natural gas explorers and prospective developers to compete to explore for and develop Alaska's North Slope natural gas resources and bring them to market.

A Request for Applications ("RFA") was released on July 2, 2007. Applications were due November 30, 2007. The applications covered a variety of projects including both overland natural gas pipelines and LNG projects. After a thorough review, only the application from TransCanada (TC) Alaska was found to have met all the threshold application "completeness" requirements of the AGIA statute and RFA. After a public comment period, the project was selected as the state's preferred pipeline supplier and was awarded a license in 2008. In 2009, Exxon/Mobil Corporation, one of the three major North Slope producers, joined TransCanada in the project. The other two major NS producers, BP and Conoco Philips are pursuing a separate project, named "Denali", without AGIA sponsorship, with plans to use essentially the same route to through the state as the TransCanada Alaska project. Both of the partnerships are conducting open seasons in 2010.

THE 2010 OPEN SEASONS

If a manufacturer is to seek in-state use of North Slope natural gas via off-take points in either the Denali or TransCanada projects, they must begin now to prepare for the 2010 Federal open season. Any manufacturer pursuing this resource must immediately begin evaluating locations for facilities and project costs for any in-state pipeline that will service that facility. They must also analyze advantages or disadvantages of locating operations in Alaska.

The following activities may also be pursued in 2010 for in-state supply:

- Negotiate for gas supply before Federal open season (Purchase point may be North Slope or local delivery area)
- Bid on Spur Line capacity during Intra-State open season
- Bid on In-Alaska capacity for "Main 48-inch Line" during Federal open season
- Negotiate a shipping contract on either inter-state and/or intra-state gas pipelines before or during the open season

Pipeline developers must provide public notice of an open season at least 30 days prior to the commencement of the open season. The method of notice includes postings on Internet websites, press releases, direct mail solicitations, and other advertising.

The notice contains the following information:

- General route of the project;
- Size and design capacity;
- Maximum allowable operating pressure and expected actual operating pressure;

- Delivery pressure;
- Projected in-service date;
- An estimated unbundled transportation rate for each service offered;
- Estimated costs of proposed facilities and cost of service, and expected return on equity used to justify the transportation rates;
- Negotiated rate and other rate options under consideration;
- Quality specifications and other requirements;
- Terms and conditions for each service offered;
- Creditworthiness standards to prospective shippers;
- Date by which potential shippers must execute precedent agreements;
- Detailed methodology for determining the value of bids;
- Methodology by which capacity is awarded;
- Required bid information (binding or non-binding, receipt and delivery points, form of a precedent agreement and time of execution, definition and treatment of non-conforming bids);
- Projected date for filing the CPCN application with FERC;
- All other information relevant to the open season (proposed service offered, projected pipeline capacity and design, proposed tariff provision, cost of projections)

CPCN applicants must provide shippers at least 90 days from the date on which notice is given to submit requests for transportation services.

Capacity allocated in the open season process shall be awarded without undue discrimination or preference of any kind. All requests for capacity allocations received during the open season are handled as if they were all submitted at the same time.

TransCanada expects to have a firm estimate of the construction costs and details for the main line early in 2010, and expects to begin their open season in May, and complete it by the end of July, 2010. The Denali project sponsors expect to hold their open season later that same year.

PETROCHEMICAL FEEDSTOCK SITUATION AT COOK INLET

ETHANE, PROPANE, BUTANE AND PENTANE SUPPLY AND USE POTENTIAL

Alaska has enough natural gas resources to fill the TransCanada Alaska pipeline for 25 years and for decades longer. Recent studies estimate that there are 224 trillion cubic feet (Tcf) of undiscovered, technically recoverable resources throughout the Alaskan Arctic. These are natural gas resources that may be technically and physically recovered independent of price. Of this amount, 137 Tcf are categorized as undiscovered, “economically recoverable” resources (USGS 2005; NETL 2007). Economically recoverable resources are sensitive to both price and technology; an increase in price or an improvement in technology would be expected to increase these estimates. In addition to these resource estimates there are roughly 24.5 Tcf of natural gas reserves known to exist within Prudhoe Bay, plus 9 Tcf of natural gas reserves discovered in other existing fields on the North Slope, including Point Thomson, for a total Alaska North Slope (ANS) proven natural gas reserves equal to 35.4 Tcf (State of Alaska, Division of Oil & Gas, 2007 Annual Report).

Estimated additional ANS natural gas reserves yet to be discovered in the Central North Slope: 37.5 Tcf. Additional reserves above this estimate may be developed through exploration and development of other North Slope regions such as ANWR and the NPR-A (US Geological Survey (USGS) 2005 estimate).

ANS proven natural gas liquids (NGL’s) proven reserves equal 2.1 billion barrels or 3.93 Tcf.
(From the State of Alaska Legislature, House Resources Committee web site at: http://housemajority.org/coms/hres/gas_report_chapter1.pdf)

Estimated NGLs yet to be discovered in the Central North Slope: 478 million barrels. Additional reserves above this estimate may be developed through exploration and development of other North Slope regions such as ANWR and the NPR-A (US Geological Survey (USGS) 2005 estimate).

Assuming the main line to Alberta is designed to ship 4.5 BCF per day of natural gas and gas liquids, the likely amounts of liquids in the main line are as shown in the table below.

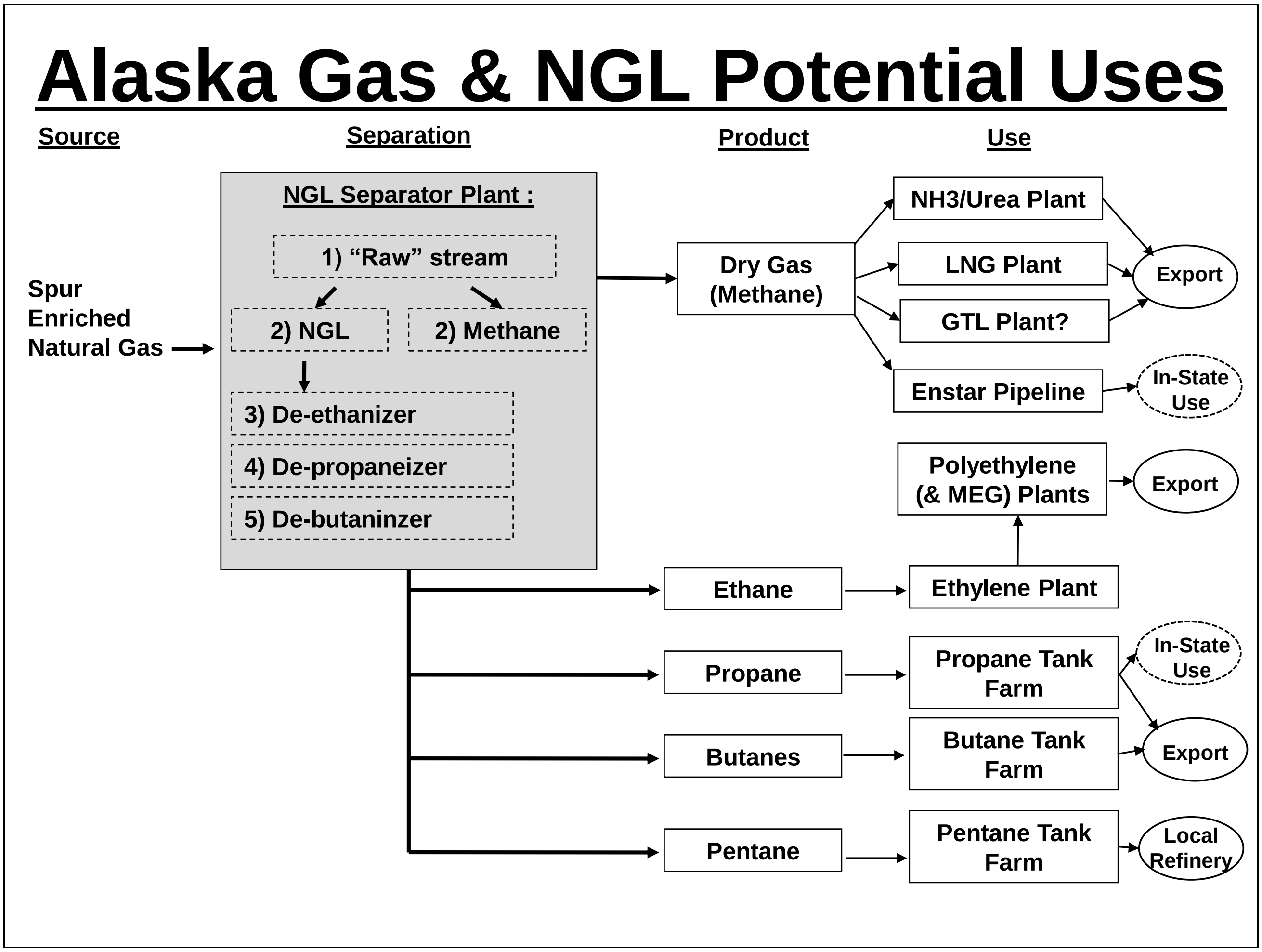
LPG's & NGL's in North Slope Pipeline

North Slope Gas Pipeline Flow --- 4.5 BCFPD

Component		Mole Percent	Bbls/Day	Thousand Tonnes Per Year
C2	Ethane	7.23	206,000	4,250
C3	Propane	3.76	110,250	3,250
C4	Butane	0.76	26,250	900
C5+	Pentanes	0.03	1,250	45

Composition Based on ANGTS – Alaska ROW Application (June 1, 2004) – Page 9 of 34

The opportunity for a high NGL concentration spur line to Cook Inlet would provide the various feedstocks required for many different chemical fuel uses, in addition to local power and home heating fuels. These potential uses include Liquified Natural Gas (LNG) and Liquified Petroleum Gas (LPG) for export, as well as feedstocks for Ammonia/Urea, GTL, and Ethylene, as shown in the flow chart below.



Assuming that a gas liquids separation plant would be located at the spur line takeoff point, and that it would remove approximately half the available gas liquids in the main line for use at the Cook Inlet, the amounts of feedstocks available for petrochemical cracker facilities or other uses there can be calculated, along with the production volumes of ethylene and propylene that could be supported by those feedstock supplies based on the amount of ethylene and propylene that can be made by cracking each feedstock as shown in the following yield table.

Olefins Yield Factors
(Ton / Ton of Ethylene)

Product	Ethane	Propane	Normal Butane	Light Naphtha	Heavy Naphtha	Atmospheric Gas Oil
Crude C3s	0.036	-	-	-	-	-
Polymer Grade Propylene	-	0.4	0.432	0.526	0.581	0.691
Crude C4s	0.036	0.103	0.255	0.297	0.381	0.425
Contained Butadiene	0.025	0.072	0.087	0.155	0.177	0.178
Contained Butylenes	0.011	0.031	0.168	0.142	0.204	0.247
Pyrolysis Gasoline	0.022	0.158	0.179	0.63	0.803	0.881
Contained Benzene	0.011	0.059	0.076	0.228	0.266	0.207
Contained Toluene	0.002	0.013	0.021	0.113	0.148	0.099
Other Aromatics	0.009	0.086	0.082	0.289	0.389	0.575
Methane Fuel	0.114	0.653	0.556	0.615	0.486	0.477
Hydrogen	0.081	0.054	0.039	0.052	0.048	0.045
Fuel Oil	-	0.013	0.043	0.127	0.168	1.154
Feedstock	**1.29**	**2.381**	**2.5**	**3.247**	**3.466**	**4.673**

Using these yields, the theoretical ethylene and propylene capacity of a Cook Inlet petrochemical plant can be calculated, as shown in the following table:

Feedstock Based Cracker Production Estimate

Carbon Number		**C2**	**C3**	**C4**	**C5**
Product Name		**Ethane**	**Propane**	**Butane**	**Pentanes**
Concentration	**Mole Pct**	**7.23**	**3.76**	**0.76**	**0.03**
Volume of Feedstock	**Bbbls/Day**	**206,000**	**110,250**	**26,250**	**1,250**
Total Available Feedstock	**KTA**	**4,250**	**3,250**	**900**	**45**
After Liquids Separation	**KTA**	**1,934**	**1,479**	**410**	**21**
Feed Used/MT of Ethylene	**MT/MT**	**1.29**	**2.38**	**2.50**	**3.25**
Ethylene Capacity	**KTA**	**1,500**	**621**	**164**	**6**
Propylene/MT of Ethylene	**MT/MT**	**0.04**	**0.40**	**0.43**	**0.53**
Propylene Capacity	**KTA**	**54**	**248**	**71**	**3**

As shown above, there should be enough Ethane for a world scale 1,500 KTA ethane cracker, and three world scale 500 KTA Polyethylene (PE) plants (or two PE + one Mono Ethylene Glycol (MEG) plant), but there would not be enough other feeds to provide enough propylene for even one world scale Propylene derivative plant, even if all of the propane and butane were used as petrochemical feed. Current world scale Polypropylene plants, for example, are in the 400 KTA to 500 KTA capacity range. Note: the small amount of Propylene produced by the cracker using just the Ethane feedstock can either be sold to the local refinery for alkylation feed, or perhaps go into LPG for exports.

The foregoing analysis explains why the petrochemical plant options examined in this paper are limited to Polyethylene (PE) and Mono Ethylene Glycol (MEG). The three types of Polyethylene available are High Density (HDPE), Low Density (LDPE) and Linear Low Density (LLDPE). Each of the PE plants in the capital and cost comparison analyses in this paper are assumed to be 500 KTA capacity. (Note: a world scale MEG plant is assumed to utilize only 360 KTA of ethylene, which along with two PE plants would reduce the required size of the ethane cracker to a still very large 1,360 KTA.)

PETROCHEMICAL PROJECT CAPITAL INVESTMENT REQUIRED

The following Capital estimate is based on a study done in 2006 by Shaw / Stone & Webster for ANGDA. The values have been updated to 2009 Constant dollars. The base case is a 1,500 KTA ethane cracker with three PE plants (HDPE, LLDPE, and a swing plant that can make both). The Mono Ethylene Glycol capital adder shown at the bottom of the table is based on CMAI data.

The capital estimate is based on the brown field site at Nikiski on the Kenai Peninsula. The capital required on the other three green field sites would be higher than that shown, to include additional infrastructure which would be required for those sites. The additional capital required on those sites would probably be over $200 MM.

Ethane Cracking to Ethylene Plus Polymerization/MEG

In MM of Constant 2009$	USGC	Alaska
Ethane Cracking Ethylene Plant (1.5 million mtpa)	723	1,042
Dedicated Univation HDPE Unit (500,000 mtpa)	246	354
Dedicated Univation LLDPE Unit (500,000 mtpa)	246	354
Univation HDPE/LLDPE Swing Unit (500,000 mtpa)	254	365
Cracking & Polymerization Complex Utilities, Etc.	440	635
Subtotal Kenai Ethylene Complex EPC Cost	1,909	2,750
Owner's Cost (@ 20% of EPC Contract Cost)	382	550
Kenai Ethylene & Polyethylene Complex Subtotal	2,291	3,300
Contingency Allowance at 15% of Subtotal	344	495
Total Kenai Olefins to PE Complex Capital Cost	**2,635**	**3,795**
Replace one PE plant with MEG & Reduce the Cracker to 1360 KTA	129	186
Total Kenai Olefins to PE & MEG Complex Capital Cost	**2,764**	**3,981**

ENERGY AND FEEDSTOCK PRICE FORECAST

THE WORLD ENERGY OUTLOOK

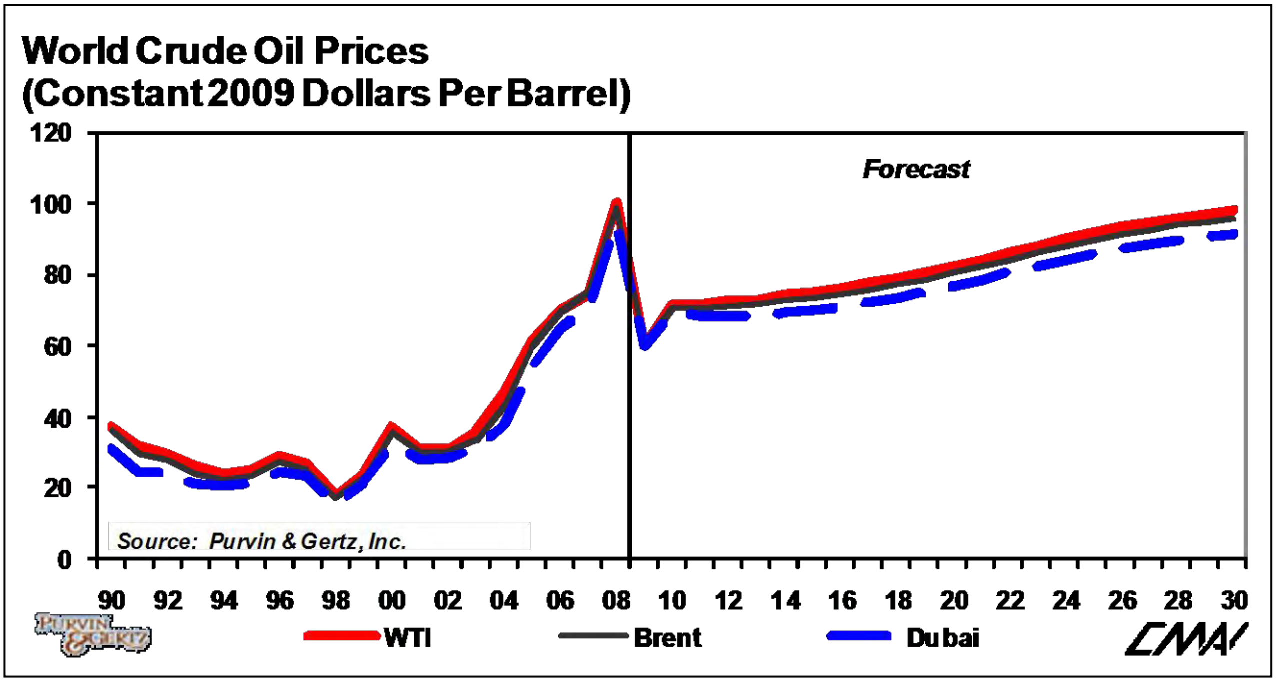
Energy costs are often the most significant contributors to operating costs in chemical processes, and the energy market is often the primary determinant of feedstock cost for most basic chemicals. Energy demand, and the associated prices, are also key components of economic activity. Sudden changes in energy costs can shock the world's economies, and petroleum and chemical product demand often responds accordingly. CMAI has a strategic alliance with *Purvin & Gertz, Inc.,* who provides the basis for the following analysis of global crude oil and natural gas.

Crude Oil

Global crude oil demand is about 74 million barrels per day, with the largest demand occurring in North America, Asia and Europe. Conversely, most crude oil reserves are located in the Middle East and Africa. The Organization of Petroleum Exporting Countries (OPEC) currently accounts for around 40 percent of total global supply, providing this cartel with leverage to impact oil prices by increasing or decreasing oil supply to the market. OPEC's ability to influence world oil prices will continue to be a key factor affecting future oil prices, as OPEC member countries hold a large majority of the world's proven oil reserves.

From the 1990s to the early part of the current decade, spare capacity allowed OPEC to adjust their crude oil production quotas in response to changes in crude oil supply and demand in an attempt to maintain a "price band" of $22 to $28 per barrel. However, during the most recent five-year history, world crude oil prices moved on a sustained upward track from this relatively low energy environment, to peak prices in excess of $140 per barrel in July 2008. This market dynamic was caused by strong demand growth from sustained global economic expansion, particularly from populous emerging economics such as India and China. During this time period, non-OPEC production was having difficulty sustaining production from depleted reserves. The resulting perceived inadequacy of spare OPEC production capacity stoked fears of future shortages. Geopolitical tensions, tight refined products markets, and hurricane impacts also contributed to speculative upward pressure in financial markets.

During the second half of 2008, the world economy entered the most severe recession since the 1930s, and as signs of weakening petroleum demand became more and more evident, market sentiment turned decidedly bearish. The correction in crude oil prices that ensued over the second half of 2008 was dramatic as prices fell by over $100 per barrel to reach the low $30 per barrel range by late December 2008. Since then, prices have pushed higher, moving above $70 per barrel by mid-2009.



Long-term crude oil prices are forecast by the cost of finding, developing, and producing new sources of oil. If prices are too high, supplies will increase because economics favor developing new reserves or increasing production from existing reserves. Conversely, demand is decreased by conservation efforts and by the use of alternative fuels such as coal, natural gas, nuclear energy or renewable fuels. Disruptions in crude oil supply and rapid price increases have caused energy users worldwide to turn their attention to other energy forms. Even with continuing growth in alternative energy supply and unconventional oil, petroleum will remain the dominant energy source for the foreseeable future. Consequently, demand growth will need to be constrained to remain in balance with supply.

Although petroleum demand growth in industrialized nations is expected to slow relative to historical growth patterns as per capita energy consumption approaches saturation, developing areas, such as China and the Middle East, will continue to drive petroleum demand.

Non-OPEC growth prospects have declined due to slowdowns in many oil producing areas, and a continued slowing in non-OPEC supply growth is expected to result in a steady increase in OPEC's production and market share over the long-term horizon. In the next 10-15 years, a large amount of new reserves will need to be developed in order to generate incremental production in the face of the natural decline in many of the world's producing areas. Most new non-OPEC reserves will be in hostile environments, such as deepwater or Arctic areas -- or will have high operating costs, such as synthetic crudes from oil sands.

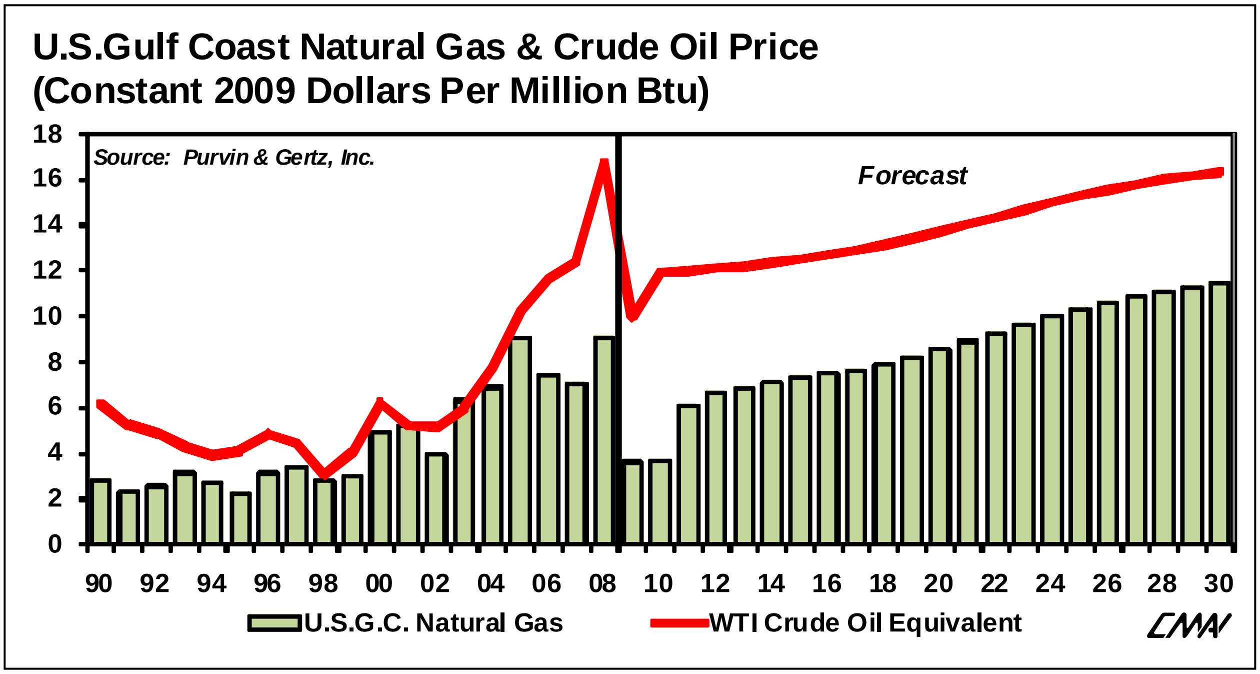
In the long-term, higher crude oil prices will be required in order to develop more difficult supply sources and to limit demand growth rates. In order to expand production to the extent necessary, and make up for the natural decline in mature producing areas, large and continuing capital investments will be required. With limited spare capacity, all increases in production, even in the Middle East, will require major investments.

Natural Gas

Natural gas markets are unlike crude oil which is a global fungible commodity regularly traded between nations in large quantities with moderate transportation costs. Conversely, natural gas tends to be a regional commodity, due to the capital expenditures, storage costs and expense inherent with transporting large volumes of gas. Sustained high energy environment over the last five years has provided the justification for extensive capital investments for ambitious pipeline projects and liquefied natural gas (LNG) facilities, shipping and receiving terminals which serve to link natural gas prices in regional markets.

Global natural gas demand is over 100 trillion cubic feet per year, with the largest demand occurring in North America. Most natural gas reserves are located in Russia and the Middle East, in areas where natural gas production is “stranded” from large consuming markets. Countries in the Middle East, Africa and other remote locations, have generally established fixed pricing policies at low levels, often between $0.50-$2.00 per MM Btu, in order to provide incentive for local consumption and investments.
Besides proximity to consumption, an economic distinction must also be made to natural gas supply associated with crude oil production. Lacking a developed market for energy, natural gas production associated with liquid hydrocarbon production can become a disposal problem. Development of hydrocarbon reservoirs are often justified with revenue from crude oil or other liquid hydrocarbons, with the production company seeking the least capital intensive option for associated natural gas production. Low long-term fixed price contracts are, therefore, viable options to justify investment for gas consumption or capital intensive logistics projects.

Saudi Arabia, for example, has developed substantial industries based on associated natural gas sold at $0.75 per MM Btu and is forecast to maintain this pricing structure through the five-year forecast. Likewise, Russia was successful in utilizing its excess natural gas production to develop pipeline infrastructure into central and west Europe based on low valued fixed prices. However, Russia has taken advantage of increased energy demand and the dependence created by its network of pipelines. Russia, in fact, cut off natural gas supply to the Ukraine and as a result, Europe, in order to leverage higher gas pipeline export prices. The result has been a convergence of regional prices.



In contrast, the natural gas market in Asia remains fragmented due to its diversity of markets and expanse as a region. South Korea and Japan are largely dependent on LNG imports. Natural gas prices tend to track parity to fuel oil heating equivalent and are, therefore, the highest globally. As a result, for these developed economies, natural gas does not play a significant role in petrochemicals, beyond utilities. Although China is a major importer of energy, the petrochemical industry continues to benefit from regulated rates for natural gas and coal, both of which are important commodities for China's rapidly increasing energy needs. With rapidly rising energy prices and domestic demand, the government has been increasing the price of natural gas to a current level of $5.20 per MM Btu and has restricted use of natural gas for incremental petrochemical investment to ensure natural gas availability for utility consumption.

In areas with a large natural gas consumption base and open markets, such as the U.S., natural gas pricing is complex and can be influenced by many factors which impact supply/demand and market sentiment, including seasonal/regional weather patterns, inventory fluctuations, prices of competitive fuels, supply disruptions and market speculation. Prior to this decade, natural gas traded at levels close to fuel oil energy parity. Early in the decade, however, two important trends developed, resulting in a shift in market fundamentals and pricing: the significant expansion of electric power generation based on natural gas, and the deterioration of local supplies of natural gas with the depletion of natural gas fields and drilling prospects. These factors, plus supply disruptions in the Gulf of Mexico, pushed natural gas prices to record levels above fuel oil equivalence.

However, as domestic supply came into balance, the rate of price increase in relation to crude, declined. In 2008, increased supply reached the market in time for decreased industrial and electrical power generation brought on by decreased economic activity. U.S. natural gas prices declined precipitously and, in fact, dropped proportionately more than crude oil prices.

As global economic activity begins to increase, U.S. natural gas demand is projected to resume more typical growth patterns. Higher consumption, along with an expected increase in crude oil, distillate and residual fuel prices, will allow for higher natural gas prices going forward over the next several years.

Increasing U.S. gas production and lower prices relative to other areas of the world has worked to slow the amount of LNG imports into the U.S. market in recent years. Over the long-term horizon, however, larger quantities of LNG imports will be required to meet future demand, as it appears that growth in consumption is likely to again outpace regional supply development.

ALASKAN ENERGY AND ETHANE PRICES

The cost of transportation on the TransCanada Alaska pipeline (its “tariff”) will protect the state’s interests throughout the years of pipeline operation. Lowest reasonable tariffs are essential to ensure genuine open access and maximize opportunities for development of Alaska’s North Slope natural gas resources. Low tariffs also mean that the state can earn a greater return on its natural gas resources. As the owner of the natural gas resources, the state gets a share of the natural gas production, its “royalty” share. As a sovereign, the state taxes the profit on natural gas production. Tariffs are deducted from the market price at the destination where the natural gas is delivered before the royalty amount and production taxes are calculated. This means the higher the tariff, the lower the return to Alaska for its natural gas resource. Therefore, the state has a vested interest in the establishment and continuation of low tariffs over the life of the pipeline.

In the Alaska Gasline Inducement Act (AGIA) of 2007, the Alaska legislature offered a package of inducements. These include: reimbursement of up to $500 million of the costs incurred to obtain a regulatory approval from the Federal Energy Regulatory Commission (“FERC”) to construct a pipeline; an AGIA project coordinator to facilitate the process; and a stable production tax rate for ten years and fixed royalty valuation methods to anyone who committed to purchase capacity to ship natural gas on the AGIA gasline during its first binding open season. The legislature recognized the state’s vital interests in encouraging exploration and development of Alaska’s natural gas resources by ensuring a genuine open access pipeline and the lowest reasonable transportation rates. AGIA license applicants were required to commit to a tariff structure that would assure the lowest possible transportation rates and expansion terms to encourage natural gas explorers and prospective developers to compete to explore for and to develop Alaska's North Slope natural gas resources and bring them to market.

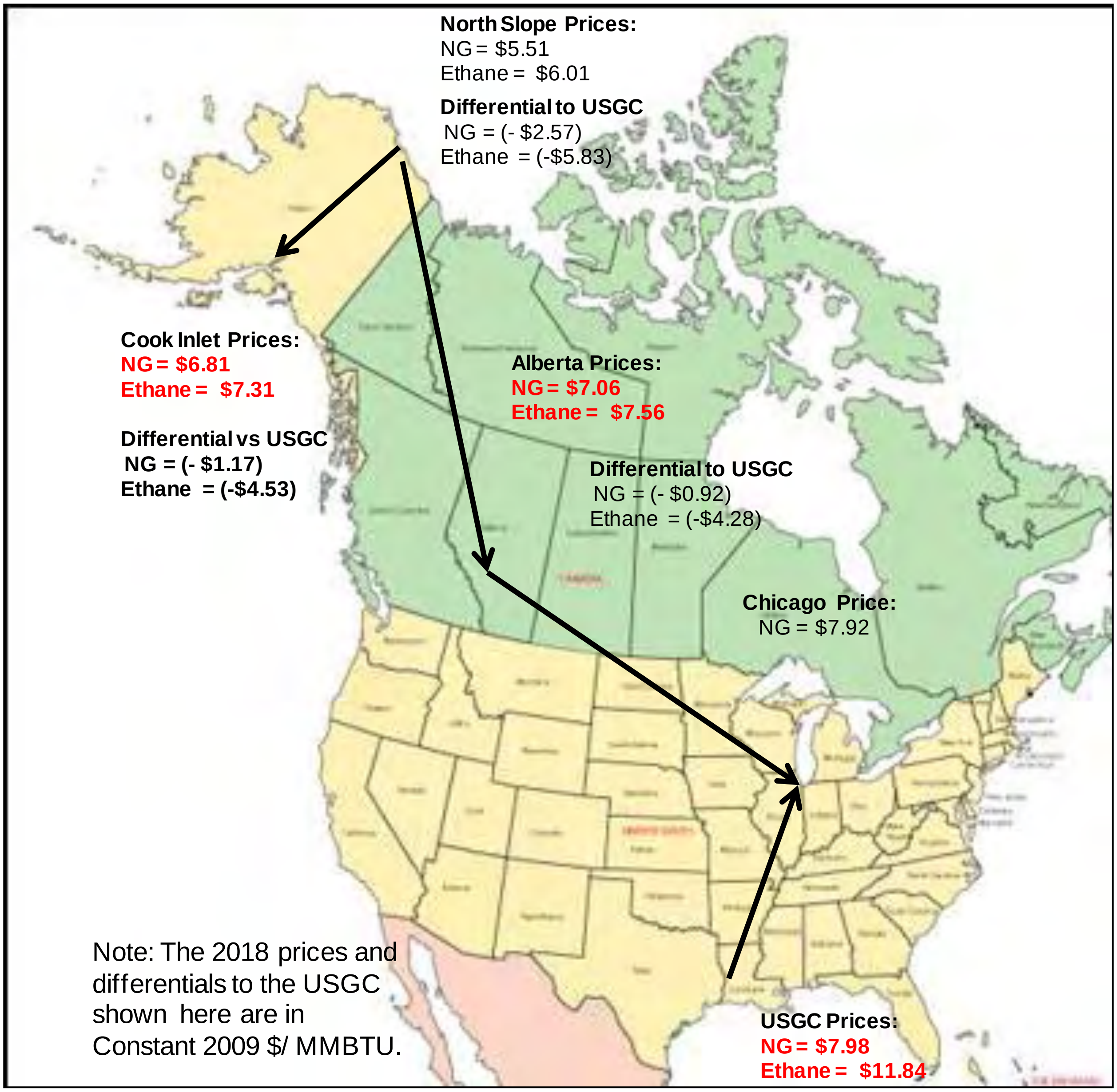
The following estimates of Pipeline Tariffs are used in the calculation of the Alaskan market price forecasts for Natural Gas and Ethane:

Pipeline Tariffs for Alskan Natural Gas and Ethane

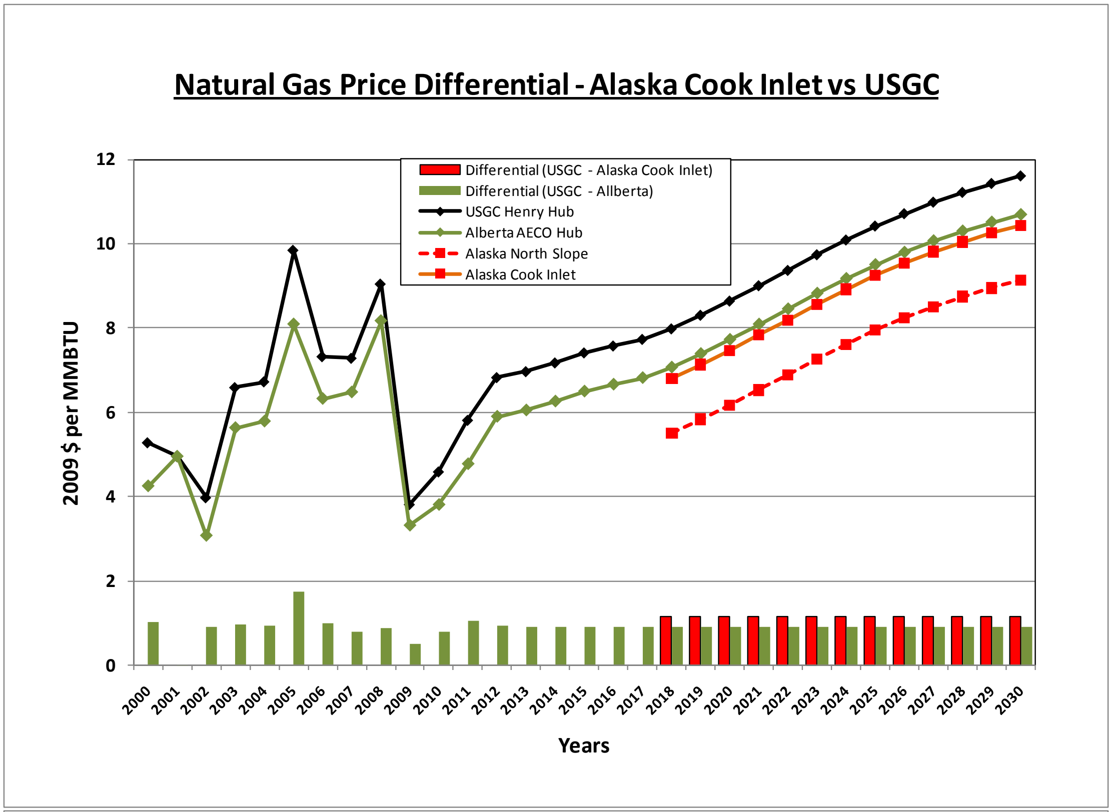
In Constant 2009$

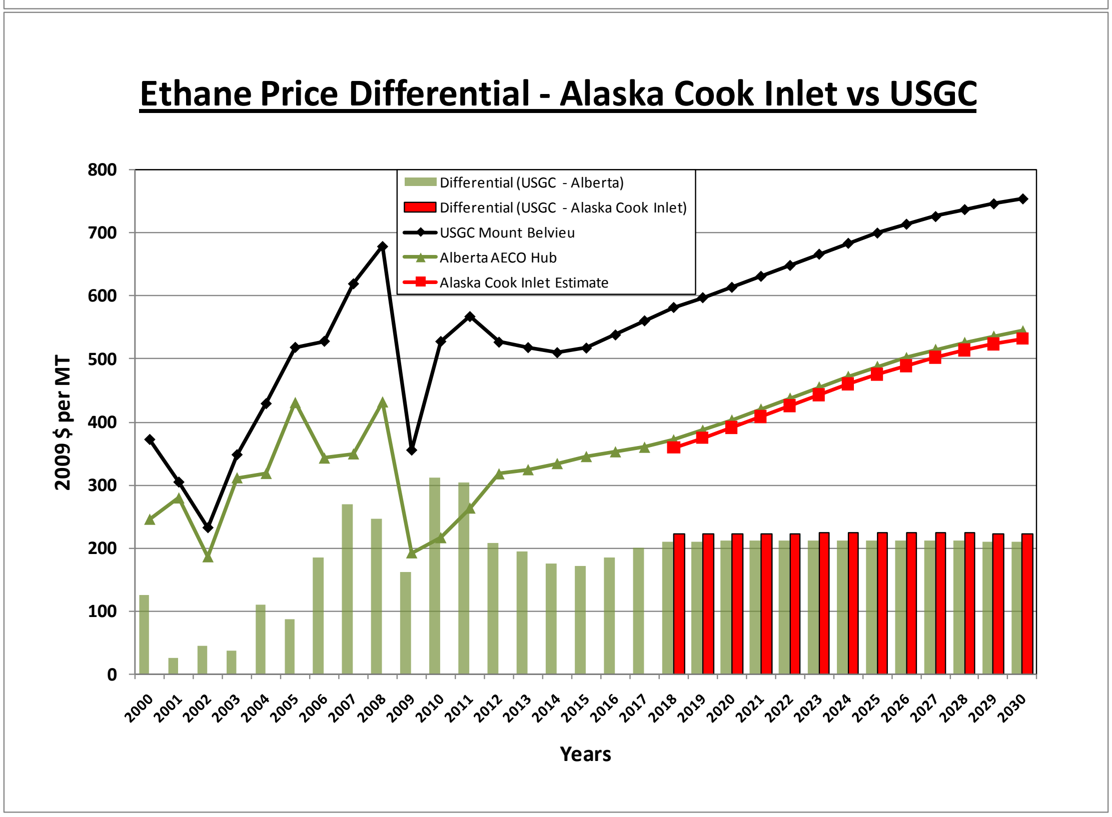
TARIFF ROUTE	$/MMBTU
Alberta to Chicago	**$ 1.22**
Alaska North Slope to Alberta	**$ 1.55**
ANS to Fairbanks (or Delta Junction?)	$ 0.55
Faribanks (or Delta Junction?) to Cook Inlet	$ 0.75
Total Alaskan North Slope to Cook Inlet	**$ 1.30**
Resulting Cook Inlet Delta to Alberta AECO	**$ (0.25)**

The price of Natural Gas and Ethane on the Alaskan North Slope will be related to its sales value in its end use market, minus the cost of transportation through the pipeline. The Natural Gas price in Alberta is usually priced lower than the Chicago price, based on its cost of pipeline shipment, since Alberta is long on gas, (as is the US Gulf Coast). Although North Slope gas and ethane will be priced based on their netback after pipeline shipments to Alberta, Cook Inlet prices will be the North Slope price plus tariff. Ethane prices in Alberta are based on its BTU value in its only alternative use, as natural gas shipped to the US. However, US ethane has to compete against crude oil based cracker feedstocks on the USGC, so its price is higher than its BTU value there when crude oil is high relative to gas (as it is now). Ethane at Cook Inlet will have a greater discount to the USGC than natural gas will.

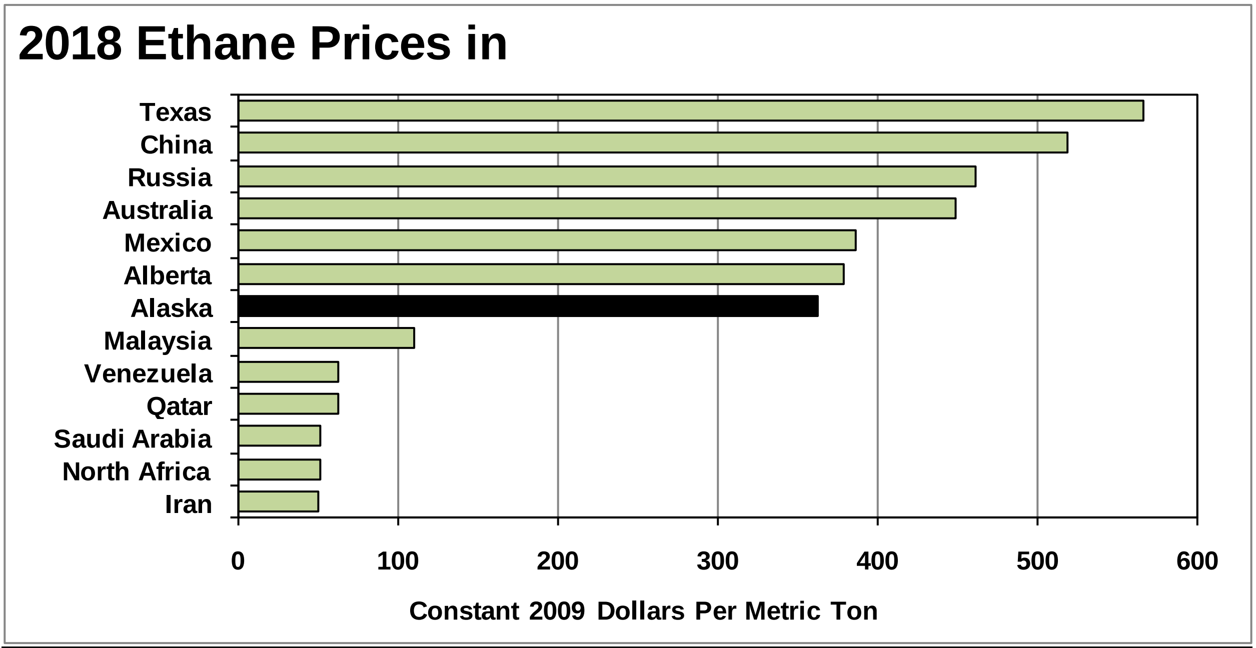


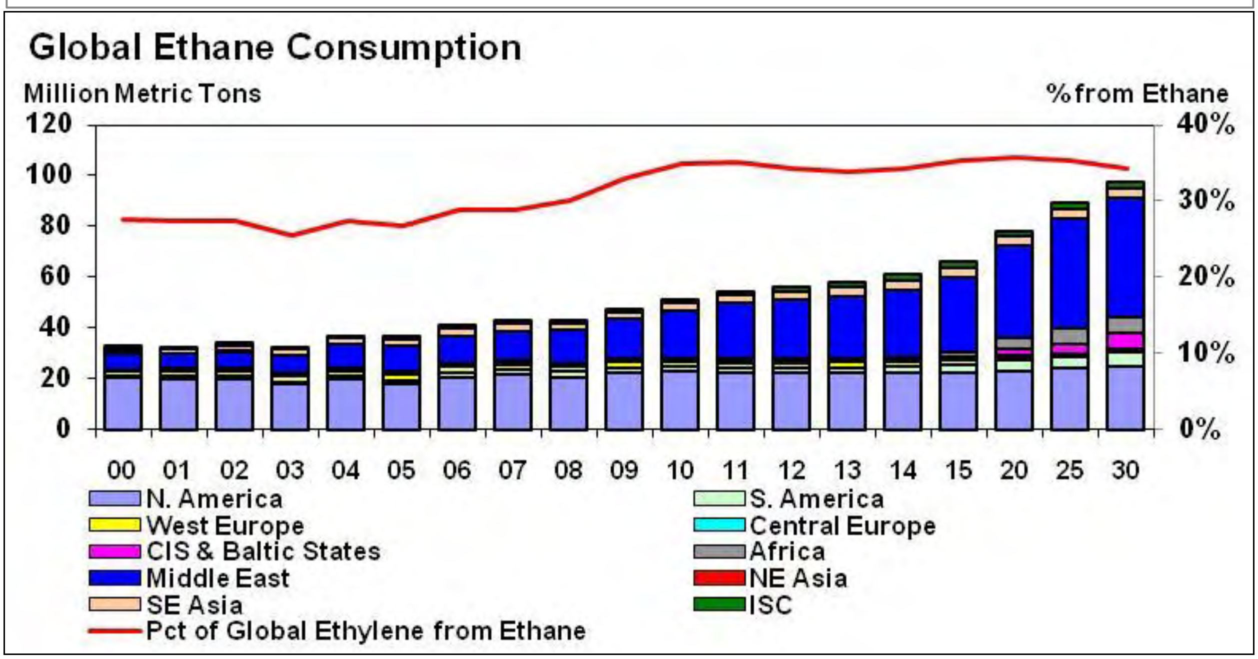
As you can see in the graphic above, the price of Ethane at the Cook Inlet in 2018 is expected to be about $4.50 per MMBTU below the USGC price, and about $0.25 per MMBTU below the Alberta Ethane price, in constant 2009 dollars. Cook Inlet's Natural gas, however, is only expected be around $1.00 per MMBTU below the USGC price, and $0.25 per MMBTU below Alberta. These differentials over time are shown in the following two graphs.
(Note: the Ethane graph units have been converted from $ per MMBTU into $ per MT)


Natural Gas Price Differential - Alaska Cook Inlet vs USGC
Differential (USGC - Alaska Cook Inlet)
Differential (USGC - Allberta)
USGC Henry Hub
Alberta AECO Hub
Alaska North Slope
Alaska Cook Inlet
2009 $ per MMBTU
0
2
4
6
8
10
12
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Years


Ethane Price Differential - Alaska Cook Inlet vs USGC
Differential (USGC - Alberta)
Differential (USGC - Alaska Cook Inlet)
USGC Mount Belvieu
Alberta AECO Hub
Alaska Cook Inlet Estimate
2009 $ per MT
0
100
200
300
400
500
600
700
800
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Years

The forecasted Alaskan price for Ethane in 2018 compares favorably with that of other regions as well. (See the graph below). Alaskan Ethane will be priced lower than in most other regions except for the Middle East and a few other stranded gas areas. But the ethane in those higher priced regions will still be advantaged versus naphtha and other crude oil based feeds there. So Alaskan ethane will have a double advantage.





This shows that Ethane feed has grown from 28% of global ethylene production in 2005 to 35% of total production now, but its share is not expected to increase in the future.

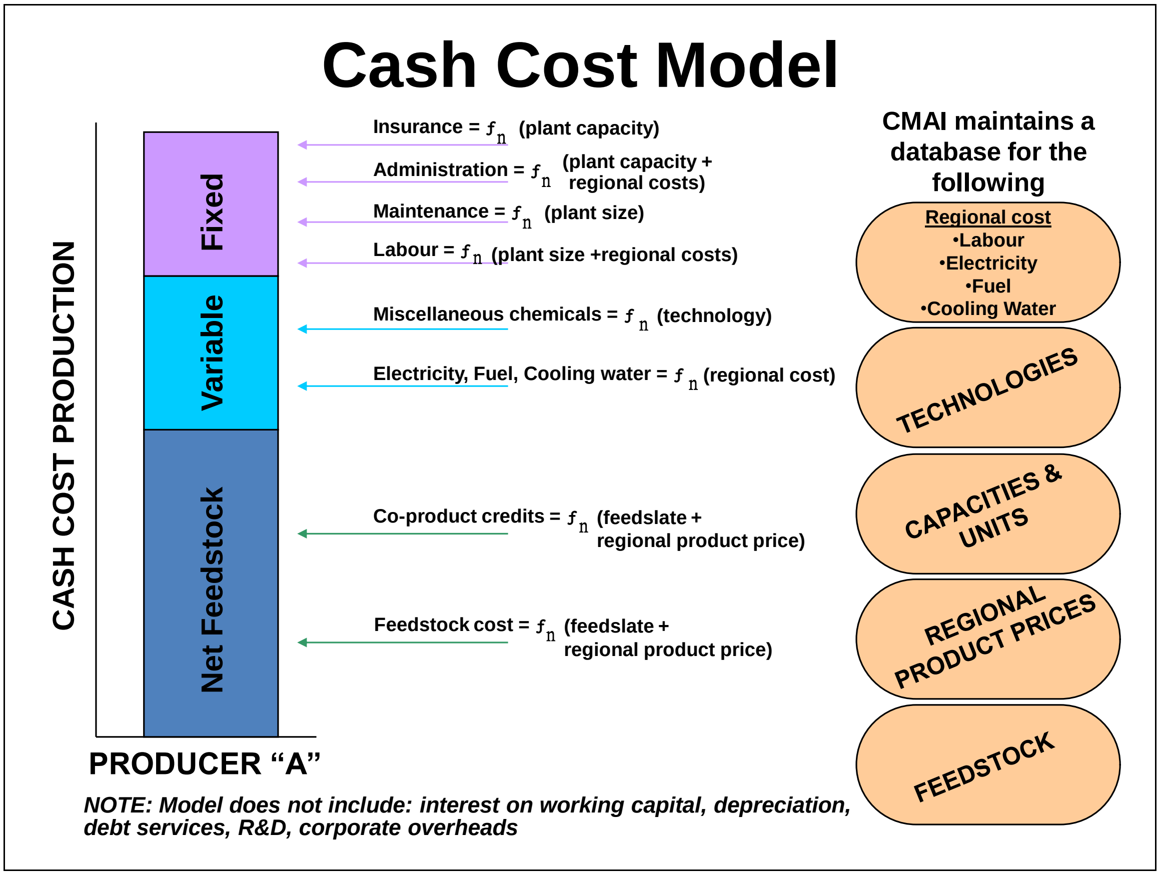
CASH COST COMPETITIVENESS

METHODOLOGY

CMAI has developed a methodology that ensures that consulting services requiring insight into competitive production costs can be undertaken to provide the appropriate conclusions, but still retain the privileged status of the client input data. CMAI has an extensive database, including a broad range of cost models for the full spectrum of products it analyzes. This database is routinely updated and is used for producer comparisons by adjusting data inputs to reflect each producer's situation. Factors considered include, technology elements of local fixed and variable cost, fixed cost variance due to plant scale and feedstock, and product value adjustment due to integration and location. CMAI cost analyses are based upon the following inputs:

- Raw material usage and product yield by technology.
- Raw material and co-product prices adjusted for location and site specific factors.
- Utilities usage by technology, with prices adjusted by location.
- Direct fixed costs.
- Estimates of manpower costs.
- Maintenance (as factor of replacement capital).
- Indirect fixed costs.
- Estimates of local taxes and insurance.
- Plant overhead (as a factor of direct fixed costs).

The results of CMAI's cost assessment should be evaluated relative to each other as opposed to absolute. There has been no attempt to incorporate specific producer data into the cost analysis beyond those factors described in this study.



- Feedstock Costs:
  The single most important factor in developing a total cost. CMAI examines the source of the feedstock to the derivative facility to determine whether the economics should be based upon a local "market price", an integrated cash cost, or more likely, a mix of the two. CMAI's understanding of buyer-seller relationships plays an important role in this determination. Furthermore, it is important to be aware that integrated producers will also have different means of evaluating their own businesses. Margin that may normally be credited to the cracker may indeed by forgone in order to provide a lower cash cost to the downstream polymer unit, thus providing a more competitive price in export markets. Such are the variables in an evaluation such as this.

- Variable Operating Costs:
  These costs will vary from producer to producer based upon location. Energy values account for the majority of the differences in costs.

- Fixed Operating Costs:
  While producers have many different methods of accounting for fixed costs, CMAI's method is to examine the size of the production unit and the corresponding fixed

investment. Fixed costs are modeled as a direct relationship to the fixed investment (which has location factored in as well as size). Labor costs are also embedded within this category.

- Logistics Costs:
  CMAI examines several costs, which combined; give a total delivered cost to the end user. CMAI includes: ocean freight, receiving costs and finally, local delivery to customer.

- Duties:
  Lastly, CMAI uses published import tariff data to determine the applicable tariffs or duties on the products. No attempt is made to calculate duty drawback or any other form of credits.

ETHYLENE COST COMPETITIVENESS

Ethylene cost competitiveness is critical to the market strategy for any export market cracker. In order to assess the competitiveness of the final products produced by the proposed Alaska complex, it is important to assess the ethylene cash production cost versus the competition by using the cost curve modeling techniques described above. When this methodology is applied to the Alaska complex, we generate site cash cost curves for ethylene and its downstream products as shown in the following charts.

Ethylene Cash Cost of Production

The Alaska ethylene unit was modeled for the year 2018 using the methodology outlined above. In order to measure competitiveness of ethylene, CMAI has selected the 'best in class' producers from various countries. It is important to note that up to this point, production costs exclude sales and administrative fees so as to achieve a comparison on the same basis as the other producers on the curve.

Based on the potential low cost 100% ethane cracker, the relative cost position of Alaska is lower than crackers located in other regions besides the Middle East.

COMPETITIVE ANALYSIS

CMAI has performed a competitive cost assessment for the proposed facility. This analysis compares the delivered cost of Polyethylene (PE) and Mono Ethylene Glycol (MEG) to the US West Coast (USWC) and Chinese markets. It demonstrates the competitive position of an Alaskan plant against the following general producing areas:

- Middle East
- US Gulf Coast
- Alberta / W. Canada
- South Korea
- Japan

Based on the delivered cost charts, we believe that on both a production and delivered cost basis, the ALASKA – Olefins Complex production will be competitive against other global producers in the target market. This is because of the low olefin cash costs as well as some logistics savings.

POLYETHYLENE COST COMPETITIVENESS

The relative competitiveness of each polyethylene unit is directly linked to the ethylene feedstock, variable and fixed cost. Ethylene feedstock cost is determined at either 100% market, 100% cash cost or a percentage of both (to make up for the shortfall of ethylene feedstock) depending on an integrated or standalone facility. Logistic cost are then added to the cash cost of polyethylene (i.e. LLDPE and LDPE) production.

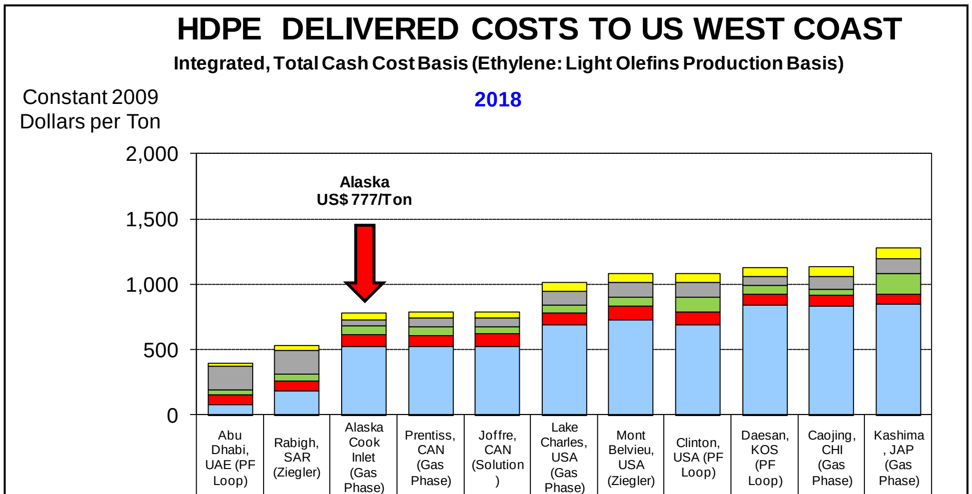
Where integration of the facility is involved, ethylene is transferred to the polyethylene unit on a dollar per ton light olefin basis. This methodology has been adopted to account for the fact that propylene produced is more likely to be consumed within the facility to produce polypropylene, propylene oxide etc. It is CMAI's opinion that the cash cost on a light olefins basis is a more representative approach, since propylene prices have been at parity or higher than ethylene prices, versus treated as a co-product credit in the past.

Polyethylene Cash Cost of Production

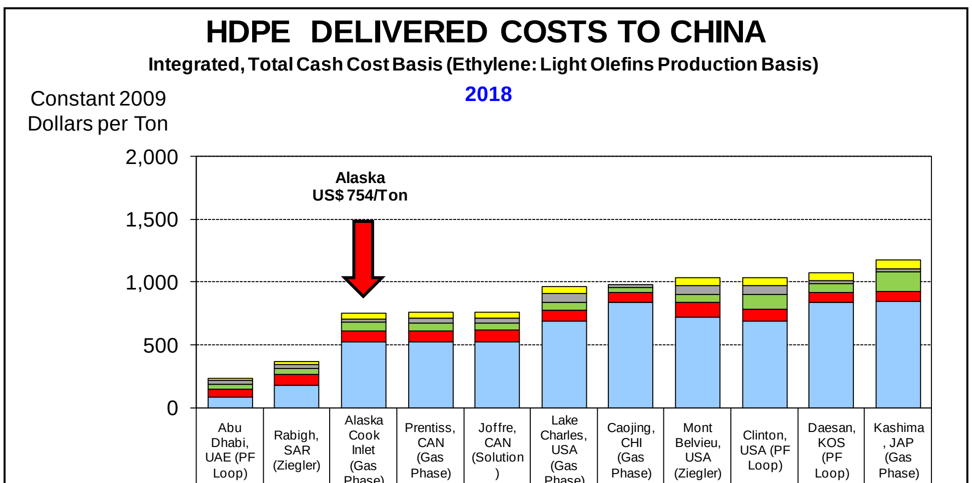
Utilizing the estimated ethylene cash cost of production described above, CMAI has examined the cash cost position of the Alaska polyethylene facilities. It is important to note that up to this point, production costs exclude sales and administrative fees so as to achieve a comparison on the same basis as the other producers on the curve.

The charts below give a comparison of the polyethylene producers globally. The lowest cost producers on an integrated production cash cost basis are the Middle East producers due to low feedstock cost. However, the high logistical costs involved may render them at a disadvantage when delivering to the Western US and China.

The following chart shows the site delivered cash cost to the US West Coast and China for ALASKA- Olefins Complex HDPE versus numerous other units. Based on the delivered cost charts, we believe that on both a production and delivered cost basis, the ALASKA – Olefins Complex production will be competitive against other global producers the markets that are targeted. This is because of the low olefin cash costs.



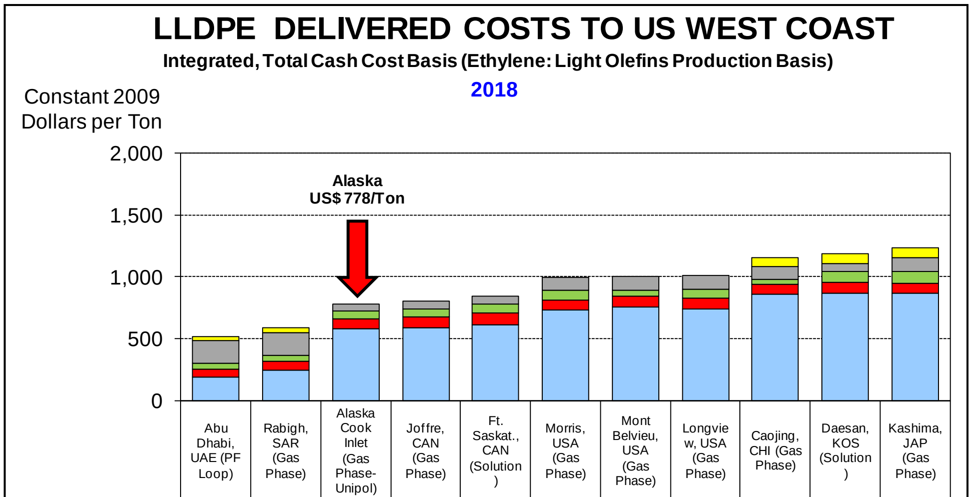
	Abu Dhabi, UAE (PF Loop)	Rabigh, SAR (Ziegler)	Alaska Cook Inlet (Gas Phase)	Prentiss, CAN (Gas Phase)	Joffre, CAN (Solution)	Lake Charles, USA (Gas Phase)	Mont Belvieu, USA (Ziegler)	Clinton, USA (PF Loop)	Daesan, KOS (PF Loop)	Caojing, CHI (Gas Phase)	Kashima , JAP (Gas Phase)
Total Cost	396	530	777	791	791	1014	1080	1083	1128	1132	1278
Duty	25	34	50	51	51	65	69	69	72	72	82
Packaging & Logistics	182	182	49	66	66	110	110	110	67	99	113
Fixed Cost	38	52	67	65	56	62	66	119	68	46	159
Variable Cost	70	83	87	88	94	90	111	93	82	79	79
Feedstock Cost	80	180	525	522	525	687	724	691	839	836	846



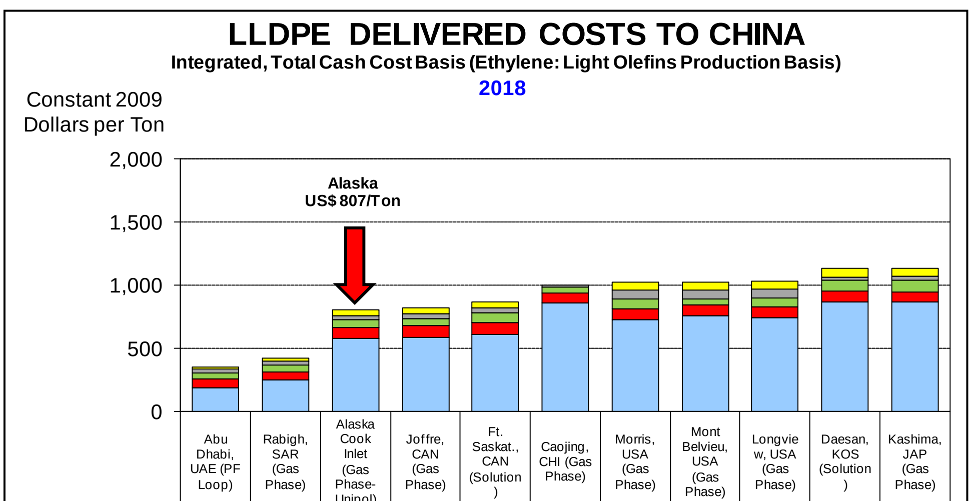
	Abu Dhabi, UAE (PF Loop)	Rabigh, SAR (Ziegler)	Alaska Cook Inlet (Gas Phase)	Prentiss, CAN (Gas Phase)	Joffre, CAN (Solution)	Lake Charles, USA (Gas Phase)	Caojing, CHI (Gas Phase)	Mont Belvieu, USA (Ziegler)	Clinton, USA (PF Loop)	Daesan, KOS (PF Loop)	Kashima , JAP (Gas Phase)
Total Cost	233	367	754	757	757	969	980	1036	1038	1075	1180
Duty	14	22	46	46	46	59	0	63	63	66	72
Packaging & Logistics	30	30	29	36	36	71	20	71	71	20	25
Fixed Cost	38	52	67	65	56	62	46	66	119	68	159
Variable Cost	70	83	87	88	94	90	79	111	93	82	79
Feedstock Cost	80	180	525	522	525	687	836	724	691	839	846

The following chart shows the site delivered cash cost to the US West Coast and China for ALASKA LLDPE versus numerous other units. As the chart below shows, the project retains a competitive advantage versus most other regions on a delivered to China basis as well as a delivered to US West Coast basis.

HDPE competitiveness in a swing reactor will be comparable to that of LLDPE shown below.

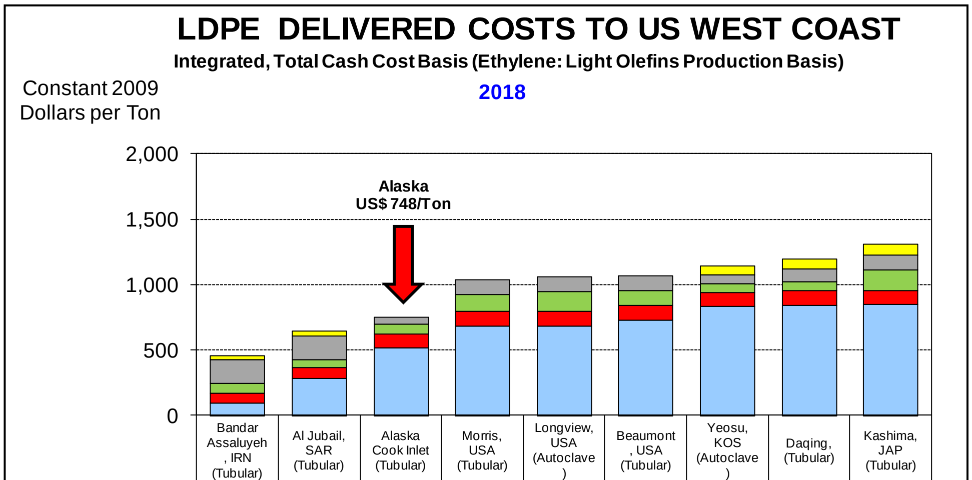


	Abu Dhabi, UAE (PF Loop)	Rabigh, SAR (Gas Phase)	Alaska Cook Inlet (Gas Phase-Unipol)	Joffre, CAN (Gas Phase)	Ft. Saskat., CAN (Solution)	Morris, USA (Gas Phase)	Mont Belvieu, USA (Gas Phase)	Longview, USA (Gas Phase)	Caojing, CHI (Gas Phase)	Daesan, KOS (Solution)	Kashima, JAP (Gas Phase)
Total Cost	519	586	778	805	849	995	1005	1010	1156	1187	1236
Duty	33	37	0	0	0	0	0	0	74	76	79
Packaging & Logistics	182	182	49	66	66	100	110	110	99	67	113
Fixed Cost	48	50	67	60	75	79	50	70	46	89	97
Variable Cost	70	68	84	88	94	87	87	87	75	85	75
Feedstock Cost	186	249	577	591	614	730	758	743	863	870	872



	Abu Dhabi, UAE (PF Loop)	Rabigh, SAR (Gas Phase)	Alaska Cook Inlet (Gas Phase-Unipol)	Joffre, CAN (Gas Phase)	Ft. Saskat., CAN (Solution)	Caojing, CHI (Gas Phase)	Morris, USA (Gas Phase)	Mont Belvieu, USA (Gas Phase)	Longview, USA (Gas Phase)	Daesan, KOS (Solution)	Kashima, JAP (Gas Phase)
Total Cost	355	422	807	825	872	1003	1029	1029	1034	1133	1138
Duty	22	26	49	50	53	0	63	63	63	69	69
Packaging & Logistics	30	30	29	36	36	20	71	71	71	20	25
Fixed Cost	48	50	67	60	75	46	79	50	70	89	97
Variable Cost	70	68	84	88	94	75	87	87	87	85	75
Feedstock Cost	186	249	577	591	614	863	730	758	743	870	872

The following chart shows the site delivered cash cost to the US West Coast and China for ALASKA- Olefins Complex LDPE versus numerous other units.



	Bandar Assaluyeh, IRN (Tubular)	Al Jubail, SAR (Tubular)	Alaska Cook Inlet (Tubular)	Morris, USA (Tubular)	Longview, USA (Autoclave)	Beaumont, USA (Tubular)	Yeosu, KOS (Autoclave)	Daqing, (Tubular)	Kashima, JAP (Tubular)
Total Cost	457	647	748	1036	1059	1067	1145	1199	1309
Duty	29	41	0	0	0	0	73	77	84
Packaging & Logistics	182	182	49	110	110	110	67	99	113
Fixed Cost	74	60	76	127	150	116	66	72	159
Variable Cost	82	80	105	116	115	116	106	107	108
Feedstock Cost	89	283	518	683	684	724	833	844	845

Based on the delivered cost charts, we believe that on both a production and delivered cost basis, the ALASKA – Olefins Complex production will be competitive against other global producers in the markets that are targeted. This is because of both the low olefin cash costs as well as some logistics savings.

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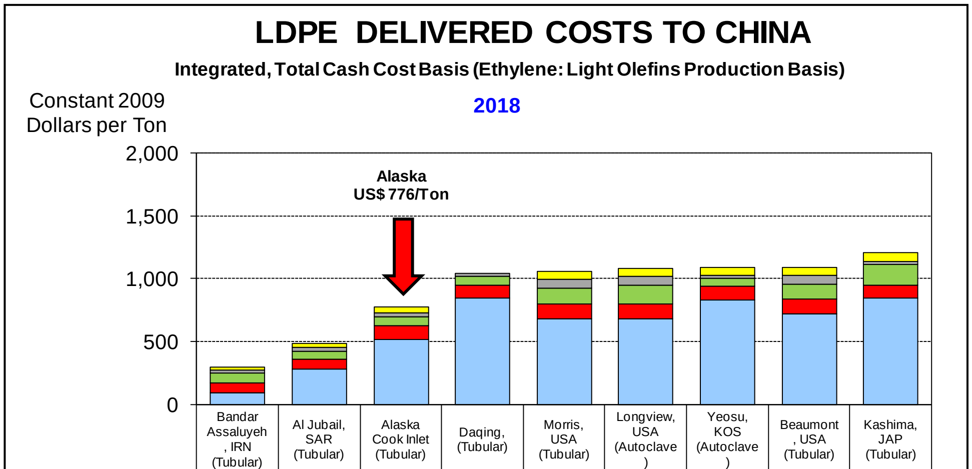


	Bandar Assaluyeh, IRN (Tubular)	Al Jubail, SAR (Tubular)	Alaska Cook Inlet (Tubular)	Daqing, (Tubular)	Morris, USA (Tubular)	Longview, USA (Autoclave)	Yeosu, KOS (Autoclave)	Beaumont, USA (Tubular)	Kashima, JAP (Tubular)
Total Cost	293	483	776	1043	1062	1086	1091	1094	1211
Duty	18	29	47	0	65	66	67	67	74
Packaging & Logistics	30	30	29	20	71	71	20	71	25
Fixed Cost	74	60	76	72	127	150	66	116	159
Variable Cost	82	80	105	107	116	115	106	116	108
Feedstock Cost	89	283	518	844	683	684	833	724	845

MEG COST COMPETITIVENESS

MEG Cash Cost of Production

Similarly to polyethylene, CMAI has examined the cash cost position of the Alaska monoethylene glycol facility using the estimated ethylene cash cost of production as described above.

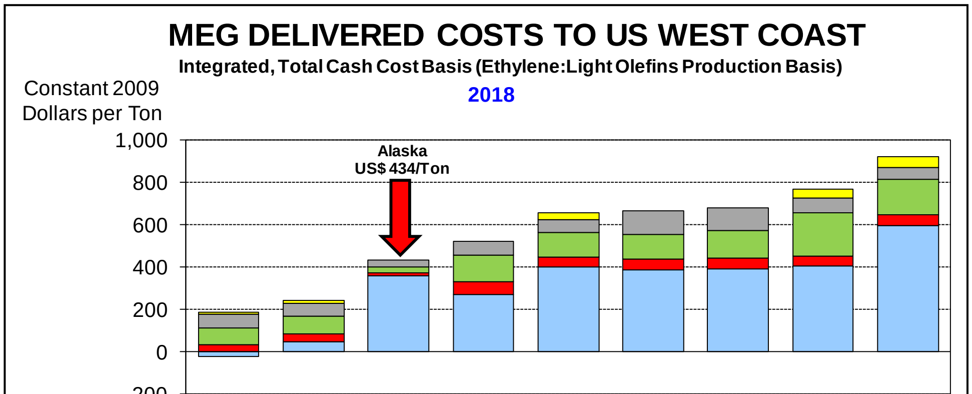
It is important to note that up to this point, production costs exclude sales and administrative fees so as to achieve a comparison on the same basis as the other producers on the curve.

Alaska's low cost position as compared to some of the other producers has been explained under the ***polyethylene cost competitiveness*** section.

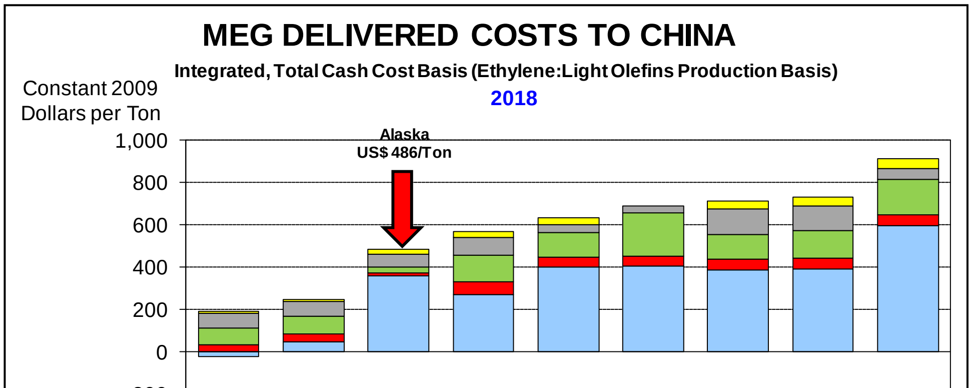
MEG Delivered Cost of Production

As an integrated producer of MEG, Alaska will be able to benefit from the low ethane feedstock cost as opposed to purchasing ethylene from the market. This gives Alaska a competitive edge over other non-integrated producers and even integrated producers in the same region who utilize mixed gas feedstock for that matter.

The sole global competition that Alaska potentially faces is from the Middle Eastern producers who have the ability of producing MEG at low cost. The other competition, to a lesser extent comes from ethane-based integrated producers in the region due to low feedstock cost and may possess better logistics costs to domestic markets.



	Bandar Assaluyeh, IRN	Rabigh, SAR	Alaska Cook Inlet	Ft. Saskat., CAN	Daesan, KOS	Point Comfort, USA	Bayport, USA	Fushun, CHI	Kawasaki, JAP
Total Cost	166	244	434	525	659	667	682	771	924
Duty	9	13	0	0	36	0	0	43	51
Packaging & Logistics	64	64	34	66	60	110	110	70	56
Fixed Cost	78	80	26	127	115	119	127	204	170
Variable Cost	36	39	12	61	49	52	52	49	49
Feedstock Cost	-20	49	362	271	400	387	393	406	598



	Bandar Assaluyeh, IRN	Rabigh, SAR	Alaska Cook Inlet	Ft. Saskat., CAN	Daesan, KOS	Fushun, CHI	Point Comfort, USA	Bayport, USA	Kawasaki, JAP
Total Cost	172	250	486	570	636	688	715	730	914
Duty	9	13	25	30	33	0	37	38	48
Packaging & Logistics	70	70	61	81	40	30	120	120	50
Fixed Cost	78	80	26	127	115	204	119	127	170
Variable Cost	36	39	12	61	49	49	52	52	49
Feedstock Cost	-20	49	362	271	400	406	387	393	598

KEY SUCCESS FACTORS FOR PETROCHEMICAL PROJECTS

Every petrochemical project needs the following critical factors to succeed:

- Low Cost of Production
  - driven by the availability and cost of both feedstocks and energy
- Low capital investment requirements versus other competing locations
  - includes site and logistics capital
- Low logistics costs for raw materials and finished products
  - proximity to both feedstocks and end use markets
  - infrastructure availability and quality
- Good channels to market and commercial strength versus the competition
- Good, stable investment climate
  - Taxes, chemical cycle timing, government regulations, incentives, etc.

The issues of feedstock and energy availability and costs have already been discussed, as well as the relative size of the capital investment required for a petrochemical facility at Cook Inlet. A development of the rest of these critical success factors follows, starting with plant site infrastructure and logistics issues.

POTENTIAL COOK INLET PLANT SITES

FOUR COOK INLET LOCATIONS HAVE BEEN STUDIED FOR PLANT SITES:

- Port MacKenzie, Matanuska-Susitna Borough, near Anchorage (Greenfield Site)
- Fire Island near Anchorage (Greenfield Site)
- Tyonek (Greenfield Site)
- Nikiski, Kenai Peninsula Borough (Brownfield Site)

PORT MACKENZIE SITE ATTRIBUTES

- The Port MacKenzie site is in the Matanuska – Susitna borough, which is the size of West Virginia, with only 85,000 people. It extends halfway from Anchorage to Fairbanks.
- Port MacKenzie is opposite the city of Anchorage on Cook Inlet, with its own deep water port and surface road connections to Anchorage and the communities to the north of it.
- The industrial site is 9,000 acres, but 40% of it is wetlands. The land around it is owned by trusts, or the state. There is no residential land nearby, but it is only 3 miles across the channel from Anchorage. About 1,500 acres is close to the port, railroad and surface roads. A railroad spur is coming to the site in 2013. An environmental impact statement for the railroad is in progress. Its cost was $6 mm. Land next door to the south is owned by the Cook Inlet Regional Corp. (Indian land).
- It has a highly skilled labor force nearby, with a lot of ex-military and ex-north slope workers.
- A ferry, bridge and railroad spur are all planned for Port MacKenzie. The ferry is scheduled to start operating in the summer of 2010. The new Ferry trip from Anchorage to Port MacKenzie will be only 15 minutes, plus loading and unloading time. A surface road with heavy truck capability, all paved and with no more than a 5% grade will be built to the site by end of next year. Workers could commute to the site from Wasilla, which is a town about 30 minutes away with no traffic.
- A new railroad spur is being built to Anchorage from Port McKenzie, but it doesn't connect to anything outside Alaska. It runs from Seward through Anchorage through Fairbanks. However, a rail barge service is available in Whittier (45 miles southwest of Anchorage), which connects to the Lower 48 states by means of a rail barge. The barge runs once a week to Seattle and back (a five day trip one way.)
- The Port MacKenzie dock handles mostly dry bulk materials (concrete etc.), with no liquids through it now, but they are willing to add that capability. Port MacKenzie has not handled any cargo in last 3 yrs except for the ships bringing in cement for a new prison. Port MacKenzie handled 20% of the cement imports to Alaska this year. The port is deep water capable to 65 foot, for Capesize ships. The tide rises 39 feet so ice is almost never a problem for regular shipping except for a week or two every 3 or 4 years in the coldest winters. The dock is 380 feet long, and is on the flow side of the channel, so no dredging is necessary, but the last time a woodchip ship was in Port MacKenzie in the winter, they couldn't hold it in the dock with 2 tugboats and 18 lines.
- The site has good access to power, and is located at a central location within the natural gas pipeline grid, although the pipeline will be 9 miles from the plant site. Natanuska Electric's main power lines are 3 miles up the road, which is where a substation would go.

- The five top points for Port MacKenzie site are:
  - A deep draft dock (Cape size and Panamax) is being expanded, and also handles barges.
  - A 9,000 acre industrial site has a one quarter mile buffer around it, and no close neighbors.
  - A workforce within commuting distance is already highly trained.
  - Road and rail access to the Anchorage container ship port and Fairbanks, as well as rrail barge service to the US West Coast.
  - No environmentally sensitive areas in the port area. No endangered species.

FIRE ISLAND SITE ATTRIBUTES

- Fire Island is a totally green field 4,300 acre island site with no residents, sitting three miles out from the city of Anchorage in the Cook Inlet.
- It was at one time a military radar and Nike missile site, but the facilities have all been demolished. Fire Island is now owned by Cook Inlet Region Inc. with access by permission only.
- Various uses have been suggested for the island since its abandonment in 1980, including an expansion of the Port of Anchorage, a replacement for Anchorage International Airport, and a power generating windmill farm.
- It has no natural gas supply, practically no buildings, no paved roads, railroads or docks, but it does have a small airstrip. The only access currently is by airplane or helicopter, and by barge in the summer.

TYONEK SITE ATTRIBUTES

- Tyonek is a native village with 600 people on the west shore of Cook Inlet. It features a 10,000 acre green field industrial park on Indian corporation land, with a deep water port facility.
- Tyonek Is one of 13 regional Native corporations set up by the Alaskan Native Claim-Settlement Act. They have a lot of oil field service, fabrication and support businesses which could partner with new petrochemical ventures.
- There is a village nearby, and the Indian Corporation is building a new community near there with 800 home sites, which have all been sold. There are 800 share holders but only 200 people live there. The other 600 can't live there because there is not enough local employment. These are trained people who work in oil fields, etc.
- Tyonek has 1000 acre plant sites available at tidewater with a permitted dock with Panamax capability, but it is for dry bulk only. The Chewitna coal mine to be built north of Tyonek, which may be permitted next year, would use this dock.

- Land is leased. Land prices at Tyonek are one tenth of the prices at Nikiski (a brown field site).
- The site has significant power generation nearby, and the natural gas pipeline to Nikiski runs through it. The largest gas and power generating units are located in Beluga, half way between Tyonek and Port Mackenzie. There would be lots of coal to liquids plant waste heat available as steam (400 MW) if the proposed CTL plant gets built.
- There are no surface roads or railroads to Tyonek from Point MacKenzie or Anchorage. The population is less than 2,000 on that whole side of Cook Inlet. They currently fly people in everyday from Anchorage to work in the Beluga power plant and oil field. The new ferry to Tyonek is a catamaran ice breaker big enough to carry 114 people and heavy equipment (like M1 Abrams tanks). It's a US navy prototype ship. It will go from Anchorage to Port MacKenzie to Tyonek, and back, but it will take three hours to travel to Tyonek from Anchorage, though.
- Regulatory permitting is realistic and reasonable.
- Tyonek has shifted toward more economic development in the last ten years. They are actively courting chemical companies for investment on their Indian owned land. They are looking at coal gasification, too.

NIKISKI SITE ATTRIBUTES

- Nikiski is a brown field site, with several existing gas fed industrial plants on it.

  - The LNG facility at Nikiski was built in 1969. Marathon owns 30% of the LNG facility and Conoco Phillips owns 70% of it. It is still operating, with its licensed recently renewed through 2011. It has a capacity of 272 mmscf/day (small, about one third the size of a world scale plant now). The LNG plant could be doubled in capacity.
  -
  - Agrium owns a fertilizer plant with 2.5 MMTPY of ammonia and urea capacity (using 155 mmscf/day of gas). The plant was originally built in 1967. It has had different units built over time. Granular Urea was added in the 1980's, and a second ammonia line was added in the late 1980's.It was shut down and mothballed two years ago due to a lack of affordable local natural gas. .The Agrium ammonia plant employed 192 workers before it closed down. It probably could be refurbished and restarted when the natural gas from the North Slope becomes available, but Agrium would be the only ones to do it. Note: Based on CMAI's forecast, the price of North Slope natural gas might be low enough to operate this existing plant, but it probably could not support the investment required for a new build.

  - BP owns a Gas to Liquids pilot plant that is still in operation there.

- There is a 72k bpd capacity refinery (running at 60) owned by Tesoro. The refinery, built here in 1969, is still the most sophisticated one in Alaska, as the others are all crude topping facilities.

- This area was chosen by Dow Chemical for a potential petrochemical plant in the 1980's, but the land was never purchased by them, and the project died.
- A Korean firm was going to build a second LNG facility and dock next to the Agrium plant, but quit.
- There also used to be a Chevron Refinery site (2700 acres, with more land available) near there that was dismantled and sent to Latin America.
- The Nikiski complex was built to monetize Cook Inlet natural gas (9 TCF originally). The site also has significant natural gas infrastruture and a port facility. Tankers for the LNG plant are owned by Marathon and Conoco Phillips. The ships are only 7 years old and they come every 2 weeks. (Not fully utilizing the port.)
- Nikiski has a large equipment dock used to fabricate modules for the North Slope, but they are shipped there by barge. There is much easier navigation and less ice in Nikiski versus Anchorage. Ice is only a problem in Nikiski for a few days per year, but Nikiski's dock has a tonnage restriction due to the current. The crude oil tankers for the refinery must be only half full to dock there.
- There is a road to Nikiski from Anchorage, but no railroad into the site.
- A 35 MW cogeneration facility at Nikiski next to the Agrium facility is currently operating for power only with the steam capacity not being used at all. The steam generator Agrium was using for process heat has 20 mw of steam available when running, but there is no generator to use the steam for power. The Tesoro refinery has their own power plant (16 mw gas fired), and they are adding wind power. The Bernice Lake plant near there is not being used now. It's a back up unit for the Agrium plant, but it's old.
- There are a lot of support facilities and fabrication capacity there with 35,000 people living close by

GENERALSUMMARY OF SITE CONSIDERATIONS

All of the sites except Fire Island are on or within a few miles of the existing natural gas pipeline infrastructure, and have good access to electric power. The two sites having existing access to surface roads and a pool of labor within easy commuting distance are Nikiski and Port MacKenzie. Port Mackenzie has the added benefit of a planned rail link, which would allow rail shipment of products to the Anchorage container ship port and the US West Coast by rail barge. The Nikiski site has the benefit of additional existing infrastructure, including a cogeneration steam generator, which would result in a reduced capital investment requirement. It is the location of the current LNG export facitlity on Cook Inlet, and it is also the location of the Tesoro refinery, which would be the likely customer for several cracker byproducts, as well as for the pentane component of the gas liquids in the pipeline.

The natural gas pipeline network goes all around the Cook Inlet and across it between Nikiski and Tyonek. This is called the CIGGS – Cook Inlet Gas Gathering System. An ethane line could follow the right of way on the west side of inlet and across it to Nikiski, but probably not on east side of Cook Inlet into Nikiski, since the current line on that side goes through Kenai National Wildlife Refuge (permit problem). The map below shows the location of the four sites relative to the route of the natural gas pipeline network around the Cook Inlet.


Willow
Sutton
Houston
PALMER
Wasilla
Knik
Eagle River
POINT MACKENZIE
BELUGA GAS RESERVOIR
ANCHORAGE
Girdwood
Kustatan
Port Nikiski
Kenai
Kasilof
Clam Gulch
Seward
Ninilchik
EXISTING NATURAL GAS
PIPELINE INFRASTRUCTURE
COOK INLET ALASKA

LOGISTICS ISSUES FOR FINISHED PRODUCTS

Cook Inlet also provides logistical advantages for petrochemical companies with downstream customers located in China, Korea, Japan and Taiwan, as well as the US West Coast.

These include:

- Tidewater sites that do not require long-distance delivery of product via railroad or highway to tidewater from manufacturing facilities, as in the U.S. Midwest or Alberta
- An advantage of two days less sailing time to Asian markets versus ports in British Columbia and Washington State via the Great Circle Route
- The ability to take advantage of available back-haul capacity returning from U.S. and Canadian West Coast ports to Asian countries via the Great Circle Route.

Comparisons to Cook Inlet for specific routes would include include:

- Favorable logistics costs versus Alberta production for Asian markets
- Favorable logistics costs versus Asian production for US West Coast markets
- Competitive logistics costs versus USGC for US West Coast markets
- Somewhat disadvantaged logistics costs versus Alberta for US West Coast markets

CHANNEL TO MARKET ISSUES

The following channel to market issues have been identified, which should be considered by a company considering a petrochemical investment in Alaska:

- An Asian company would be considered a domestic supplier in the US market if it has production capacity in Alaska, which could help in marketing to customers and in its dealings with the government.
- An Alaskan plant would not only have duty free access to the entire US market, but would also be able to participate in the North American Free Trade Agreement with Canada and Mexico, as well.
- The first mover on petrochemical investment in Alaska will understand the local situation better than latecomers will, and is better positioned for additional future petrochemical and downstream investments.
- Partnering with or buying a US company could facilitate market development activities for an Alaskan plant's foreign owner (IPIC bought Nova, and SABIC bought GE Plastics).

INVESTMENT CLIMATE ISSUES

The following investment climate issues have been identified, which should be considered regarding an Alaskan petrochemical investment:

- The political stability of the US government and tax system is one of the best in the world. However, the Alaska state corporate income tax rate, at 9.4%, is one of the highest in the country.
- Intellectual property rights are well protected.
- A weak dollar could favor a US investment that is based on domestic capital, operating costs and raw materials.
- Environmental permitting can be difficult, but this will be eased somewhat by sharing work done for the pipeline, and the state of Alaska wants the pipeline to be built.
- Cycle timing is favorable for manufacturers looking to build petrochemical facilities in Alaska. The Open Season negotiations will be taking place at the absolute bottom of the chemical cycle trough, occurring in 2010.
- Investment in productive assets now is a way to put funds that might currently be underperforming in financial investments to good use for the long term.
- The state of Alaska is expected to be an ally in this Open Season/investment process. This is not an acquisition of an existing company, but rather the establishment of a new presence/company in Alaska. Alaska will strongly support that endeavor.

TARGET COMPANY COMPARISON

ASIAN COMPANIES WITH POTENTIAL INTEREST IN ALASKA PETROCHEMICALS

The following Asian companies were selected to be evaluated with respect to their potential interest in investing in Alaskan petrochemicals:

- China
    - China Petroleum & Chemical Corporation (Sinopec)
    - China National Offshore Oil Corporation (CNOOC)
    - Sinochem
    - ChemChina
    - PetroChina
- South Korea
    - LG Chemical
    - SK Energy
    - Hanwha Chemical Corp
    - Honam
- Japan
    - Mitsubishi
    - Mitsui
    - Sumitomo
    - Idemitsu Kosan
    - Itochu

In this section of the report, the key success factors in manufacturing and marketing have been prioritized and weighted for each of the companies targeted. The companies are then compared to each other and to the market leaders on a single bubble chart for each product with potential for Alaskan production.

Note: The size of the bubbles in the charts on the following pages are proportional to each company's sales of the product in question, and the bubble's position on the grid is based on the company's weighted average score on each of the two dimensions: marketing and manufacturing.

The criteria used to evaluate each company's marketing and manufacturing competitiveness in each product (Ethylene, HDPE, LLDPE, LDPE and Mono Ethylene Glycol) and the weighting used in calculating their competitive positions are shown in the table below:

Product Bubble Chart Criteria

Manufacturing Position (Vertical Axis):

Scale (capacity basis) – 20%

Upstream integration (feedstock 1) – 15%

Upstream integration (feedstock 2) – 10%

Downstream integration – 10%

Weighted average unit size – 10%

Technology – 10%

Weighted average age of plants – 5%

Announced capacity expansion/closures – 5%

Estimated transportation cost – 5%

Feedstock Cost – 10%

Market Position(Horizontal Axis):

Product Quality – 10%

Distribution - 10%

Regional Strength – 15%

Geographic Coverage – 15%

Global Market Share – 15%

Purchase requirements – 10%

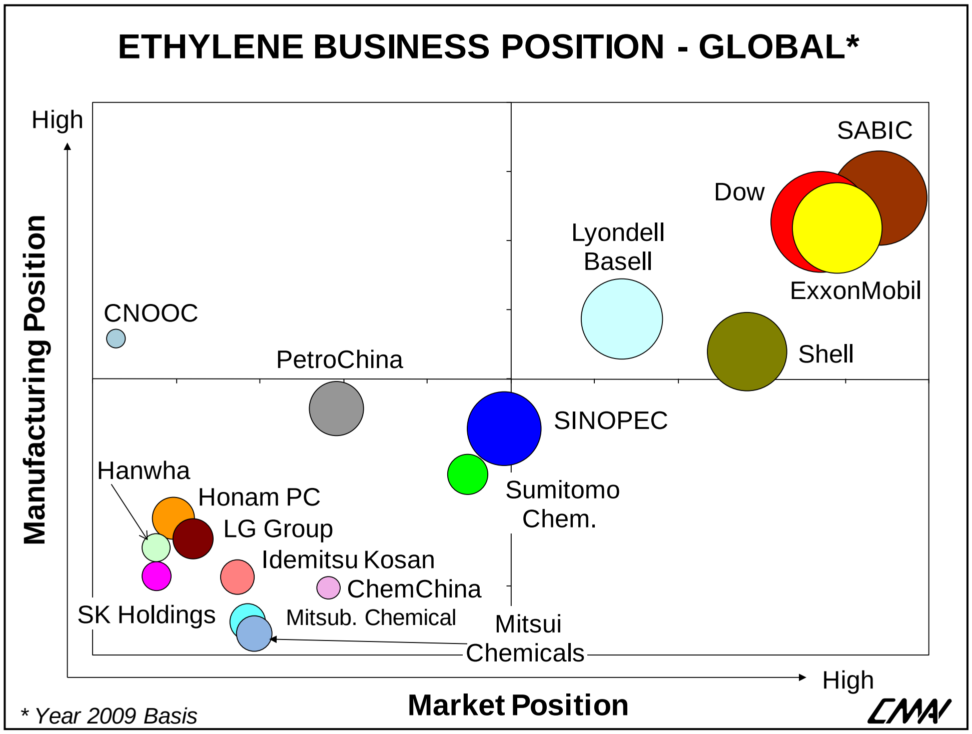
Sales position – 10%

5-year %AAGR forecast for regional product demand (based on capacity-weighted regional presence) – 15%

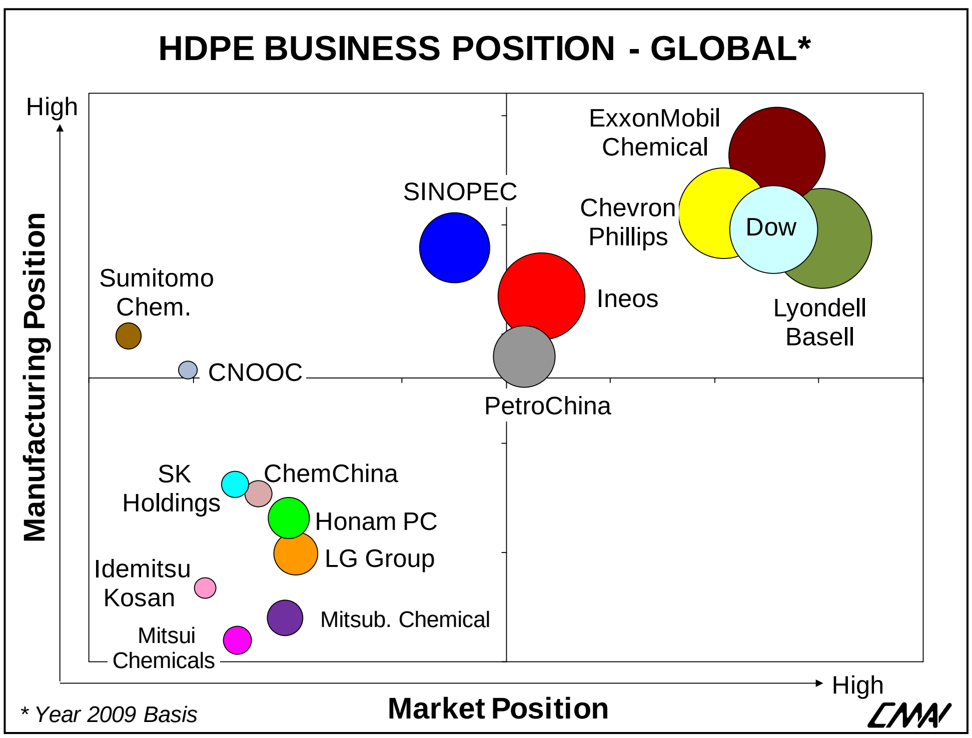
**Note that the individual parameters are included based on data availability (therefore, not all them are included for each product) and may be weighted slightly differently for different products.*

As indicated in the charts below, the industry leaders are not the same across all of the ethylene based products, which may be surprising. Shell is a leading producer of MEG, but not Polyethylene, having sold that to LyondellBasell. ExxonMobil and LyondellBasell are leading companies in Ethylene and Polyethylene, but not in MEG. Dow is the only company that appears on the right half of every bubble chart, although SABIC is close, and generally has the best manufacturing position over all. SABIC is only the sixth largest HDPE and LDPE producer, so it does not appear as a Top 5 industry leader in the charts for those markets, but it is close, and it is growing rapidly. It will be a Top 5 industry leader in all of these markets in the next couple of years.

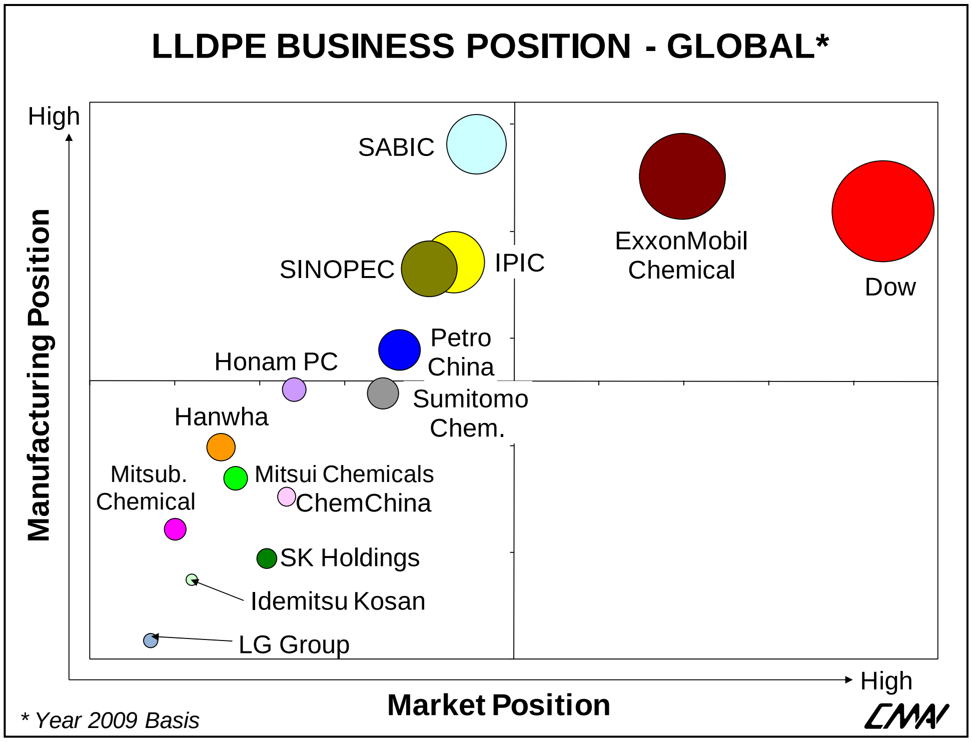
Of the Asian companies, SINOPEC is by far the largest in this markets, and is growing rapidly. It will also be in the Top 5 list for every one of these products within the next few years.



The Asian companies with the best Ethylene positions are SINOPEC, PetroChina, Sumitomo. Although CNOOC has a good manufacturing position, it has a very low market strength rating. Honam and LG are not in strong positions, even though they are larger than some of the others. Mitsubishi and Mitsui have very weak manufacturing positions, based on naphtha cracking in high cost Japan.

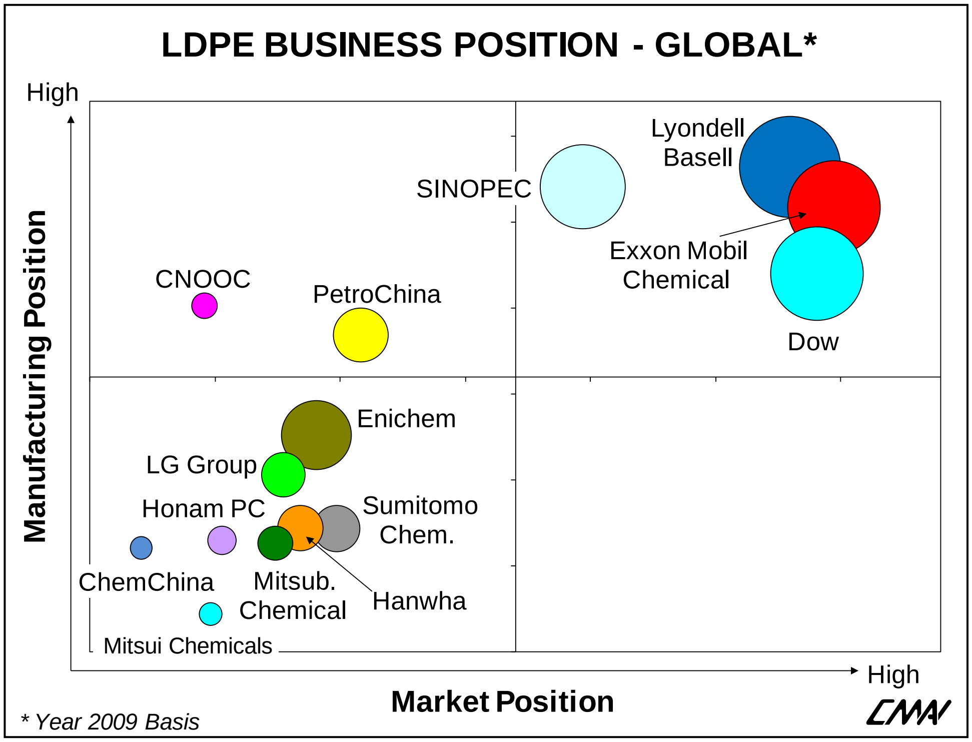


SINOPEC and PetroChina are in strong positions in HDPE. Sumitomo and CNOOC have fairly good manufacturing positions, but are weak on market strength. None of the other companies will challenge the leaders.

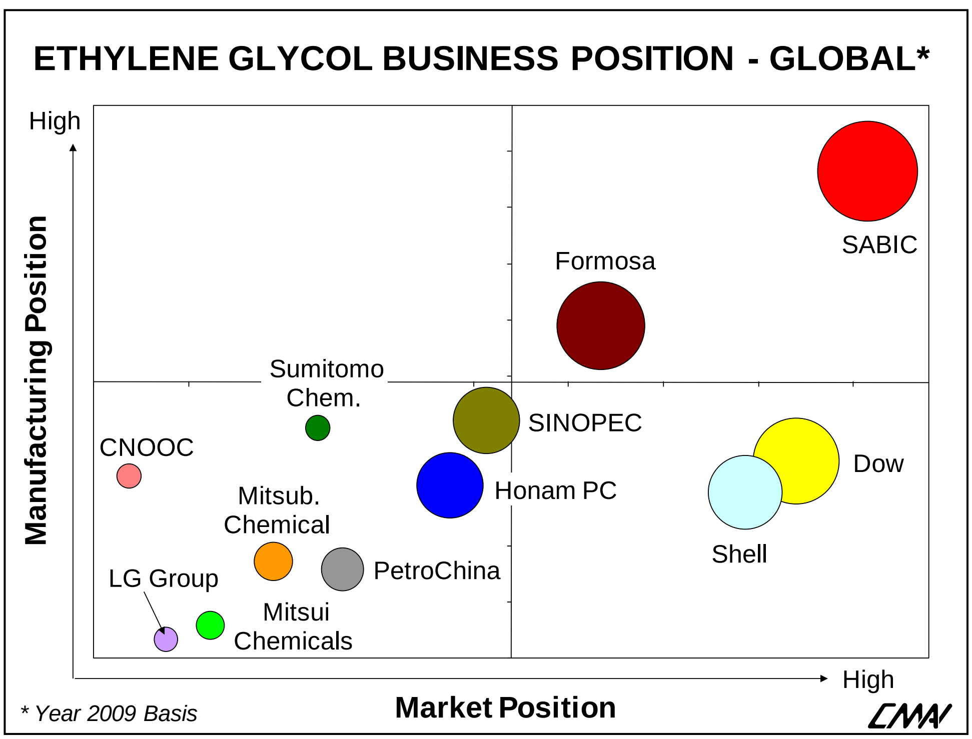


SINOPEC, PetroChina and Sumitomo are the leading Asian companies in LLDPE. IPIC has moved up on the competitiveness scale with their recent purchase of the Nova assets in Alberta. Hanwa and Honam have relatively strong manufacturing positions in LLDPE, while LG rates much lower in this product. ExxonMobil and Dow are the clear market leaders in this product.

In LDPE, SINOPEC is a market leader. While CNOOC and PetroChina have solid manufacturing positions. LG, Hanwa and Sumitomo have some size in this market, and lead the pack of “also-rans” in Asia.



Sabic is the undisputed king of MEG, which it cheaply ships all over the world. Dow and Shell have strong market positions, but lack the manufacturing strength of SABIC. Formosa has a lot of manufacturing strength and size in this market, with large new plants. Dow's size and score is diluted by its JV status in MEGlobal.



TARGET COMPANY PROFILES

ASIAN COMPANIES WITH POTENTIAL INTEREST IN ALASKA PETROCHEMICALS

In this section of the report, for each company there is a corporate profile, followed by a chart showing the products which represent the largest capacity shares globally for that company, ranked from the highest share at the bottom, to the smallest at the top. There are a limited number of products that can be shown in each chart, so the lack of a bar for a specific product does not mean that the company doesn't make it, only that it doesn't rank among the company's products with the largest capacity share. The bars colored black represent the products of interest in this study (Ethylene, HDPE, LLDPE, LDPE, and MEG).

The two numbers in parentheses after the product name in the charts represent the company's global ranking in capacity, and the total number of producers of that product. For instance the numbers (3/78) would indicate that the company is the third largest producer of that product, out of 78 total producers in the world in 2009.

Some of the corporate profiles also include important news items regarding recent JV, acquisition or investment activity by the company, as well as a note regarding their interest in meeting with the delegation from Alaska on the topic of petrochemical investment there.

CHINA PETROLEUM & CHEMICAL CORPORATION (SINOPEC)

Corporate Overview:

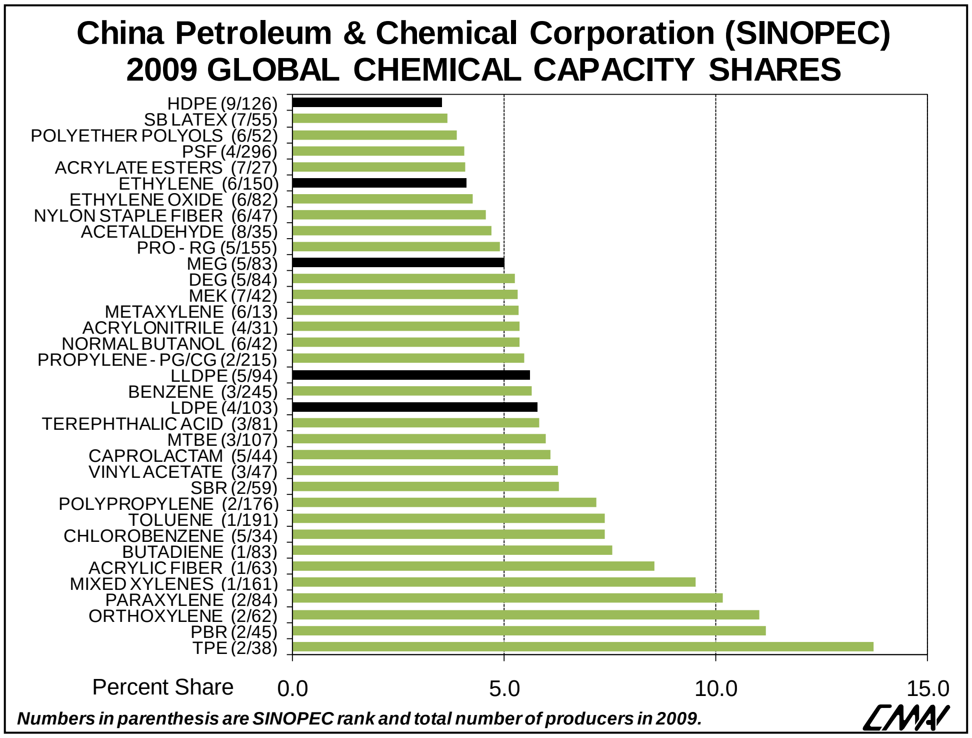
Sinopec is a relatively new, but rapidly growing power in the oil and gas industry. It is also the largest petrochemical manufacturer in China and the third largest refiner in the world. The Chinese government owns 76% of the company through the state-owned Sinopec Group. Sinopec derives about 20% of its considerable revenues from chemical production and another 10% from refining. Over half of its revenues are derived from marketing and distribution. The company has 334,377 employees (at the end of 2007); with chemicals segment: employment totaling 70,712 people.

SINOPEC's refining and chemical manufacturing operations have historically been located entirely in the People's Republic of China. In fact, most of the facilities are located in the eastern part of the country along the central coastal region, with some in the south. The production network includes 56 plants/complexes at 33 sites/locations in 22 distinct municipalities. In several locations, multiple subsidiaries/joint ventures share a single site/location. Most of the company's sales are also within China. However, some of the products manufactured by the Chemicals segment are exported.

SINOPEC has grown into a large, somewhat diversified commodity chemical company with a product mix that extends from basic chemicals such as ethylene, propylene, and aromatics to polymers, elastomers and fibers such as polyolefins, polystyrene, polyvinyl chloride, polyester fibers, acrylic fibers, SB rubber, thermoplastic elastomers, and polyisobutylene.

SINOPEC has undergone some major expansion in the past few years, much of which is associated with joint ventures with major western chemical companies. In Nanjing, BASF/Yangzi PC started up a complex in 2005 based of olefins cracking that included aromatics and C_4 processing, oxo chemistry, acrylic acid and derivatives, EO/EG and polyolefins. Also that year, Shanghai SECCO, a venture with BP Chemicals, started an olefins-based complex in Caojing that included aromatics, polyolefins, styrenics and acrylonitrile. The following year, a joint venture that included participation of Huntsman, BASF, Shanghai Chlor-Alkali and Shanghai Huayi started producing the isocyanate MDI/PMDI and precursors at SHG Lianheng Isocyanate in Caojing while Shanghai BASF PUR began producing toluene diisocyanate and precursors at that location.

The company's 2007 joint venture with ExxonMobil and Saudi Aramco is further evidence of Sinopec's willingness to collaborate with international interests. Recently, Sinopec has shown continued interest in Alaska's petrochemical potential. Sinopec would be interested in manufacturing olefins and polyolefins for export to the Chinese market.



Sinopec has indicated to CMAI through their formal channel that Sinopec is lacking an interest in going after a US asset.

Sinopec To Build $22B Refinery In Russia - Report

by Xinhua Economic News
November 24, 2009

The Sinopec Group plans to invest 22 billion US dollars in building a refinery with refining capacity of 20 million tonnes per year in the Primorsky region of Russia, reported the Russian media Interfax. It will be the first time a Chinese oil firm has built a refinery in Russia. Besides the refining facility, the Sinopec Group will also build a power plant, a pipeline and a port. The refinery, to be built by two phases, is scheduled to enter operation by 2014. The report said OAO Rosneft, the Russian state-run oil firm, might participate in the project. The refinery is expected to feed on Russian oil, and export the oil products to adjacent regions.

The Sinopec Group in recent years has been cooperating with Rosneft in developing natural gas in the Sakhalin region.

Sinopec Signs $6.5B Iran Refinery Deal

by Xinhua Economic News

November 27, 2009

The Sinopec Group has signed an agreement with the National Iranian Oil Refining & Distribution Company (NIORDC) to provide 6.5 billion US dollars in capital to the latter for building and upgrading refineries in Iran, reported the semi-official Iranian media MEHR. Market-watchers believe that it will develop into another loan-for-oil deal in which Iran would export crude oil to China in exchange for loans.

The report said the two parties are now in talks and that detailed agreements would not be released for two months. It comes as another attempt by Sinopec to enter into the Middle East's market after it was rebuffed to bid for Iraqi oilfields several days ago.

The Iranian government is considering to build seven greenfield refineries and upgrade another nine, with total investments of about 23 billion dollars. But the plan has been postponed due to the lack of capital. Iran contains plentiful oil resources but is short on refining capacity. The Iranian government expects the newly-built refineries to boost its refining capacity from 1.67 million barrels per day to 3.2 million.

PetroChina, Sinopec Move To End Natural Gas Crisis

by Xinhua Economic News
November 24, 2009

PetroChina and Sinopec, China's leading oil and gas suppliers, have moved to end natural gas crisis caused by cold weather since the beginning of November.

PetroChina, the country's largest oil and gas producer, said Tuesday that it has cut its own industrial usage of natural gas by over 10 million cubic meters per day to help secure supply to residents and heating systems in snowfall-hit cities, which are mostly in the northern and central parts of China.

Sinopec announced Tuesday that the company has geared up natural gas production in the fourth quarter, registering record highest monthly output of 23.8 million cubic meters per day, about 1.8 million cubic meters more than the daily average output in the third quarter.

Sinopec, the country's second largest oil company and largest oil refiner, also followed PetroChina to cut its own industrial usage of natural gas.

The company said it has added 850,000 cubic meters of natural gas daily since the beginning of the fourth quarter to reinforce supply to residents and heating systems users.

Since the beginning of November, China has suffered from plummeting temperatures and heavy snowfall across the country, leading to increasing demand for natural gas for heating. Domestic oil majors, especially PetroChina and Sinopec, have been blamed for the stressed supply.

In response to criticism that domestic oil majors deliberately intended to restrict gas supply for an earlier adoption of gas price hike, PetroChina and Sinopec have uniformly refuted the criticism, shrugging off the accusation by detailing their efforts to reinforce the natural gas supply.

Zhang Guobao, vice minister of the National Development and Reform Commission (NDRC) and head of the National Energy Administration's aid Monday that demand-supply imbalance is the primary cause of the current tight natural gas supply in China.

Zhang Guobao said the government is taking measures to solve the supply shortage, adding that a natural gas price lower than other forms of energy, such as gasoline, also boosted domestic demand, making the imbalance even worse.

The minister confirmed that the central government is planning to reform the current natural gas pricing mechanism, but he did not give any concrete timetable for the reform.

CHINA NATIONAL OFFSHORE OIL CORPORATION (CNOOC)

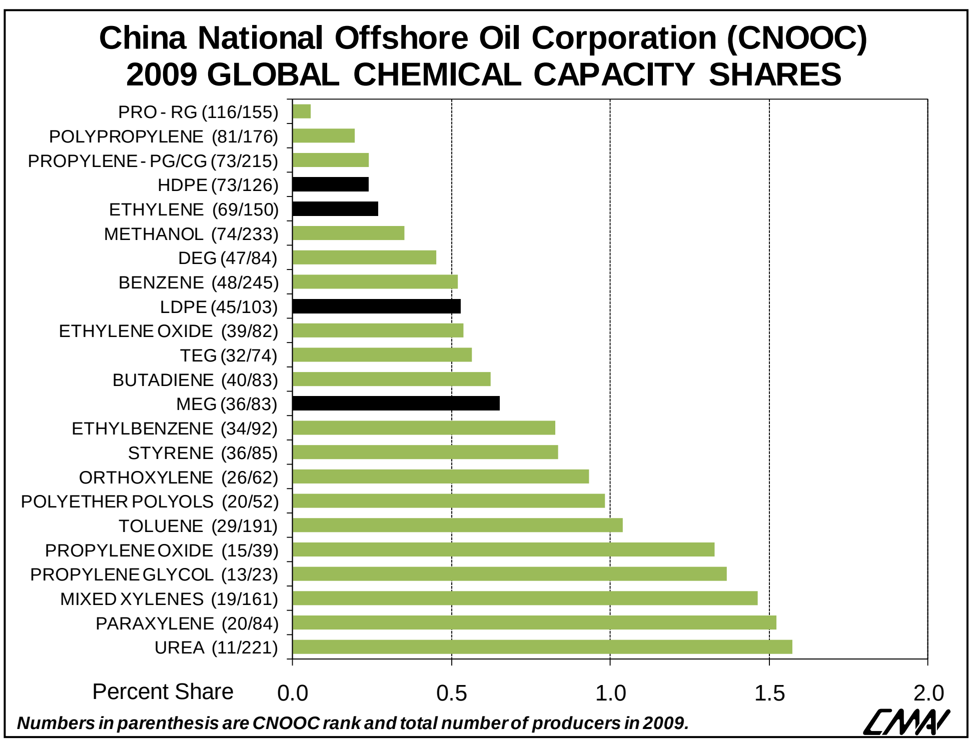
Corporate Overview:

The Chinese government owns 70% of this major petroleum company. Established in 1982, the Company has its headquarters in Beijing. It now has 57,000 employees. CNOOC was originally intended to oversee offshore oil exploration and production, but it has now expanded its operational scope into natural gas, power generation, refining, logistics, and petrochemicals. CNOOC has established six business sectors ranging from exploration and development of oil and gas, technical services, logistic services, chemicals and fertilizer production, natural gas and power generation to financial services.

In 2008, the Company realized a total revenue of RMB 194.8 billion and a total profit of RMB 67.8 billion. Its total assets reached RMB 409.5 billion and net assets were RMB 205.9 billion. (Note: RMB Exchange rate is approx. 6.8 per USD) Oil and gas production of the year reached 42.93 million tons of oil equivalent.

CNOOC co-owns a joint venture with Shell that has produced ethylene and other value-added petrochemicals since 2005.

If CNOOC were to invest in the Alaskan petrochemical industry, it would likely be as a joint venture with an American company. CNOOC's aborted 2005 takeover of Unocal was not well received in America, which may have strained business relations.



SINOCHEM

Corporate Overview:

Sinochem is usually associated with chemical trading rather than production. The company is the fourth largest oil state owned enterprise in China. It operates through more than 100 subsidiaries in China and abroad in concerns including petroleum, petrochemicals, rubber, fertilizer, and plastics. In an effort to vertically integrate, the company is currently expanding its overseas exploration and production assets. Sinochem is an unlikely investor in Alaska, because it is not a petrochemical producer.

Sinochem has told CMAI that it is not interested in pursuing any US asset. This message came from the Sinochem vice president in charge of their Oil and Gas business.

CHEMCHINA

China National Chemical Corporation (ChemChina) is a large-scale state-owned company composed of companies affiliated with the former Ministry of Chemical Industry. Headquartered in Beijing, ChemChina was formally inaugurated on May 9th, 2004.

There are currently six sectors in ChemChina industries: advanced chemical materials and specialty chemicals, oil processing and chemical raw materials, agrochemicals, chlor-alkali chemicals, rubber processing and rubbers & plastics equipment and science and R&D sector. ChemChina has 9 specialized companies namely, China National BlueStar (Group) Corporation, China Haohua Chemical (Group) Corporation (CHC), ChemChina Agrochemical Corporation, China National Chemical Equipment Corporation (CNCE), China National Chemical Advanced Materials Corporation, ChemChina Petrochemical Corporation, ChemChina International Holding Company, China BlueStar Construction Engineering Bureau, and China National Chemical Information Center (CNCIC). It has 118 subsidiary companies in production and operation and 25 R&D institutions. ChemChina also owns overseas companies such as Adisseo in France, Bluestar Silicones International and Qenos in Australia. Meanwhile, it has built up production plants, R&D bases in 140 countries worldwide. ChemChina has a few privileges authorized by the central government. That means, it can do business with foreign customers directly and is allowed with exclusive right to do specialty chemicals business. ChemChina is ranked 35th among China's top 500 enterprises, according to National Bureau of Statistics of China.

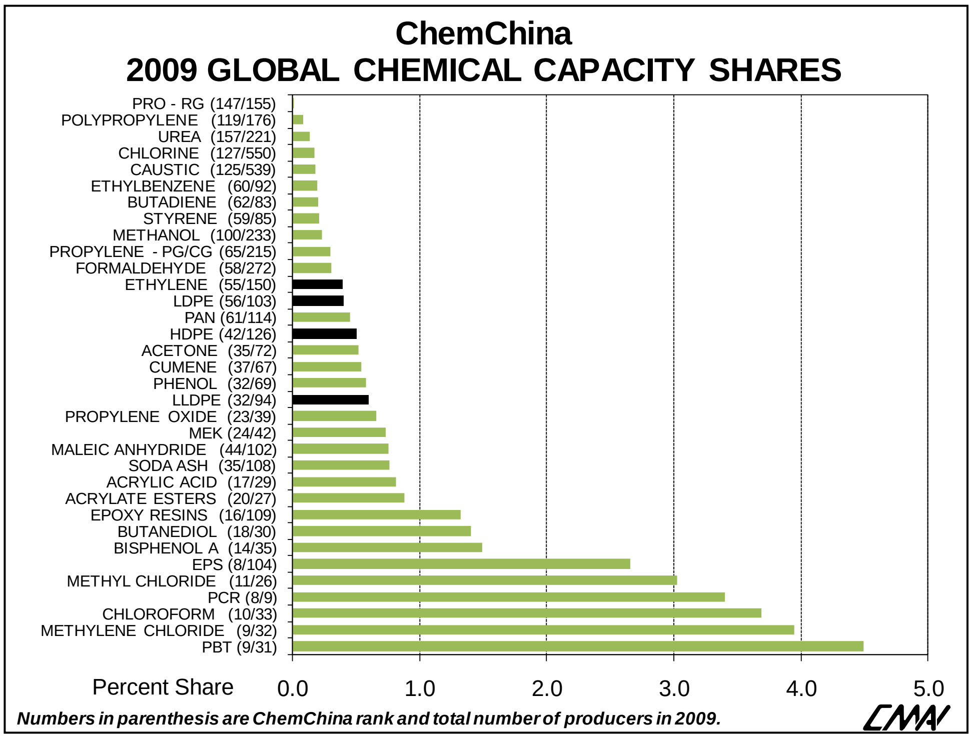
In terms of advanced materials, ChemChina produces organic silicone, organic fluorine, methionine, PBT, PVC paste resin, POM, PC, PPO, PPS, epoxy resin, PU, PHB (polyphenyl p-hydroxybenzoate), sulfur hexafluoride, gas-phase silica white, titanium dioxide, photosensitive chemicals, high performance fibers, and industrial coatings.

In the sector of oil processing and chemical raw materials, ChemChina has 12 refineries and the annual crude oil processing output is totaled 20 million tons. Through the technological process of "producing chemicals from oil refining," they provide intermediates and raw materials for advanced chemical materials and specialty chemicals. The main organic raw materials of ChemChina include ethylene, propylene, butadiene, phenol, acetone, methyl ethyl ketone, maleic anhydride, 1,4-butanediol, tetrahydrofuran, acrylic acid, nonylphenol, bisphenol A and TDI. Within these materials, the equipped scale of bisphenol A and nonylphenol rank the first in China. ChemChina also owns the largest TDI manufacturing facility in China.

Its output of caustic soda and neoprene rubber rank the first in China, propylene oxide and polyvinyl chloride (PVC) rank the second. The manufacturing scale of PVC paste resin is the largest in Asia and the third largest in the world.

In the sector of rubber processing and chemical equipment, ChemChina owns production lines of all-steel radial tires, semi-steel radial tires, aviation tires, and giant engineering tires, with an annual output of over 10 million. It can also produce polysulfide rubber, rubber seals, new process flexible and rigid carbon black, etc. ChemChina's production capacity of rubber & plastics equipment ranks the third in the world, and it is the only company in China that can produce ion-exchange membrane electrolyzers, with the third-largest output in the world. In the agrochemical sector, ChemChina has become the largest pesticide producer in China.

ChemChina confirmed a meeting with the Alaskan delegation in Beijing.



CNPC AND PETROCHINA

Corporate Overview:

State-owned CNPC is a fully integrated oil and gas company. The company is particularly aggressive in acquiring oil producing assets in Africa, Asia, and Canada. In addition to exploration, production, transportation, marketing, and refining, CNPC also produces over 15 million tons of petrochemicals per year.

While CNPC is expanding its petrochemical capacity in China, it may not be as interested in overseas expansion. Unlike Korea and Japan, China does have a domestic supply of natural gas. Still, China is a net importer of LNG, and the country has a vast appetite for industrial inputs. Alaska can provide a great deal of feedstock which may be of value to CNPC. Similar to CNOOC, any investment will probably be in joint venture form.

CNPC is the government-owned parent company of public-listed PetroChina, a company created on November 5, 1999 as part of the restructuring of CNPC. In the restructuring, CNPC injected into PetroChina most of the assets and liabilities of CNPC relating to its exploration and production, refining and marketing, chemicals and natural gas businesses. CNPC and PetroChina develop overseas assets through a joint venture, CNPC Exploration & Development Company, which is 50% owned by PetroChina. The half ownership was acquired in June 2005 by PetroChina after paying CNPC 20.74 billion yuan.

CNPC holds proved reserves of 3.7 billion barrels of oil equivalent. In 2007, CNPC produced 54 billion cubic metres of natural gas. CNPC spun off most of its domestic assets into a separate company, PetroChina, during a restructuring. CNPC has 30 international exploration and production projects with operations in Azerbaijan, Canada, Indonesia, Myanmar, Oman, Peru, Sudan, Thailand, Turkmenistan, and Venezuela.

In Iraq, CNPC began development of Ahdab, an oil field in Wasit Governorate holding a modest one billion barrels, in March 2009, becoming the first significant foreign investors in Iraq. Adhab is not expected to be a major profit center, earning the company a projected 1 percent profit. Instead development of the field was seen as an entry strategy into Iraq. Following Adhab, CNPC obtained a contract to develop the much larger Rumaila with joint venture partner British Petroleum.

In Syria, CNPC with Indian state oil firm, ONGC created a joint venture to acquire minority stakes ranging from about 33.3% to 38% in several mature Syrian oil and natural-gas properties. The combined entity was a notable instance of cooperation between two state oil firms that regularly competed for assets around the world.

CNPC is heavily involved in the development of Kazakh oil after the acquisition of Alberta-based PetroKazakhstan, a company with all operations in Kazakhstan. The company was purchased for $4.18 billion. Political resistance in Kazakhstan to the deal was placated by the sale of a minority stake in PetroKazakhstan by CNPC to KazMunaiGaz, the Kazakh state-owned oil company.

In Uzbekistan,in 2006, CNPC formed an international consortium with state-run Uzbekneftegaz, LUKoil Overseas, Petronas, and Korea National Oil Corporation to explore and develop oil and gas fields in the Aral Sea.

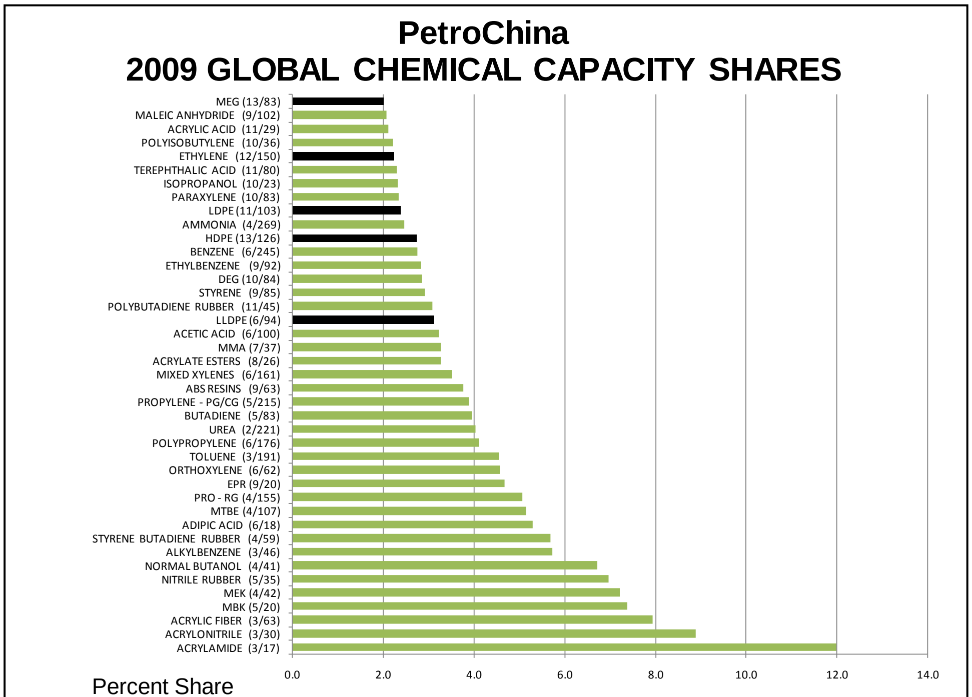
PetroChina is the largest Chinese oil and gas producer and distributor, and the second largest Chinese petrochemical producer behind SINOPEC. Already among the ten most profitable companies in the world, PetroChina with revenue of US $150 billion would join the largest top twenty global corporations in terms of sales. Established in November 1999 by CNPC (China National Petroleum Corporation) as a joint stock company with limited liabilities, PetroChina since April 2000 has been listed on the New York and Hong Kong stock exchanges, and since November 2007 also on the Shanghai stock exchange. State-owned CNPC continues to hold 86.29 percent of PetroChina's shares. The company is geographically focused on the Northern part of China and employs over 460 thousand people.

During the period from 2010 through 2020, PetroChina plans to evolve into a major international oil and gas company, similar to Western-based corporations such as ExxonMobil, Shell, BP, and Total. Apart from greatly expanding its international presence through acquisitions and participation in joint venture projects, PetroChina also aims to achieve returns similar to the global oil and gas majors.

The emphasis on oil and gas exploration and production in PetroChina's business strategy reflects the subordinate roles of the chemical and refining segments to the company's overall operations. Both segments will remain geographically focused on China, although PetroChina will make efforts to meet the rapidly growing requirements for both fuels and chemicals in the domestic market. New investment projects are underway utilizing more modern technologies and improving PetroChina's still subpar economies of scale, particularly in petrochemicals.

PetroChina's chemical and marketing segment only accounts for less than ten percent of total sales and around four percent of total operating income. This is very typical of international oil and gas majors and will not change materially in the future, particularly in light of the strong emphasis on oil and gas exploration and production in PetroChina's strategic business plan. Yet, with revenues of US $13.5 billion, PetroChina's chemical business ranks between Akzo Nobel and Chevron Phillips Chemical among the top twenty global chemical producers. Large-scale capacity projects currently underway or in the planning stages is expected to enable PetroChina's chemical segment to join the group of the top ten global chemical producers by the middle of the next decade; particularly as some of the largest Western and Japanese companies are pursuing strategies of consolidation rather than expansion.

PetroChina over the next several decades will remain a beneficiary of the exponential demand growth for crude and refined oil and gas products as well as chemical intermediates in China. As a mainly state-owned entity, PetroChina will be instrumental in the implementation of the government's energy policies both at home and abroad. Government policies rather than independent business considerations, therefore, will shape the company's future developments. At the same time, PetroChina will enjoy support and protection in the form of government subsidies and possibly also trade barriers against external competition.



Numbers in parenthesis are PetroChina rank and total number of producers in 2009.

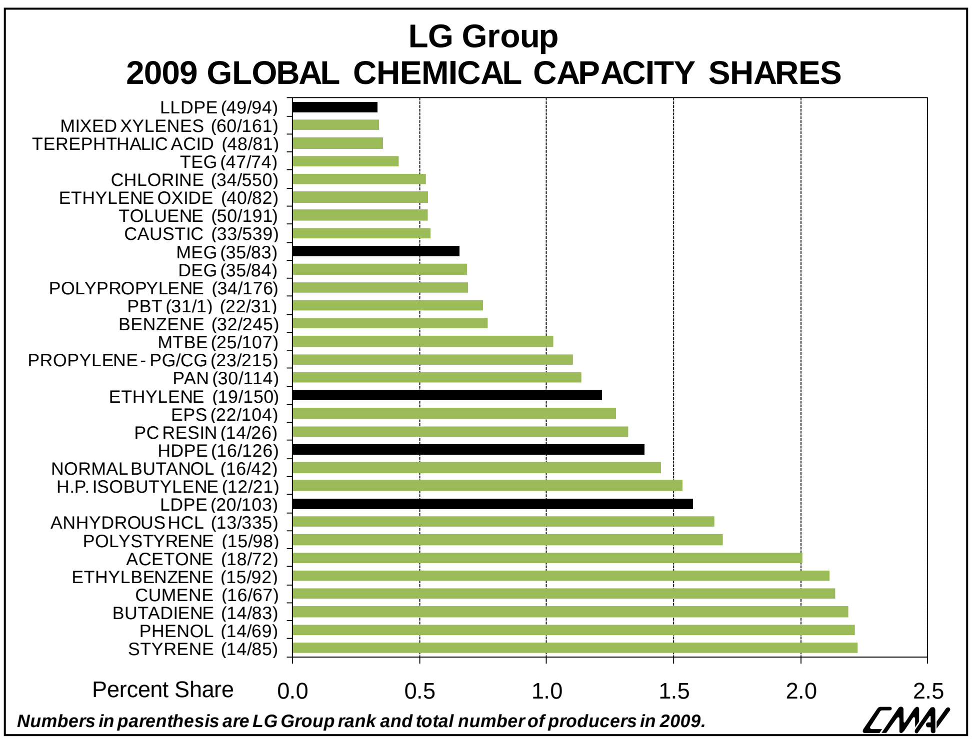
LG CHEMICAL

Corporate Overview:

LG Chem is the chemical subsidiary of the much larger LG Group ($81.5 billion revenue). LG Chem has a diverse range of products: industrial/construction materials, electronic materials, and petrochemicals. Petrochemicals such as polyolefins, styrenics, specialty chemicals, and engineering plastics account for 60% of sales. The industrial materials division is scheduled to be spun off, which will increase the petrochemical share of the product mix. 80% of sales are to South Korean and Chinese markets.

Given LG Chem's position in petroleum-scarce Korea, the company relies on imported petrochemical feedstock to operate its domestic production. From this perspective, LG has a vested interest in securing future raw material sources, possibly by moving into upstream production or via a joint venture.

However, LG Chem has stated that they have no interest in investing in the US, as they are focusing all their future investments on the Middle East and China.



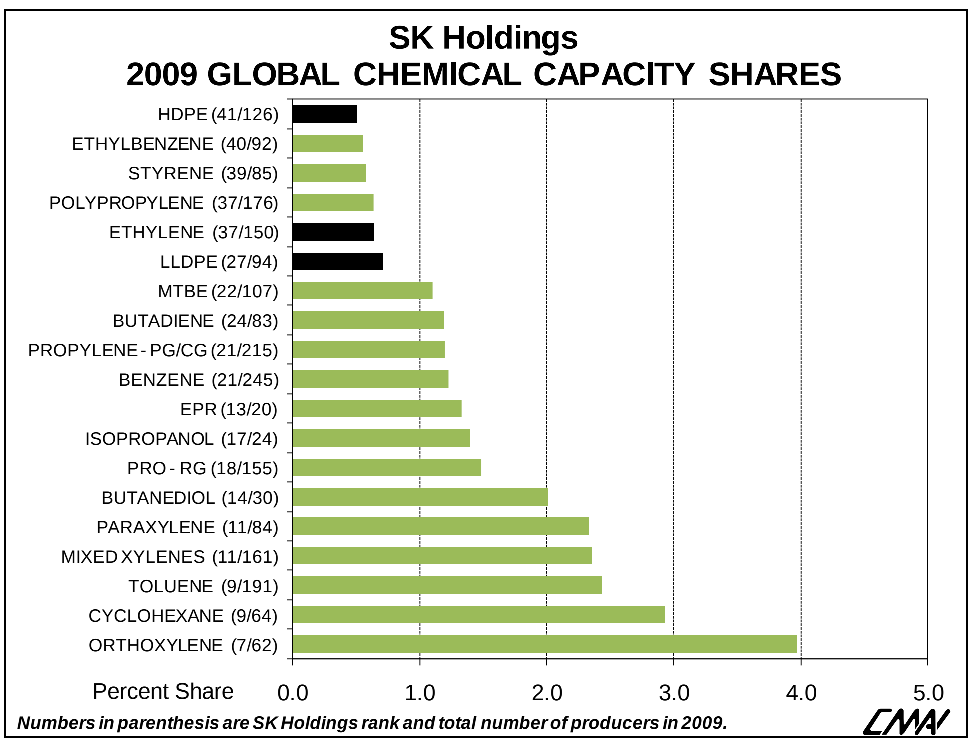
SK ENERGY

Corporate Overview:

SK Energy is Korea's largest oil refining company. SK Energy is the largest part of the SK Group conglomerate, accounting for half the group's business. Not just a refining company, SK Energy also derives a quarter of its revenue from petrochemical production. SK makes olefins and polyolefins, primarily based on naphtha feedstock from their Ulsan facility. The SK Group is also South Korea's largest LPG importer and distributor.

Export sales account for over half of SK Energy's business. The company is seeking expansion opportunities in China and the United States. SK Energy also has demonstrated interest in Alaska, having visited the Anchorage area very recently. Considering their expertise in LPG, they may be considering a propane liquefaction facility, possibly as a joint venture.

The meeting invitation was declined. SK Energy has minimal interest to invest in the US and CMAI had difficulty in setting up a meeting with top level management on the requested date due to busy schedule of year end (Executive's calendars are very full during December).

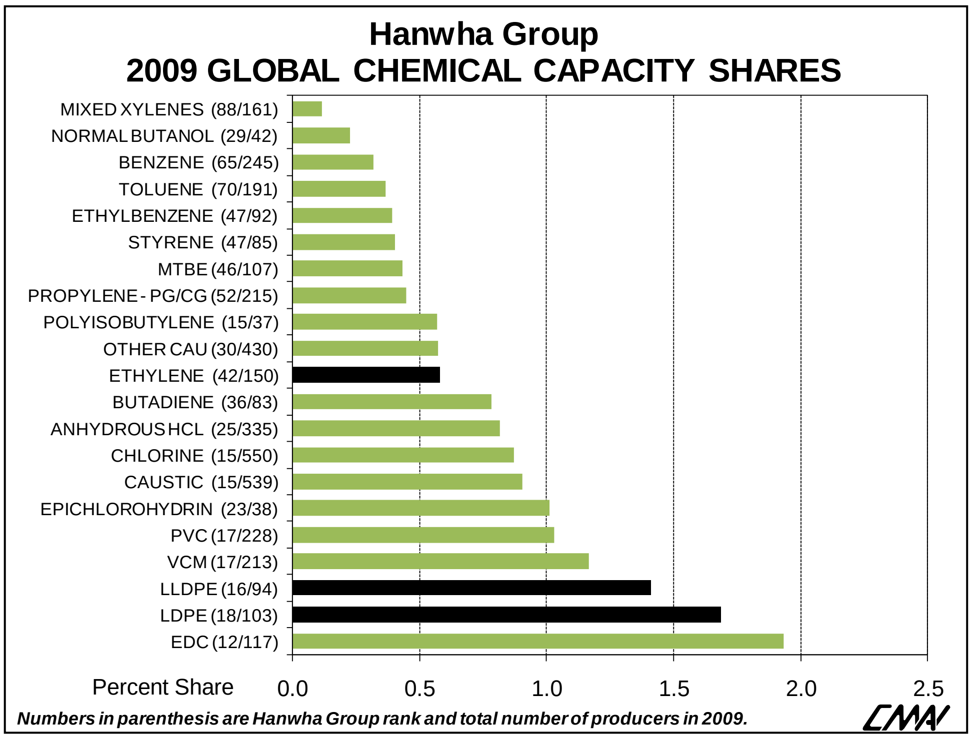


HANWHA CHEMICAL CORP

Corporate Overview:

Hanwha Chemical's core business is the production of polyethylene, caustic soda, and PVC. While the Korean company has significant revenues and produces a relevant product, it appears that Hanwha Chemical's operations are confined to the Southeast Asian market.

Hanwha have an memorandum of understanding with Saudi Arabia for a new JV in Polyolefins, and are focusing their investments on the Middle East and China.



HONAM

Honam is one of the three petrochemical companies of the Lotte Group - Honam Petrochemical, KP Chemical, and Lotte Daesan Petrochemical.

Honam makes a wide range of polyolefins including HDPE, LLDPE, LDPE, as well as Polypropylene, Ethyl Vinyl Acetate, PET and elastomers. It also makes Styrene, Butadiene, Aromatics (BTX) and MEG.

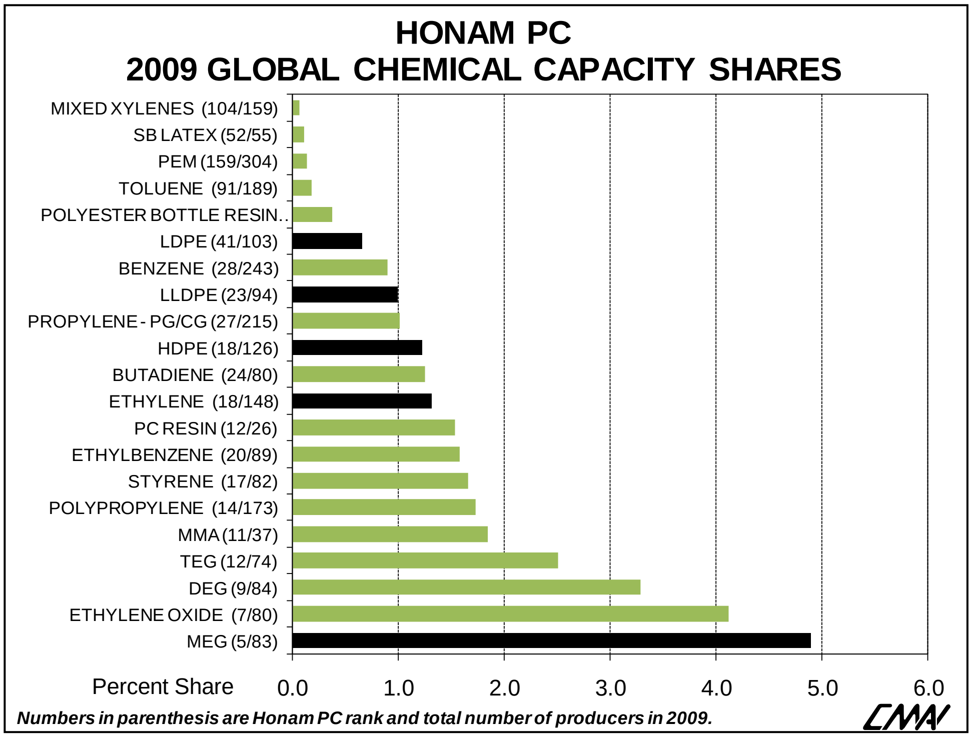
Honam had announced a planned a JV with Qatar Petroleum several years ago, to build an ethylene cracker in Qatar, but it has been delayed due to cost increases and tight credit markets. QP is also working with Exxon and Shell on cracker JV projects, and will decide soon on which ones to move forward. Honam may lose out to their bigger rivals, as there is not enough feedstock to build all of them. They may need a new JV partner soon.

Honam wanted to hear about the Alaskan project's details but no executive level managers were available.

Financial Income Statement as of Q2 2009.
(Note: Korean Won Exchange rate was between 900 and 1,300 per USD through the whole four year period.)

As Of 2009.6.10 [Unit:100 Million Won]

Title	2009.2Q	2008	2007	2006	2005
Sales	26,900	30,982	22,553	21,813	21,128
- Cost of sales	22,241	28,887	18,731	18,219	16,809
Gross profit	4,658	2,095	3,822	3,594	4,319
- SG&A	874	1,192	1,088	1,040	918
Operating profit	3,784	903	2,734	2,554	3,401
- Non-operating income	2,388	3,140	3,459	3,013	3,045
- Non-op expense	1,686	4,758	233	248	301
Recurring profit	4,486	-714	5,960	5,319	6,145
- Extraordinary income	-	-	-	-	7
- Extraordinary loss	-	-	-	-	-
Net profit before tax	4,486	-714	5,960	5,319	6,152
- Income tax, etc	-56	-262	1,326	1,503	1,038
Net profit	4,541	-453	4,634	3,816	5,114


HONAM PC
2009 GLOBAL CHEMICAL CAPACITY SHARES
MIXED XYLENES (104/159)
SB LATEX (52/55)
PEM (159/304)
TOLUENE (91/189)
POLYESTER BOTTLE RESIN..
LDPE (41/103)
BENZENE (28/243)
LLDPE (23/94)
PROPYLENE - PG/CG (27/215)
HDPE (18/126)
BUTADIENE (24/80)
ETHYLENE (18/148)
PC RESIN (12/26)
ETHYLBENZENE (20/89)
STYRENE (17/82)
POLYPROPYLENE (14/173)
MMA (11/37)
TEG (12/74)
DEG (9/84)
ETHYLENE OXIDE (7/80)
MEG (5/83)
Percent Share
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Numbers in parenthesis are Honam PC rank and total number of producers in 2009.

MITSUBISHI

Corporate Overview:

Japan's largest chemical company, Mitsubishi Chemical Corp is affiliated with the Mitsubishi conglomerate. Mitsubishi Chemical was born in 1994, following the merger of Mitsubishi Kasei and Mitsubishi Petrochemical. Their product lineup includes petrochemicals, specialty chemicals, plastics, and pharmaceutical chemicals. Petrochemical production comprises 43% of the company's product mix.

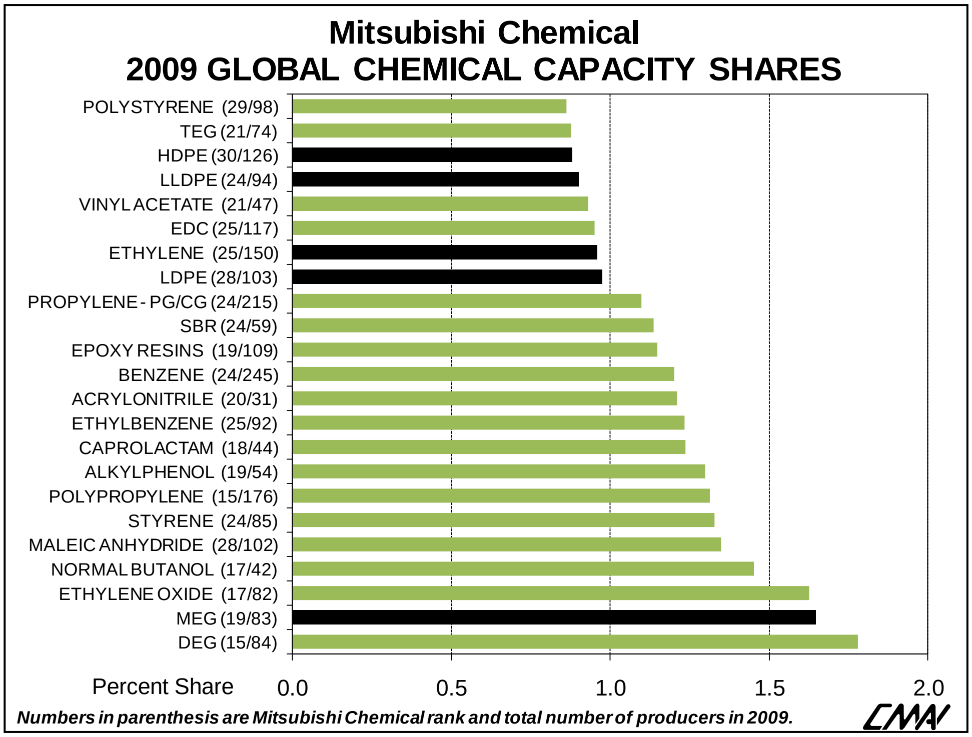
Mitsubishi Chemical Group is a diversified chemical and pharmaceutical company with 27.5 thousand employees worldwide, operations in Asia, West Europe and North America, and over U.S. $30 billion (3,175 billion Yen) in estimated sales for 2008. Mitsubishi Chemical's product range extends from basic chemicals and polymers to performance and functional products as well as pharmaceuticals and medical applications. Major industries utilizing Mitsubishi Chemical's products include information & electronics, automotive, packaging, health care, household goods and energy.

The company has a comprehensive portfolio, with production facilities in Japan, North America, Europe, and Asia. Similar to LG Chem and Mitsui Chemicals, Mitsubishi Chemical Corp lacks a domestic feedstock source, which is problematic for all these companies.

Changes in Mitsubishi Chemical's portfolio during the current decade involve a shift toward higher value-added products away from large volume commodities. The company's strategic directive encompasses the streamlining of the chemicals and polymers businesses, while giving greater weight to the performance and functional product segments. Health care, including pharmaceuticals and medical applications, gained in importance with the Mitsubishi Tanabe merger in 2007. Almost 60 percent of R&D expenditures are now earmarked for the health care segment to ensure steady progress in building a global, research-driven pharmaceutical company.

The restructuring of the chemicals and polymers segments ranges from closures and divestitures of inefficient production facilities, the set up of joint ventures – both in Japan and abroad, to focused investments in competitive product chains, such as C4 and C3 derivatives. The impact of the global financial crisis in late 2008 accelerated plans for the consolidation of less profitable product areas, such as ethylene derivatives and terephthalic acid.

Mitsubishi's new CEO has changed company's focus to move away from commodity chemicals into specialty chemicals, technology, and pharmaceuticals. There is no interest in basic chemicals except for certain sectors like polycarbonate and other high value add sectors.They will continue with their Middle East investments, but de-emphasize future investments in commodity chemicals.

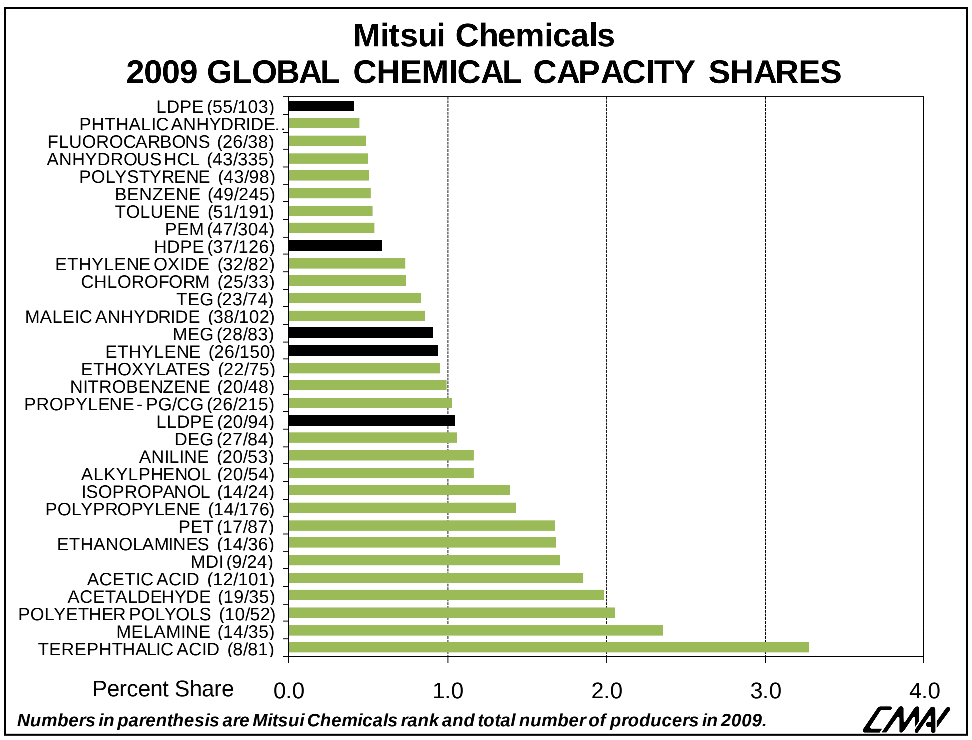


MITSUI

Corporate Overview:

Mitsui Chemicals produces petrochemicals (ethylene, polyethylene, and polypropylene), phenol-based chemicals, fine chemicals, performance polymers, and other derivative chemicals. Mitsui's petrochemical production accounts for 33% of all sales. Despite having facilities in Asia, Europe, and North America, Asia accounts for 94% of all sales (84% in Japan alone).

Mitsui Chemicals is clearly focused on serving the domestic market with its chemical products. The company does have manufacturing plants overseas, which demonstrates a willingness to explore overseas opportunities to serve that purpose. Alaska's location can be a strategic advantage in this respect. However, this project is too big for Mitsui's appetite as a relatively small chemical company. They suggest to pass on to their "sister" company Mitsui Corp. (a separate Japanese Trading Company) which has larger appetite for such ventures.



SUMITOMO

Corporate Overview:

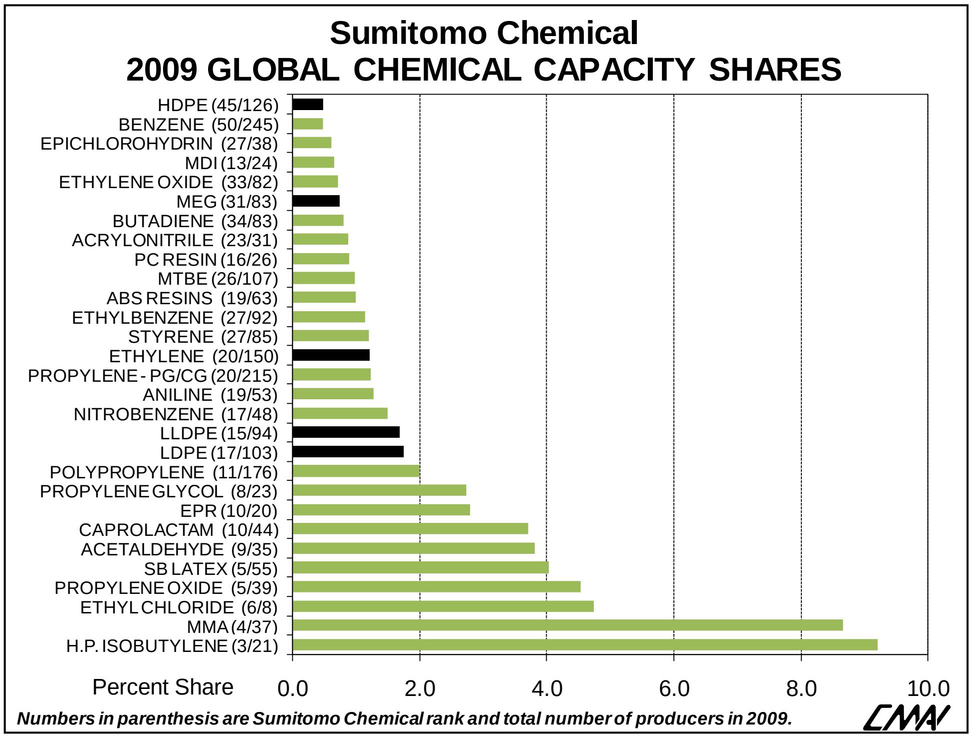
Sumitomo Chemical is one of the largest chemical companies in Japan. The company produces petrochemicals, agricultural chemicals, pharmaceuticals, and base chemicals. The petrochemical division accounts for 30% of revenues, which includes olefins and polyolefins. The company is a part of the much larger Sumitomo Group, and almost all of Sumitomo Chemical's sales are to Japan and other parts of Asia. The company's North American operations include polypropylene production in Houston, Texas.

The company's strategic location and extensive marketing network in the rapidly growing Asian market continues to make Sumitomo an attractive partner for non-Asian companies. Sumitomo Chemical's most significant investment project at over US $10 billion, by far, has been the Petro-Rabigh joint venture with Saudi Aramco in Saudi Arabia. The integrated oil refining & petrochemical complex commenced operations in 2009 and includes a 1.3 million metric ton ethane-based steam cracker, a high severity (HS) FCC unit that produces 800 thousand metric tons of propylene as well as polyolefins, MEG and propylene oxide derivative units. Sumitomo originally planned to invest in Shell's second Singapore complex at Palau Bukom, but in 2005 decided in favor of the Middle Eastern project. If Phase II of the joint venture will be realized by the middle of the next decade as planned, as much as 50 percent of Sumitomo's capacity for petrochemicals and plastics could be based on Petro-Rabigh's feedstock-cost advantaged production. So far Sumitomo is the only major Asian chemical producer with a significant asset base in the Middle East.

Sales of Sumitomo Chemical by 2008 reached over U.S. $17 billion (1.79 trillion Yen), making Sumitomo Chemical one of the top twenty global chemical companies on a total sales basis. Within the Asia Pacific region, Sumitomo Chemical ranked in fifth position behind SINOPEC (chemicals business only), Formosa, Mitsubishi Chemical, and PetroChina (chemicals business only).Earnings were negative in 2008Sumitomo's earnings estimates for 2009 suggest only moderate improvements with a small profit projected to be concentrated again in the Pharmaceutical and Agricultural Chemicals divisions.

Solid profits during the ten years prior to the recent recession enabled Sumitomo to pursue a growth strategy characterized by the shift of capital investments toward IT-related chemicals and life sciences (pharmaceuticals), and the Middle East for petrochemical and plastics production, but it put the company into debt, and the company's debt is now bigger than its equity. However, the shift of assets in the petrochemical and plastics business segment toward the Middle East, where low feedstock cost provide longer term advantages, will improve Sumitomo's earnings profile.

They reported some interest in the project, but scheduling conflicts of key managers did not allow availability for the trade mission to meet with them. They may be only interested in understanding the competition for Petro-Rabigh.

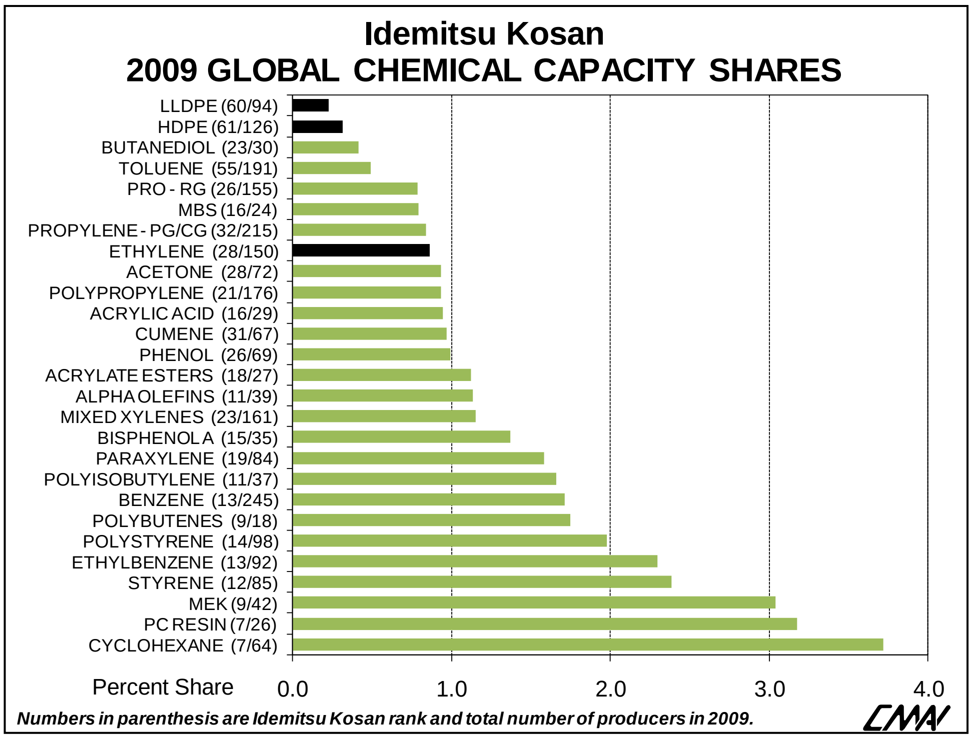


IDEMITSU KOSAN

Corporate Overview:

Idemitsu Kosan is the 2nd largest Japanese petroleum company, behind Nippon. Idemitsu Kosan owns and operates oil rigs and refineries, and produces and sells petroleum, oil and petrochemical products in Japan. As a part of the refining process, the company produces a large volume of base petrochemicals, including ethylene. Idemitsu Kosan is not higher on this list because their petrochemical operations are oil based, not natural gas. Oil refining and sales is their core business, not petrochemicals.

This project is very large for Idemitsu, and they are reported to have no interest in the Alaskan project as all resources already fully constrained with their Vietnam project



ITOCHU

ITOCHU Corporation is one of Japan's leading trading companies and is engaged in a wide variety of businesses, including textiles, machinery, aerospace, information technology, multimedia, metals, energy, chemicals, forest products, food, retail, financial services and so forth. Itochu maintains over 130 offices around the world and owns over 640 subsidiaries and affiliates. Itochu aims to build new profit-making strategies and adding new functions in order to become more global, and to foster businesses in new fields.

ITOCHU Corporation, together with its subsidiaries, operates as a general trading company worldwide. It operates in seven segments: Textile; Machinery; Aerospace, Electronics, and Multimedia; Energy, Metals, and Minerals; Chemicals, Forest products, and General merchandise; Food; and Finance, Realty, Insurance and Logistics Services. The Textile segment engages in the production and sale of textile materials, textiles, apparel, fashion goods, and industrial materials and products. The Machinery segment involves in the infrastructure related projects, such as automobiles, ships, construction and industrial machinery, plants, railways, highways, and bridges. The Aerospace, Electronics, and Multimedia segment engages in the provision of IT-related systems and Internet services, mobile phone sales/content distribution, and video distribution operations. The Energy, Metals, and Minerals segment involves in the development of metal and mineral, and energy resources; processing of steel products; and trade of greenhouse gas emissions, iron ore, coal, pig iron and ferrous raw materials, non-ferrous and light metals, steel products, crude oil, oil products, gas, and nuclear products. The Chemicals, Forest products, and General merchandise segment offers lumber, pulp, paper, rubber, glass and cement, chemicals, plastics, and inorganic chemicals. The Food segment engages in the production, distribution, and retail of various food products, such as wheat, barley, wheat flour, rice, palm oil, coconut oil, corn, soybean meal, sweeteners, dairy products, liquor, soft drinks, beef, processed foods, frozen foods, canned foods, and pet foods. The Finance, Realty, Insurance and Logistics Services segment engages in the structuring and sale of financial products, agency and consultancy services of insurance and reinsurance, warehousing, trucking, international intermodal transport, and real estate development operations. ITOCHU was founded in 1858 and is headquartered in Tokyo, Japan.

ITOCHU doesn't make any chemicals of interest to this project, but it distributes a variety of chemical products, from specialty chemicals like adhesives and acids to plastic resins and ion exchange filters. The company ranks among the top 10 chemical distributors in the US.

ITOCHU Corporation Income Statement

All amounts in millions of US Dollars except per share amounts. Fiscal Years ending:

	Mar 1, 2009	Mar 1, 2008	Mar 1, 2007
Revenue	35,144.5	28,815.2	22,458.9
Cost of Goods Sold	24,243.4	18,785.5	14,749.7
Gross Profit	10,901.1	10,029.8	7,709.2
Gross Profit Margin	31%	34.8%	34.3%
SG&A Expense	7,895.5	7,285.4	5,422.3
Depreciation & Amortization	668.0	720.8	478.4
Operating Income	2,610.5	3,350.5	2,931.8
Operating Margin	7.4%	11.6%	13.1%
Nonoperating Income	(390.1)	232.2	339.9
Nonoperating Expenses	--	(323.8)	--
Income Before Taxes	2,140.7	2,847.1	2,547.2
Income Taxes	747.9	1,228.7	754.4
Net Income After Taxes	1,392.8	1,618.5	1,792.7
Continuing Operations	1,700.0	2,201.4	1,502.2
Discontinued Operations	--	--	--
Total Operations	1,700.0	2,201.4	1,502.2
Total Net Income	1,700.0	2,201.4	1,502.2
Net Profit Margin	4.8%	7.6%	6.7%
Diluted EPS from Total Net Income	1.07	1.29	0.95

They have expressed interest in the Alaskan project, and have agreed to receive the delegation and have a meeting with them.

APPENDIX

TOP LISTS

World
ETHYLENE PRODUCERS BY SHAREHOLDER
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Dow	10,041	7.55%
2	SABIC	8,934	6.72%
3	Exxon Mobil Corp.	8,159	6.14%
4	Access Industries	6,530	4.91%
5	Royal Dutch/Shell	6,240	4.69%
6	SINOPEC	5,442	4.09%
7	Ineos	4,951	3.72%
8	Abu Dhabi Gov't	4,443	3.34%
9	Formosa Group	4,126	3.10%
10	NPC-Iran	4,030	3.03%
	Totals	**62,896**	**47.31%**

North America
ETHYLENE PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Dow	5,366	16.03%
2	Access Industries	4,467	13.34%
3	Exxon Mobil Corp.	4,197	12.54%
4	Abu Dhabi Gov't	3,010	8.99%
5	Royal Dutch/Shell	2,632	7.86%
6	Ineos	1,746	5.22%
7	Chevron Corp.	1,706	5.10%
8	ConocoPhillips	1,706	5.10%
9	Formosa Group	1,495	4.47%
10	PEMEX	1,382	4.13%
	Totals	**27,707**	**82.77%**

Northeast Asia
ETHYLENE PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	SINOPEC	5,442	18.05%
2	CNPC	2,676	8.88%
3	Formosa Group	2,631	8.73%
4	LG Group	1,620	5.37%
5	Mitsub. Chemical	1,275	4.23%
6	Mitsui Chemicals	1,245	4.13%
7	CPC-Taiwan	1,115	3.70%
8	Idemitsu Kosan	1,101	3.65%
9	Daelim	900	2.99%
10	SK Holdings	860	2.85%
	Totals	**18,865**	**62.58%**

World
HIGH DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDER
2009 Average Annual Capacities

RANK	OWNER		CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Access Industries		2,714	7.23%
2	Exxon Mobil Corp.		2,484	6.62%
3	Dow		2,085	5.56%
4	Ineos		2,056	5.48%
5	SABIC		1,995	5.32%
6	NPC-Iran		1,472	3.92%
7	Total		1,433	3.82%
8	Abu Dhabi Gov't		1,420	3.78%
9	SINOPEC		1,324	3.53%
10	Formosa Group		1,301	3.47%
		Totals	**18,284**	**48.73%**

North America
HIGH DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Exxon Mobil Corp.	1,651	17.69%
2	Dow	1,430	15.32%
3	Access Industries	1,364	14.61%
4	Ineos	926	9.92%
5	Chevron Corp.	869	9.30%
6	ConocoPhillips	869	9.30%
7	Formosa Group	766	8.21%
8	Abu Dhabi Gov't	515	5.52%
9	Total	440	4.71%
10	PEMEX	250	2.68%
	Totals	**9,079**	**97.27%**

Northeast Asia
HIGH DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	SINOPEC	1,324	17.41%
2	CNPC	923	12.13%
3	Formosa Group	535	7.03%
4	LG Group	520	6.83%
5	Daelim	380	4.99%
6	Mitsub. Chemical	330	4.34%
7	Jilin Petrochemica	300	3.94%
8	Lee Family	225	2.96%
9	Mitsui Chemicals	220	2.89%
10	Minority Sharehold	196	2.58%
	Totals	**4,953**	**65.10%**

World
LINEAR LOW DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDER
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Dow	4,475	18.64%
2	Exxon Mobil Corp.	3,160	13.16%
3	Abu Dhabi Gov't	1,628	6.78%
4	SABIC	1,536	6.40%
5	SINOPEC	1,346	5.61%
6	CNPC	675	2.81%
7	Formosa Group	548	2.28%
8	Ente Nazionale Idr	530	2.21%
9	Access Industries	512	2.13%
10	Ineos	500	2.08%
	Totals	**14,910**	**62.11%**

North America
LINEAR LOW DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Dow	2,375	34.70%
2	Exxon Mobil Corp.	1,610	23.52%
3	Abu Dhabi Gov't	1,000	14.61%
4	Access Industries	512	7.48%
5	Westlake	415	6.06%
6	Formosa Group	284	4.15%
7	PEMEX	250	3.65%
8	Chevron Corp.	147	2.14%
9	ConocoPhillips	147	2.14%
10	Koch Industries	75	1.10%
	Totals	**6,814**	**99.56%**

Northeast Asia
LINEAR LOW DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	SINOPEC	1,346	27.15%
2	CNPC	675	13.62%
3	Hanwha Group	339	6.83%
4	Formosa Group	264	5.33%
5	Sumitomo Chem.	264	5.33%
6	Mitsui Chemicals	251	5.06%
7	Mitsub. Chemical	216	4.36%
8	SK Holdings	170	3.43%
9	BP	169	3.41%
10	Minority Sharehold	103	2.07%
	Totals	**3,796**	**76.58%**

World
LOW DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDER
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Access Industries	1,785	8.38%
2	Exxon Mobil Corp.	1,509	7.08%
3	Dow	1,496	7.02%
4	SINOPEC	1,231	5.78%
5	Ente Nazionale Idr	837	3.93%
6	SABIC	745	3.50%
7	Westlake	692	3.25%
8	Ineos	530	2.49%
9	DuPont	515	2.42%
10	Abu Dhabi Gov't	508	2.39%
	Totals	**9,847**	**46.23%**

North America
LOW DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Westlake	692	17.04%
2	Dow	679	16.72%
3	Exxon Mobil Corp.	666	16.40%
4	Access Industries	649	15.99%
5	PEMEX	381	9.38%
6	DuPont	347	8.55%
7	Chevron Corp.	141	3.46%
8	ConocoPhillips	141	3.46%
9	Blackstone Group	136	3.34%
10	Abu Dhabi Gov't	125	3.08%
	Totals	**3,956**	**97.43%**

Northeast Asia
LOW DENSITY POLYETHYLENE PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	SINOPEC	1,231	24.01%
2	CNPC	455	8.86%
3	Hanwha Group	359	7.00%
4	LG Group	335	6.53%
5	BASF SE	261	5.09%
6	Formosa Group	240	4.68%
7	Mitsub. Chemical	207	4.04%
8	Sumitomo Chem.	182	3.55%
9	TOSOH	152	2.96%
10	USI Corporation	140	2.73%
	Totals	**3,561**	**69.46%**

World
MONOETHYLENE GLYCOL PRODUCERS BY SHAREHOLDER
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	SABIC	2,524	11.45%
2	Formosa Group	1,928	8.75%
3	Dow	1,859	8.43%
4	Royal Dutch/Shell	1,361	6.18%
5	SINOPEC	1,106	5.02%
6	Kuwait Government	909	4.12%
7	Reliance Industries	740	3.36%
8	Japanese MEG Conso	700	3.18%
9	Minority Sharehold	582	2.64%
10	BASF SE	527	2.39%
	Totals	**12,234**	**55.52%**

North America
MONOETHYLENE GLYCOL PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Dow	1,140	27.30%
2	Royal Dutch/Shell	830	19.88%
3	Kuwait Government	456	10.93%
4	Huntsman Group	365	8.74%
5	Old World	315	7.54%
6	Formosa Group	300	7.18%
7	Access Industries	250	5.99%
8	Grupo IDESA	200	4.79%
9	PEMEX	125	2.99%
10	Eastman	105	2.51%
	Totals	**4,087**	**97.86%**

Northeast Asia
MONOETHYLENE GLYCOL PRODUCERS BY SHAREHOLDERS
2009 Average Annual Capacities

RANK	OWNER	CAPACITY (-000- Metric Tons)	SHARE % OF TOTAL
1	Formosa Group	1,628	23.30%
2	SINOPEC	1,106	15.83%
3	Minority Sharehold	461	6.60%
4	CNPC	401	5.73%
5	Lotte Mulsan Co.	363	5.20%
6	Mitsub. Chemical	350	5.01%
7	China Man-Made	323	4.62%
8	Shanghai PC	268	3.84%
9	OUCC	230	3.29%
10	Nippon Shokubai	210	3.01%
	Totals	**5,339**	**76.45%**

NET TRADE TABLES

Global High Density Polyethylene Net Trade Table
(-000- Metric Tons)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2027	2015	2020	2025
North America	**48**	**253**	**624**	**997**	**1,127**	**815**	**615**	**455**	**280**	**180**	**28**	**-659**	**-993**
CAN	874	964	1,114	898	992	950	950	940	925	925	925	925	1,231
USA	-279	-204	140	656	802	500	300	200	100	50	-37	-504	-909
South America	**-339**	**-282**	**-357**	**-493**	**-315**	**-457**	**-535**	**-539**	**-685**	**-741**	**-532**	**-449**	**-470**
West Europe	**-67**	**-349**	**-348**	**-267**	**-533**	**-1,452**	**-1,825**	**-2,020**	**-1,795**	**-1,890**	**-1,798**	**-2,457**	**-2,860**
Central Europe	**121**	**285**	**289**	**300**	**253**	**167**	**127**	**107**	**82**	**49**	**24**	**-115**	**-310**
CIS & Baltic States	**-158**	**-254**	**-373**	**-341**	**-238**	**-345**	**-360**	**-390**	**-395**	**-465**	**-545**	**-139**	**993**
Africa	**-341**	**-399**	**-452**	**-478**	**-502**	**-615**	**-669**	**-739**	**-837**	**-800**	**-762**	**-87**	**114**
Middle East	**1,663**	**1,757**	**1,725**	**1,533**	**2,508**	**3,829**	**4,934**	**5,500**	**5,539**	**5,778**	**6,387**	**8,750**	**10,548**
Northeast Asia	**-1,101**	**-1,061**	**-976**	**-990**	**-1,627**	**-1,681**	**-2,236**	**-2,206**	**-1,988**	**-2,111**	**-2,833**	**-3,762**	**-5,733**
China	-2,595	-2,498	-2,457	-2,487	-2,839	-2,423	-2,954	-2,868	-2,650	-2,773	-3,504	-4,452	-6,492
Japan	126	152	167	112	128	90	65	10	10	10	-10	-110	-190
Korea South	1,192	1,127	1,120	1,195	890	540	540	540	540	540	590	690	840
North Korea	-7	-7	-7	-1	-6	-7	-8	-8	-8	-8	-9	-10	-11
Southeast Asia	**261**	**323**	**239**	**143**	**-138**	**108**	**328**	**395**	**337**	**513**	**468**	**83**	**338**
Indian Subcontinent	**-87**	**-273**	**-372**	**-404**	**-535**	**-370**	**-377**	**-561**	**-537**	**-512**	**-437**	**-1,164**	**-1,623**

Global Low Density Polyethylene Net Trade Table

(-000- Metric Tons)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2027	2015	2020	2025
North America	**505**	**493**	**582**	**615**	**491**	**582**	**525**	**445**	**415**	**370**	**257**	**-191**	**-343**
CAN	132	74	32	80	2	-5	-5	-5	-10	-10	-20	-30	-40
USA	579	610	743	704	704	822	765	690	665	630	562	228	147
South America	**-210**	**-213**	**-301**	**-368**	**-348**	**-394**	**-446**	**-480**	**-517**	**-582**	**-464**	**-353**	**-450**
West Europe	**168**	**138**	**337**	**411**	**560**	**623**	**585**	**635**	**920**	**875**	**850**	**548**	**490**
Central Europe	**15**	**-12**	**22**	**-18**	**-22**	**-108**	**-118**	**-124**	**-136**	**-143**	**-149**	**-177**	**-191**
CIS & Baltic States	**93**	**71**	**26**	**16**	**7**	**-45**	**-55**	**-80**	**-110**	**-140**	**-135**	**126**	**784**
Africa	**-471**	**-486**	**-501**	**-422**	**-375**	**-455**	**-468**	**-485**	**-504**	**-519**	**-528**	**-567**	**-319**
Middle East	**273**	**363**	**316**	**258**	**784**	**1,051**	**1,441**	**1,761**	**1,925**	**2,217**	**2,563**	**2,588**	**2,769**
Northeast Asia	**-260**	**-207**	**-111**	**-218**	**-661**	**-976**	**-1,202**	**-1,370**	**-1,621**	**-1,865**	**-2,137**	**-1,837**	**-2,667**
China	-1,074	-908	-891	-914	-1,342	-1,651	-1,897	-2,100	-2,356	-2,620	-2,851	-2,605	-3,350
Japan	223	184	171	157	208	206	210	245	240	250	240	210	180
Korea South	394	340	385	383	308	310	310	310	310	310	290	215	160
North Korea	-3	-3	-4	-2	-4	-6	-5	-5	-5	-5	-5	-7	-7
Southeast Asia	**-9**	**-2**	**-216**	**-101**	**-204**	**-46**	**-10**	**-28**	**-70**	**108**	**89**	**26**	**175**
Indian Subcontinent	**-103**	**-144**	**-154**	**-173**	**-218**	**-232**	**-251**	**-271**	**-298**	**-318**	**-343**	**-160**	**-244**

Global LLDPE Net Trade Table

(-000- Metric Tons)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2027	2015	2020	2025
North America	**816**	**896**	**1,101**	**1,496**	**1,297**	**1,111**	**836**	**655**	**625**	**495**	**285**	**-159**	**-112**
CAN	755	906	958	1,168	999	865	860	850	840	835	825	880	1,272
USA	443	380	502	536	565	450	200	50	50	-50	-230	-569	-739
South America	**-88**	**-41**	**-76**	**-165**	**-159**	**-307**	**-340**	**-352**	**-490**	**-623**	**-379**	**-843**	**-887**
West Europe	**-423**	**-476**	**-398**	**-520**	**-636**	**-1,098**	**-1,365**	**-1,305**	**-1,289**	**-1,260**	**-1,615**	**-1,866**	**-2,407**
Central Europe	**-187**	**-219**	**-283**	**-334**	**-328**	**-295**	**-314**	**-342**	**-374**	**-408**	**-442**	**-575**	**-679**
CIS & Baltic States	**-33**	**-84**	**-108**	**-113**	**-80**	**-18**	**-20**	**-35**	**-26**	**-35**	**-65**	**381**	**1,097**
Africa	**-93**	**-142**	**-163**	**-202**	**-167**	**-266**	**-294**	**-325**	**-352**	**-199**	**-75**	**829**	**1,239**
Middle East	**1,569**	**1,586**	**1,608**	**1,475**	**2,125**	**3,130**	**3,411**	**3,407**	**3,464**	**3,759**	**4,483**	**6,144**	**8,003**
Northeast Asia	**-1,636**	**-1,598**	**-1,463**	**-1,330**	**-1,394**	**-1,777**	**-1,925**	**-1,675**	**-1,731**	**-2,087**	**-2,653**	**-3,585**	**-5,165**
China	-2,019	-1,982	-1,816	-1,611	-1,644	-1,810	-1,927	-1,552	-1,562	-1,888	-2,428	-3,633	-5,076
Japan	-23	-58	-65	-144	-55	-170	-200	-325	-400	-425	-425	-450	-535
Korea South	361	368	310	305	190	150	150	150	170	170	150	150	150
North Korea	-6	-6	-7	-1	0	-8	-8	-8	-9	-9	-10	-12	-14
Southeast Asia	**273**	**269**	**34**	**-20**	**-183**	**-7**	**665**	**743**	**862**	**1,015**	**955**	**789**	**736**
Indian Subcontinent	**-199**	**-193**	**-252**	**-287**	**-475**	**-471**	**-653**	**-770**	**-689**	**-657**	**-495**	**-1,115**	**-1,826**

Global MEG Net Trade Table
(-000- Metric Tons)

	2005	2006	2007	2008	2009	2010	2015	2020	2025
North America	**1,219**	**1,311**	**1,381**	**1,127**	**435**	**332**	**158**	**236**	**90**
CAN	1,132	1,153	1,321	1,316	1,110	1,143	1,143	1,143	1,143
USA	202	244	228	-32	-496	-645	-770	-763	-827
South America	**-17**	**-33**	**-78**	**-112**	**-156**	**-127**	**-297**	**-247**	**469**
West Europe	**-336**	**-388**	**-295**	**-322**	**-195**	**-687**	**-848**	**-1,395**	**-1,424**
Central Europe	**70**	**76**	**88**	**63**	**37**	**26**	**-33**	**-148**	**-204**
CIS & Baltic States	**133**	**-3**	**-98**	**-178**	**-162**	**-216**	**-283**	**-239**	**-315**
Africa	**-78**	**-84**	**-83**	**-70**	**-61**	**-76**	**299**	**1,272**	**1,324**
Middle East	**3,198**	**3,597**	**3,928**	**4,332**	**5,041**	**5,829**	**7,968**	**9,528**	**11,970**
Northeast Asia	**-3,503**	**-3,696**	**-3,981**	**-3,894**	**-4,195**	**-4,666**	**-7,016**	**-9,057**	**-11,745**
China	-3,833	-3,978	-4,807	-5,097	-5,339	-5,398	-7,414	-9,650	-12,270
Japan	220	144	154	25	86	135	0	0	0
Korea South	-331	-270	-241	-15	47	-46	-230	-220	-267
KON	0	0	0	0	0	0	0	0	0
Southeast Asia	**-504**	**-512**	**-405**	**-418**	**-195**	**-68**	**107**	**-3**	**-111**
Indian Subcontinent	**-182**	**-267**	**-456**	**-527**	**-549**	**-347**	**40**	**89**	**354**

PETROCHEMICAL PRICE TABLES

PETROCHEMICAL PRICE FORECAST
CURRENT U.S. DOLLARS

Product, Grade	Indexes, GDP Deflator, Percent Change from Last Yr		Crude Oil, WTI	Natural Gas			Ethane, Purity		
Origin	North America	North America	North America	North America	North America	North America	North America	North America	North America
Delivery Basis	Index United States	Deflator 2009=1.00 United States	Spot, Avg. 1st Month US$ / Barrel FOB Cushing, OK	Contract Alberta US$ / MMbtu AECO- NIT	Contract Pipeline US$ / MMbtu Chicago City Gate	Contract Pipeline US$ / MMbtu Henry Hub	Spot Pipeline ($/TON) Alberta	Spot Pipeline $/MMBTU Alberta	Spot Average US$ / Metric Ton FOB Mont Belvieu, TX
2000	2.14	0.80	30.30	3.40	4.38	4.23	196.98	4.01	297.29
2001	2.44	0.82	25.89	4.05	4.01	4.06	228.86	4.66	248.36
2002	1.70	0.84	26.09	2.57	3.34	3.34	156.28	3.18	193.79
2003	2.10	0.85	31.11	4.80	5.56	5.62	265.63	5.40	295.76
2004	2.80	0.87	41.42	5.03	5.83	5.85	277.21	5.64	372.54
2005	3.20	0.89	56.37	7.23	8.40	8.80	385.56	7.84	462.81
2006	3.20	0.92	66.01	5.83	6.62	6.76	316.65	6.44	486.52
2007	2.70	0.95	72.26	6.17	6.78	6.94	333.09	6.78	589.01
2008	2.17	0.98	99.54	7.99	8.76	8.85	422.74	8.60	662.77
2009	1.00	1.00	62.00	3.31	3.62	3.82	192.60	3.92	354.18
2010	2.00	1.02	78.86	3.84	4.49	4.64	218.81	4.45	531.76
2011	3.50	1.06	80.53	4.91	5.89	5.99	271.54	5.52	583.09
2012	3.00	1.09	79.04	6.28	7.20	7.28	338.93	6.89	560.18
2013	2.50	1.11	81.39	6.64	7.58	7.65	356.31	7.25	567.55
2014	2.00	1.14	84.32	7.04	8.00	8.07	376.15	7.65	572.74
2015	2.00	1.16	87.16	7.45	8.43	8.51	396.46	8.06	592.52
2016	2.00	1.18	90.34	7.79	8.79	8.87	413.21	8.40	628.82
2017	2.00	1.21	93.56	8.14	9.16	9.23	430.05	8.75	668.12
2018	2.00	1.23	97.18	8.60	9.64	9.72	452.99	9.21	707.26
2019	2.00	1.26	101.14	9.18	10.24	10.32	481.12	9.79	740.75
2020	2.00	1.28	105.42	9.79	10.87	10.95	511.08	10.40	776.39
2021	2.00	1.31	109.99	10.45	11.56	11.64	543.80	11.06	814.47
2022	2.00	1.33	114.78	11.14	12.27	12.35	577.56	11.75	853.56
2023	2.00	1.36	119.73	11.86	13.01	13.09	613.05	12.47	894.59
2024	2.00	1.39	124.73	12.58	13.75	13.84	648.30	13.19	936.23
2025	2.00	1.41	129.73	13.29	14.49	14.57	683.38	13.90	977.67
2026	2.00	1.44	134.65	13.97	15.20	15.28	716.97	14.58	1,017.27
2027	2.00	1.47	139.44	14.65	15.90	15.99	750.24	15.26	1,055.27
2028	2.00	1.50	144.08	15.29	16.56	16.65	781.56	15.90	1,092.81
2029	2.00	1.53	148.56	15.91	17.22	17.30	812.30	16.52	1,128.53
2030	2.00	1.56	152.89	16.51	17.84	17.93	841.56	17.12	1,163.26

The prices presented herein are strictly the opinion of CMAI and are based on information collected within the public sector and on assessments by CMAI staff. **CMAI MAKES NO GUARANTEE OR WARRANTY AND ASSUMES NO LIABILITY AS TO THEIR USE**.

PETROCHEMICAL PRICE FORECAST
CONSTANT 2009 DOLLARS

Product, Grade	Indexes, GDP Deflator, Percent Change from Last Yr		Crude Oil, WTI	Natural Gas			Ethane, Purity		
Origin	North America	North America	North America	North America	North America	North America	North America	North America	North America
Delivery Basis	Index United States	Deflator 2009=1.00 United States	Spot, Avg. 1st Month US$ / Barrel FOB Cushing, OK	Contract Alberta US$ / MMbtu AECO- NIT	Contract Pipeline US$ / MMbtu Chicago City Gate	Contract Pipeline US$ / MMbtu Henry Hub	Spot Pipeline ($/TON) Alberta	Spot Pipeline $/MMBTU Alberta	Spot Average US$ / Metric Ton FOB Mont Belvieu, TX
2000	2.14	0.80	37.82	4.24	5.46	5.28	245.85	5.00	371.07
2001	2.44	0.82	31.64	4.95	4.90	4.96	279.65	5.69	303.48
2002	1.70	0.84	31.12	3.07	3.99	3.98	186.41	3.79	231.16
2003	2.10	0.85	36.49	5.63	6.52	6.59	311.56	6.34	346.90
2004	2.80	0.87	47.59	5.78	6.70	6.72	318.45	6.48	427.97
2005	3.20	0.89	63.00	8.08	9.39	9.84	430.86	8.76	517.18
2006	3.20	0.92	71.48	6.32	7.17	7.32	342.88	6.97	526.83
2007	2.70	0.95	75.82	6.47	7.11	7.28	349.50	7.11	618.03
2008	2.17	0.98	101.70	8.16	8.95	9.04	431.91	8.79	677.14
2009	1.00	1.00	62.00	3.31	3.62	3.82	192.60	3.92	354.18
2010	2.00	1.02	77.31	3.77	4.40	4.55	214.52	4.36	521.34
2011	3.50	1.06	76.28	4.65	5.58	5.67	257.21	5.23	552.32
2012	3.00	1.09	72.69	5.78	6.63	6.69	311.69	6.34	515.17
2013	2.50	1.11	73.02	5.96	6.80	6.86	319.69	6.50	509.22
2014	2.00	1.14	74.17	6.19	7.04	7.10	330.87	6.73	503.80
2015	2.00	1.16	75.17	6.43	7.27	7.34	341.90	6.95	510.98
2016	2.00	1.18	76.38	6.59	7.43	7.50	349.35	7.11	531.65
2017	2.00	1.21	77.55	6.75	7.59	7.65	356.47	7.25	553.80
2018	2.00	1.23	78.97	6.99	7.84	7.90	368.12	7.49	574.75
2019	2.00	1.26	80.58	7.31	8.16	8.22	383.31	7.80	590.16
2020	2.00	1.28	82.34	7.64	8.49	8.55	399.20	8.12	606.42
2021	2.00	1.31	84.23	8.00	8.85	8.91	416.42	8.47	623.69
2022	2.00	1.33	86.17	8.36	9.21	9.27	433.61	8.82	640.81
2023	2.00	1.36	88.12	8.73	9.58	9.64	451.23	9.18	658.44
2024	2.00	1.39	90.01	9.08	9.92	9.98	467.81	9.52	675.58
2025	2.00	1.41	91.78	9.40	10.25	10.31	483.45	9.83	691.65
2026	2.00	1.44	93.39	9.69	10.54	10.60	497.28	10.11	705.56
2027	2.00	1.47	94.82	9.96	10.81	10.87	510.15	10.38	717.56
2028	2.00	1.50	96.05	10.19	11.04	11.10	521.02	10.60	728.52
2029	2.00	1.53	97.10	10.40	11.25	11.31	530.90	10.80	737.58
2030	2.00	1.56	97.96	10.58	11.43	11.49	539.24	10.97	745.37

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PETROCHEMICAL PRICE FORECAST
CURRENT U.S. DOLLARS

Product, Grade	Propane	Propane, non-TET	Naphtha, 40 N+A, Full Range 56-60 API	Naphtha	Natural Gasoline (Light Naphtha), non-TET	Ethylene			
Origin	Northeast Asia	North America	North America	Northeast Asia	North America	North America	North America	North America	Northeast Asia
	Spot Average US$ / Metric Ton	Spot Average US$ / Metric Ton	Spot Average US$ / Metric Ton	Spot Average US$ / Metric Ton	Spot Average US$ / Metric Ton	Average Acquisition Contract Estimate Pipeline US$ / Metric Ton	Contract-Net Transaction Pipeline US$ / Metric Ton	Spot, Avg. Pipeline US$ / Metric Ton	Spot, Avg. US$ / Metric Ton
Delivery Basis	CIF Japan	FOB Mont Belvieu, TX	FOB US Gulf Coast	C&F Japan	FOB Mont Belvieu, TX	Delivered US Gulf Coast	Delivered US Gulf Coast	Delivered US Gulf Coast	CFR NE Asia
2000	328.65	302.15	298.81	271.26	289.27	648.92	665.51	599.15	592.53
2001	282.88	244.84	255.80	235.85	233.48	548.13	580.54	472.73	438.29
2002	274.08	213.71	255.97	236.70	227.92	449.25	490.06	372.88	419.18
2003	320.24	298.44	309.21	285.10	288.14	561.69	628.31	474.28	481.00
2004	381.63	385.51	417.19	388.67	393.18	720.77	744.05	697.20	917.95
2005	474.50	475.46	565.59	486.68	496.35	943.75	974.62	949.93	899.72
2006	548.03	527.24	640.20	582.75	565.91	993.80	1,060.05	903.37	1,148.00
2007	641.75	630.02	731.60	695.77	661.86	1,007.46	1,074.74	940.17	1,150.54
2008	761.08	737.09	901.96	825.30	824.85	1,172.08	1,289.69	1,054.46	1,189.25
2009	527.65	434.44	589.05	547.69	512.57	659.57	738.54	580.60	835.33
2010	609.58	586.83	708.66	662.71	656.01	809.73	866.22	753.24	982.50
2011	632.92	619.91	724.02	695.48	678.67	913.53	983.80	843.26	1,054.17
2012	630.93	598.14	708.98	700.32	657.71	961.51	1,022.13	900.88	1,104.72
2013	653.40	619.23	735.62	723.03	676.32	1,015.70	1,076.32	955.07	1,158.27
2014	687.06	641.77	765.15	752.47	700.87	1,114.92	1,170.03	1,059.80	1,240.07
2015	719.85	669.30	793.45	782.19	726.34	1,192.39	1,236.48	1,148.30	1,318.87
2016	751.48	699.88	822.96	811.50	753.69	1,255.43	1,288.50	1,222.36	1,385.15
2017	780.41	727.15	851.98	840.00	780.05	1,290.58	1,323.65	1,257.51	1,404.88
2018	811.19	756.16	885.23	870.82	809.68	1,325.73	1,369.82	1,281.64	1,410.39
2019	844.12	787.94	921.40	904.56	841.99	1,354.92	1,399.90	1,309.95	1,421.15
2020	879.60	822.14	960.40	941.09	876.83	1,405.55	1,451.43	1,359.68	1,476.91
2021	917.25	859.01	1,002.07	980.10	913.89	1,459.48	1,506.27	1,412.69	1,533.73
2022	956.32	897.21	1,045.78	1,021.03	952.64	1,514.31	1,562.04	1,466.59	1,590.95
2023	997.01	937.08	1,090.87	1,063.23	992.68	1,572.37	1,621.05	1,523.69	1,650.64
2024	1,038.07	977.31	1,136.47	1,105.98	1,033.11	1,631.08	1,680.73	1,581.43	1,711.53
2025	1,078.70	1,017.42	1,182.01	1,148.61	1,073.42	1,689.38	1,740.03	1,638.74	1,772.56
2026	1,121.79	1,057.56	1,226.64	1,190.59	1,113.70	1,747.70	1,799.36	1,696.04	1,832.69
2027	1,163.62	1,096.68	1,270.11	1,231.47	1,152.91	1,805.93	1,858.62	1,753.24	1,889.35
2028	1,204.33	1,134.44	1,312.07	1,271.06	1,190.75	1,861.50	1,915.25	1,807.75	1,946.46
2029	1,243.64	1,170.97	1,352.53	1,309.24	1,227.24	1,915.43	1,970.25	1,860.61	2,001.95
2030	1,281.68	1,206.30	1,391.70	1,346.06	1,262.55	1,967.98	2,023.90	1,912.06	2,055.61

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PETROCHEMICAL PRICE FORECAST
CONSTANT 2009 DOLLARS

Product, Grade	Propane	Propane, non-TET	Naphtha, 40 N+A, Full Range 56-60 API	Naphtha	Natural Gasoline (Light Naphtha), non-TET	Ethylene			
Origin	**Northeast Asia**	**North America**	**North America**	**Northeast Asia**	**North America**	**North America**	**North America**	**North America**	**Northeast Asia**
Delivery Basis	**Spot Average US$ / Metric Ton CIF Japan**	**Spot Average US$ / Metric Ton FOB Mont Belvieu, TX**	**Spot Average US$ / Metric Ton FOB US Gulf Coast**	**Spot Average US$ / Metric Ton C&F Japan**	**Spot Average US$ / Metric Ton FOB Mont Belvieu, TX**	**Average Acquisition Contract Estimate Pipeline US$ / Metric Ton Delivered US Gulf Coast**	**Contract-Net Transaction Pipeline US$ / Metric Ton Delivered US Gulf Coast**	**Spot, Avg. Pipeline US$ / Metric Ton Delivered US Gulf Coast**	**Spot, Avg. US$ / Metric Ton CFR NE Asia**
2000	410.20	377.13	372.96	338.58	361.06	809.95	830.66	747.82	739.57
2001	345.66	299.18	312.57	288.19	285.30	669.78	709.39	577.64	535.56
2002	326.93	254.92	305.33	282.34	271.87	535.88	584.57	444.78	500.02
2003	375.61	350.04	362.67	334.40	337.96	658.81	736.95	556.28	564.17
2004	438.41	442.87	479.26	446.49	451.68	828.00	854.75	800.94	1,054.52
2005	530.25	531.32	632.04	543.87	554.66	1,054.64	1,089.13	1,061.54	1,005.43
2006	593.42	570.91	693.23	631.03	612.79	1,076.12	1,147.86	978.21	1,243.10
2007	673.37	661.05	767.64	730.05	694.46	1,057.09	1,127.69	986.49	1,207.22
2008	777.58	753.07	921.51	843.19	842.73	1,197.49	1,317.65	1,077.32	1,215.03
2009	527.65	434.44	589.05	547.69	512.57	659.57	738.54	580.60	835.33
2010	597.63	575.32	694.77	649.71	643.14	793.85	849.24	738.47	963.24
2011	599.52	587.21	685.82	658.79	642.86	865.33	931.90	798.77	998.55
2012	580.23	550.08	652.01	644.05	604.86	884.25	940.00	828.49	1,015.96
2013	586.25	555.58	660.01	648.72	606.81	911.30	965.70	856.91	1,039.23
2014	604.36	564.52	673.05	661.89	616.50	980.71	1,029.19	932.23	1,090.80
2015	620.78	577.19	684.26	674.54	626.38	1,028.29	1,066.32	990.27	1,137.36
2016	635.35	591.73	695.79	686.10	637.22	1,061.43	1,089.39	1,033.47	1,171.10
2017	646.87	602.73	706.20	696.27	646.58	1,069.75	1,097.16	1,042.34	1,164.49
2018	659.21	614.48	719.37	707.66	657.98	1,077.34	1,113.17	1,041.51	1,146.14
2019	672.51	627.76	734.08	720.67	670.82	1,079.47	1,115.30	1,043.64	1,132.24
2020	687.04	642.16	750.15	735.07	684.88	1,097.85	1,133.68	1,062.02	1,153.59
2021	702.40	657.80	767.36	750.53	699.83	1,117.62	1,153.45	1,081.79	1,174.48
2022	717.96	673.58	785.13	766.54	715.20	1,136.88	1,172.71	1,101.04	1,194.41
2023	733.83	689.72	802.92	782.57	730.64	1,157.31	1,193.14	1,121.48	1,214.92
2024	749.07	705.23	820.08	798.08	745.49	1,176.99	1,212.82	1,141.16	1,235.04
2025	763.13	719.78	836.22	812.59	759.39	1,195.16	1,230.99	1,159.33	1,254.00
2026	778.05	733.50	850.77	825.77	772.44	1,212.17	1,248.00	1,176.34	1,271.12
2027	791.24	745.72	863.65	837.37	783.96	1,228.00	1,263.83	1,192.17	1,284.72
2028	802.86	756.27	874.69	847.35	793.81	1,240.96	1,276.79	1,205.13	1,297.60
2029	812.81	765.32	883.98	855.69	802.10	1,251.88	1,287.71	1,216.05	1,308.43
2030	821.25	772.95	891.74	862.50	808.99	1,261.00	1,296.83	1,225.17	1,317.15

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PETROCHEMICAL PRICE FORECAST
CURRENT U.S. DOLLARS

Product, Grade	Propylene, Polymer Grade					Propylene, Chemical Grade		Propylene, Refinery Grade	
Origin	North America	North America	North America	Northeast Asia	Northeast Asia	North America	North America	North America	North America
Delivery Basis	Contract-Benchmark Stream Value US$ / Metric Ton Delivered United States	Contract-Net Transaction US$ / Metric Ton Delivered US Gulf Coast	Spot US$ / Metric Ton Delivered US Gulf Coast	Spot US$ / Metric Ton CFR NE Asia	Spot Export US$ / Metric Ton FOB S. Korea	Contract-Benchmark Stream Value US$ / Metric Ton Delivered United States	Spot US$ / Metric Ton Delivered US Gulf Coast	Spot - Simple Average US$ / Metric Ton Delivered Texas	Alkylate Value, Conv Spot Netback US$ / Metric Ton FOB Texas
2000	531.86	486.43	529.33		445.94	498.79	487.65	425.94	292.45
2001	417.04	376.06	378.47		370.87	383.97	338.73	300.49	283.58
2002	429.90	389.57	399.01		452.92	396.83	371.15	334.08	300.41
2003	505.22	460.25	473.82	539.58	553.23	472.15	441.03	390.57	325.46
2004	737.62	688.02	720.86	838.68	819.79	704.55	684.92	617.00	475.13
2005	931.44	881.84	884.54	967.25	910.03	898.37	855.43	776.60	710.80
2006	1,043.51	993.91	998.39	1,111.85	1,082.66	1,010.44	959.84	885.34	952.07
2007	1,144.33	1,094.72	1,104.45	1,110.98	1,086.79	1,111.27	1,077.21	1,002.36	949.50
2008	1,355.83	1,306.68	1,312.53	1,226.67	1,190.42	1,321.84	1,286.23	1,139.11	1,158.31
2009	864.39	814.88	828.64	900.67	869.92	831.32	807.97	732.59	776.22
2010	1,083.93	1,034.32	1,048.77	986.25	947.92	1,050.86	1,026.73	951.65	958.68
2011	1,111.49	1,061.88	1,075.38	1,060.00	1,024.17	1,078.42	1,053.33	979.21	930.04
2012	1,150.54	1,100.93	1,106.71	1,088.37	1,056.39	1,117.51	1,073.64	1,001.77	878.61
2013	1,193.08	1,143.47	1,148.60	1,158.27	1,125.49	1,160.06	1,115.53	1,043.88	914.95
2014	1,283.48	1,233.88	1,238.99	1,240.07	1,206.63	1,250.45	1,205.92	1,134.05	953.20
2015	1,346.24	1,296.64	1,302.92	1,318.87	1,284.76	1,313.06	1,269.85	1,196.44	983.66
2016	1,390.48	1,340.88	1,347.01	1,385.15	1,350.36	1,357.37	1,313.94	1,240.31	1,013.15
2017	1,390.38	1,340.78	1,347.01	1,404.88	1,369.40	1,357.37	1,313.94	1,239.65	1,044.66
2018	1,401.12	1,351.52	1,358.03	1,410.39	1,374.20	1,367.95	1,324.96	1,250.01	1,083.30
2019	1,404.53	1,354.92	1,360.24	1,421.15	1,384.24	1,371.48	1,327.17	1,253.09	1,123.43
2020	1,455.16	1,405.55	1,410.94	1,476.91	1,439.25	1,422.19	1,377.88	1,303.36	1,166.92
2021	1,509.08	1,459.48	1,466.06	1,533.73	1,495.32	1,475.98	1,432.99	1,356.93	1,214.76
2022	1,563.92	1,514.31	1,518.97	1,590.95	1,551.77	1,530.87	1,485.90	1,411.38	1,265.83
2023	1,621.97	1,572.37	1,578.49	1,650.64	1,610.68	1,588.86	1,545.42	1,469.15	1,317.69
2024	1,680.68	1,631.08	1,635.81	1,711.53	1,670.77	1,647.72	1,602.74	1,527.35	1,370.54
2025	1,738.99	1,689.38	1,695.34	1,772.56	1,730.99	1,705.92	1,662.27	1,585.33	1,423.56
2026	1,797.30	1,747.70	1,752.66	1,832.69	1,790.29	1,764.34	1,719.59	1,643.31	1,474.33
2027	1,855.53	1,805.93	1,812.18	1,889.35	1,846.10	1,822.54	1,779.11	1,701.07	1,523.64
2028	1,911.10	1,861.50	1,867.30	1,946.46	1,902.34	1,878.10	1,834.23	1,756.18	1,571.60
2029	1,965.03	1,915.43	1,920.21	2,001.95	1,956.95	1,931.89	1,887.14	1,809.76	1,617.57
2030	2,017.58	1,967.98	1,973.12	2,055.61	2,009.71	1,984.58	1,940.05	1,862.01	1,662.35

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PETROCHEMICAL PRICE FORECAST
CONSTANT 2009 DOLLARS

Product, Grade	Propylene, Polymer Grade					Propylene, Chemical Grade		Propylene, Refinery Grade	
Origin	North America	North America	North America	Northeast Asia	Northeast Asia	North America	North America	North America	North America
Delivery Basis	Contract-Benchmark Stream Value US$ / Metric Ton Delivered United States	Contract-Net Transaction US$ / Metric Ton Delivered US Gulf Coast	Spot US$ / Metric Ton Delivered US Gulf Coast	Spot US$ / Metric Ton CFR NE Asia	Spot Export US$ / Metric Ton FOB S. Korea	Contract-Benchmark Stream Value US$ / Metric Ton Delivered United States	Spot US$ / Metric Ton Delivered US Gulf Coast	Spot - Simple Average US$ / Metric Ton Delivered Texas	Alkylate Value, Conv Spot Netback US$ / Metric Ton FOB Texas
2000	663.84	607.14	660.69	0.00	556.60	622.57	608.66	531.63	365.02
2001	509.59	459.53	462.46	0.00	453.18	469.19	413.90	367.18	346.52
2002	512.80	464.69	475.96	0.00	540.26	473.35	442.73	398.50	358.34
2003	592.58	539.84	555.74	632.88	648.89	553.79	517.29	458.10	381.73
2004	847.37	790.38	828.11	963.46	941.76	809.38	786.82	708.80	545.82
2005	1,040.88	985.45	988.46	1,080.89	1,016.95	1,003.93	955.94	867.85	794.31
2006	1,129.96	1,076.24	1,081.10	1,203.96	1,172.34	1,094.15	1,039.35	958.68	1,030.94
2007	1,200.70	1,148.65	1,158.86	1,165.71	1,140.33	1,166.01	1,130.28	1,051.74	996.28
2008	1,385.22	1,335.01	1,340.99	1,253.26	1,216.22	1,350.50	1,314.12	1,163.81	1,183.42
2009	864.39	814.88	828.64	900.67	869.92	831.32	807.97	732.59	776.22
2010	1,062.67	1,014.04	1,028.21	966.91	929.33	1,030.25	1,006.60	932.99	939.89
2011	1,052.84	1,005.86	1,018.64	1,004.07	970.13	1,021.52	997.76	927.55	880.97
2012	1,058.09	1,012.47	1,017.78	1,000.92	971.51	1,027.72	987.37	921.28	808.01
2013	1,070.45	1,025.95	1,030.54	1,039.23	1,009.81	1,040.83	1,000.87	936.59	820.91
2014	1,128.98	1,085.35	1,089.84	1,090.80	1,061.39	1,099.93	1,060.76	997.54	838.46
2015	1,160.97	1,118.19	1,123.61	1,137.36	1,107.95	1,132.35	1,095.09	1,031.78	848.29
2016	1,175.61	1,133.67	1,138.86	1,171.10	1,141.69	1,147.62	1,110.90	1,048.64	856.59
2017	1,152.48	1,111.36	1,116.53	1,164.49	1,135.08	1,125.11	1,089.12	1,027.53	865.91
2018	1,138.61	1,098.30	1,103.59	1,146.14	1,116.73	1,111.65	1,076.72	1,015.81	880.33
2019	1,118.99	1,079.47	1,083.71	1,132.24	1,102.83	1,092.67	1,057.36	998.35	895.04
2020	1,136.60	1,097.85	1,102.06	1,153.59	1,124.18	1,110.85	1,076.23	1,018.03	911.47
2021	1,155.61	1,117.62	1,122.66	1,174.48	1,145.07	1,130.26	1,097.34	1,039.09	930.23
2022	1,174.12	1,136.88	1,140.37	1,194.41	1,165.00	1,149.31	1,115.54	1,059.60	950.33
2023	1,193.82	1,157.31	1,161.82	1,214.92	1,185.51	1,169.45	1,137.48	1,081.34	969.87
2024	1,212.78	1,176.99	1,180.40	1,235.04	1,205.63	1,188.99	1,156.54	1,102.13	988.98
2025	1,230.25	1,195.16	1,199.37	1,254.00	1,224.59	1,206.85	1,175.97	1,121.54	1,007.10
2026	1,246.57	1,212.17	1,215.61	1,271.12	1,241.71	1,223.71	1,192.67	1,139.77	1,022.57
2027	1,261.73	1,228.00	1,232.25	1,284.72	1,255.31	1,239.29	1,209.76	1,156.69	1,036.05
2028	1,274.03	1,240.96	1,244.83	1,297.60	1,268.19	1,252.03	1,222.78	1,170.75	1,047.70
2029	1,284.30	1,251.88	1,255.00	1,308.43	1,279.02	1,262.64	1,233.39	1,182.81	1,057.20
2030	1,292.79	1,261.00	1,264.29	1,317.15	1,287.74	1,271.64	1,243.11	1,193.10	1,065.17

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PETROCHEMICAL PRICE FORECAST
CURRENT U.S. DOLLARS

Product, Grade	Pygas (Pyrolysis Gas)		Crude C4S		Polyethylene, Low Density		
Origin	North America	Northeast Asia	Northeast Asia	North America	North America	North America	Northeast Asia
	Estimate or Calculation	Estimate or Calculation	Contract-Market	Spot	Domestic Market (Contract)	Domestic Market (Contract)	Spot, avg.
				3rd party purchase	GP- Film	Extrusion Coating	GP-Film
	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton
Delivery Basis	FOB US Gulf Coast	CFR S. Korea	FOB S. Korea	Delivered US Gulf Coast	Delivered	Delivered	CFR China
2000	285.39	290.63	244.14	347.40	1,023.30	1,122.51	750.83
2001	222.60	225.01	212.26	304.02	942.47	1,071.07	622.08
2002	240.06	252.58	213.03	294.18	923.18	1,077.50	590.42
2003	311.60	337.04	256.59	407.79	1,150.07	1,304.39	687.29
2004	534.30	565.73	408.10	433.58	1,282.34	1,436.66	1,084.58
2005	619.25	598.64	526.68	630.63	1,549.65	1,703.97	1,134.79
2006	705.44	652.80	639.00	750.08	1,640.59	1,794.91	1,238.75
2007	763.98	758.35	715.70	840.96	1,681.01	1,835.33	1,443.75
2008	841.99	796.57	939.26	1,193.00	1,971.28	2,125.60	1,561.67
2009	529.18	538.63	574.24	683.10	1,559.75	1,714.08	1,170.09
2010	695.40	673.57	726.78	1,008.96	1,666.31	1,820.63	1,271.38
2011	691.18	683.64	765.79	1,062.82	1,684.68	1,839.00	1,362.28
2012	679.29	639.70	752.87	992.75	1,719.97	1,884.49	1,442.66
2013	707.01	664.02	776.63	1,000.62	1,791.55	1,960.18	1,508.13
2014	745.12	701.51	807.85	1,001.00	1,909.24	2,081.24	1,597.37
2015	788.50	745.26	839.22	998.96	1,998.97	2,174.41	1,683.83
2016	796.95	751.81	870.10	1,012.45	2,059.67	2,238.62	1,758.45
2017	814.22	767.16	900.00	1,024.27	2,095.12	2,277.65	1,784.38
2018	843.81	794.30	932.24	1,057.22	2,114.88	2,301.06	1,795.50
2019	875.52	823.79	967.52	1,092.35	2,099.16	2,289.06	1,812.70
2020	909.81	855.69	1,005.61	1,129.97	2,152.35	2,346.05	1,877.73
2021	946.44	889.84	1,046.33	1,170.20	2,225.11	2,422.69	1,944.00
2022	985.01	925.75	1,088.93	1,212.65	2,299.20	2,500.73	2,010.65
2023	1,024.66	962.71	1,132.90	1,255.91	2,377.43	2,582.99	2,079.70
2024	1,064.89	1,000.18	1,177.43	1,299.95	2,456.61	2,666.28	2,149.99
2025	1,105.08	1,037.56	1,221.80	1,343.99	2,535.32	2,749.18	2,221.12
2026	1,144.41	1,074.15	1,265.49	1,387.87	2,614.02	2,832.16	2,291.44
2027	1,182.66	1,109.81	1,308.15	1,430.27	2,694.32	2,916.82	2,358.39
2028	1,219.74	1,144.35	1,349.39	1,471.83	2,770.14	2,997.09	2,425.80
2029	1,255.39	1,177.65	1,388.32	1,510.88	2,844.23	3,075.72	2,491.48
2030	1,289.93	1,209.81	1,426.83	1,549.56	2,916.82	3,152.94	2,555.73

PETROCHEMICAL PRICE FORECAST
CONSTANT 2009 DOLLARS

Product, Grade	Pygas (Pyrolysis Gas)		Crude C4S		Polyethylene, Low Density		
Origin	North America	Northeast Asia	Northeast Asia	North America	North America	North America	Northeast Asia
	Estimate or Calculation	Estimate or Calculation	Contract-Market	Spot 3rd party purchase	Domestic Market (Contract) GP- Film	Domestic Market (Contract) Extrusion Coating	Spot, avg. GP-Film
	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton	US$ / Metric Ton
Delivery Basis	FOB US Gulf Coast	CFR S. Korea	FOB S. Korea	Delivered US Gulf Coast	Delivered	Delivered	CFR China
2000	356.22	362.74	304.72	433.61	1,277.23	1,401.06	937.15
2001	272.01	274.95	259.37	371.50	1,151.64	1,308.78	760.15
2002	286.35	301.29	254.11	350.91	1,101.21	1,285.29	704.28
2003	365.48	395.31	300.96	478.30	1,348.92	1,529.92	806.13
2004	613.80	649.90	468.82	498.09	1,473.13	1,650.41	1,245.95
2005	692.01	668.98	588.57	704.72	1,731.72	1,904.17	1,268.12
2006	763.88	706.88	691.94	812.22	1,776.50	1,943.60	1,341.37
2007	801.62	795.71	750.96	882.39	1,763.82	1,925.75	1,514.88
2008	860.24	813.83	959.62	1,218.86	2,014.02	2,171.68	1,595.52
2009	529.18	538.63	574.24	683.10	1,559.75	1,714.08	1,170.09
2010	681.76	660.36	712.52	989.17	1,633.64	1,784.93	1,246.45
2011	654.71	647.57	725.39	1,006.75	1,595.80	1,741.98	1,290.41
2012	624.70	588.30	692.38	912.98	1,581.77	1,733.07	1,326.74
2013	634.34	595.77	696.81	897.77	1,607.41	1,758.71	1,353.12
2014	655.43	617.07	710.61	880.51	1,679.42	1,830.71	1,405.09
2015	679.98	642.70	723.73	861.48	1,723.87	1,875.17	1,452.10
2016	673.80	635.64	735.65	855.99	1,741.39	1,892.68	1,486.72
2017	674.90	635.89	746.00	849.01	1,736.63	1,887.93	1,479.06
2018	685.71	645.48	757.58	859.14	1,718.63	1,869.93	1,459.09
2019	697.53	656.32	770.83	870.28	1,672.41	1,823.71	1,444.19
2020	710.64	668.36	785.46	882.60	1,681.17	1,832.46	1,466.66
2021	724.75	681.41	801.25	896.10	1,703.92	1,855.21	1,488.65
2022	739.50	695.01	817.51	910.40	1,726.13	1,877.43	1,509.50
2023	754.18	708.59	833.85	924.39	1,749.86	1,901.16	1,530.73
2024	768.42	721.73	849.63	938.04	1,772.69	1,923.99	1,551.43
2025	781.79	734.02	864.36	950.81	1,793.62	1,944.91	1,571.33
2026	793.74	745.01	877.71	962.60	1,813.03	1,964.33	1,589.30
2027	804.19	754.64	889.52	972.55	1,832.09	1,983.38	1,603.66
2028	813.14	762.88	899.56	981.19	1,846.71	1,998.00	1,617.15
2029	820.49	769.68	907.37	987.48	1,858.92	2,010.21	1,628.37
2030	826.54	775.20	914.25	992.90	1,868.99	2,020.28	1,637.61

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PETROCHEMICAL PRICE FORECAST
CURRENT U.S. DOLLARS

Product, Grade	Polyethylene, Linear Low Density				Polyethylene, High Density					
Origin	North America	North America	North America	Northeast Asia	North America	North America	North America	Northeast Asia	Northeast Asia	Northeast Asia
Delivery Basis	Domestic Market (Contract) Butene, Film US$ / Metric Ton Delivered	Domestic Market (Contract) Hexene Film US$ / Metric Ton Delivered	Domestic Market (Contract) Octene Film US$ / Metric Ton Delivered	Spot, avg. Butene, Film US$ / Metric Ton CFR China	Domestic Market (Contract) Blow Molding US$ / Metric Ton Delivered	Domestic Market (Contract) Injection Molding US$ / Metric Ton Delivered	Domestic Market (Contract) HMW Film US$ / Metric Ton Delivered	Spot, avg. HMW Film US$ / Metric Ton CFR China	Spot, avg. Blow Molding US$ / Metric Ton CFR China	Spot, avg. Injection Molding US$ / Metric Ton CFR China
2000	846.93	891.03	938.79	684.17	977.37	929.61	957.16	691.04	685.00	682.08
2001	766.10	810.19	854.28	585.00	911.23	839.59	876.33	585.83	583.33	569.58
2002	746.81	790.90	834.99	537.92	849.69	761.51	827.64	555.00	555.42	539.58
2003	973.70	1,017.79	1,061.88	633.33	1,058.21	970.02	1,039.84	641.67	641.67	631.67
2004	1,105.97	1,150.07	1,194.16	947.08	1,207.02	1,118.83	1,172.11	945.42	945.42	930.42
2005	1,373.28	1,417.37	1,461.47	1,065.21	1,483.51	1,395.33	1,439.42	1,043.33	1,043.33	1,033.33
2006	1,464.22	1,508.31	1,552.41	1,227.50	1,574.45	1,486.27	1,530.36	1,245.42	1,245.42	1,235.42
2007	1,504.64	1,578.13	1,622.22	1,335.83	1,614.87	1,526.69	1,570.78	1,362.50	1,362.50	1,352.50
2008	1,794.91	1,883.10	1,927.19	1,475.42	1,905.14	1,816.96	1,861.05	1,484.17	1,484.17	1,474.17
2009	1,383.39	1,471.57	1,515.66	1,134.67	1,480.76	1,392.57	1,449.52	1,149.43	1,145.26	1,135.26
2010	1,489.94	1,578.13	1,622.22	1,181.38	1,600.17	1,511.99	1,556.08	1,186.18	1,186.18	1,176.18
2011	1,508.31	1,596.50	1,640.59	1,272.28	1,618.54	1,530.36	1,574.45	1,275.92	1,275.92	1,265.92
2012	1,607.98	1,656.40	1,748.99	1,344.79	1,633.59	1,539.58	1,704.82	1,350.23	1,350.23	1,328.15
2013	1,678.43	1,728.06	1,822.97	1,407.82	1,694.86	1,598.50	1,777.70	1,413.39	1,413.39	1,390.87
2014	1,797.38	1,848.01	1,944.81	1,495.05	1,803.99	1,705.71	1,898.64	1,500.73	1,500.73	1,477.76
2015	1,887.33	1,938.96	2,037.70	1,579.47	1,894.03	1,793.78	1,990.60	1,585.27	1,585.27	1,561.83
2016	1,936.73	1,978.62	2,090.12	1,652.00	1,943.46	1,841.20	2,031.29	1,657.91	1,657.91	1,634.01
2017	1,968.85	2,011.57	2,125.30	1,675.81	1,975.74	1,871.44	2,065.30	1,681.84	1,681.84	1,657.46
2018	2,012.42	2,056.00	2,172.00	1,684.75	2,019.49	1,913.10	2,110.80	1,690.90	1,690.90	1,666.03
2019	2,024.39	2,068.84	2,187.16	1,699.74	2,031.60	1,923.09	2,124.74	1,706.01	1,706.01	1,680.65
2020	2,092.66	2,138.00	2,258.69	1,762.51	2,100.01	1,989.33	2,195.01	1,768.91	1,768.91	1,743.03
2021	2,165.25	2,211.49	2,334.60	1,826.47	2,172.75	2,059.85	2,269.65	1,833.00	1,833.00	1,806.61
2022	2,239.16	2,286.33	2,411.89	1,890.77	2,246.81	2,131.66	2,345.65	1,897.43	1,897.43	1,870.51
2023	2,317.30	2,365.41	2,493.49	1,957.42	2,325.11	2,207.65	2,425.92	1,964.22	1,964.22	1,936.76
2024	2,396.37	2,445.45	2,576.08	2,025.26	2,404.33	2,284.52	2,507.16	2,032.19	2,032.19	2,004.19
2025	2,474.89	2,524.95	2,658.20	2,093.90	2,483.02	2,360.81	2,587.90	2,100.97	2,100.97	2,072.40
2026	2,553.35	2,604.41	2,740.33	2,161.68	2,561.64	2,436.99	2,668.62	2,168.89	2,168.89	2,139.75
2027	2,633.41	2,685.49	2,824.12	2,226.03	2,641.86	2,514.71	2,750.98	2,233.39	2,233.39	2,203.67
2028	2,708.76	2,761.89	2,903.29	2,290.80	2,717.39	2,587.70	2,828.69	2,298.30	2,298.30	2,267.98
2029	2,782.27	2,836.45	2,980.69	2,353.78	2,791.06	2,658.78	2,904.59	2,361.43	2,361.43	2,330.51
2030	2,854.17	2,909.43	3,056.55	2,415.28	2,863.13	2,728.21	2,978.93	2,423.08	2,423.08	2,391.54

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PETROCHEMICAL PRICE FORECAST
CONSTANT 2009 DOLLARS

Product, Grade	Polyethylene, Linear Low Density				Polyethylene, High Density					
Origin	North America	North America	North America	Northeast Asia	North America	North America	North America	Northeast Asia	Northeast Asia	Northeast Asia
Delivery Basis	Domestic Market (Contract) Butene, Film US$ / Metric Ton Delivered	Domestic Market (Contract) Hexene Film US$ / Metric Ton Delivered	Domestic Market (Contract) Octene Film US$ / Metric Ton Delivered	Spot, avg. Butene, Film US$ / Metric Ton CFR China	Domestic Market (Contract) Blow Molding US$ / Metric Ton Delivered	Domestic Market (Contract) Injection Molding US$ / Metric Ton Delivered	Domestic Market (Contract) HMW Film US$ / Metric Ton Delivered	Spot, avg. HMW Film US$ / Metric Ton CFR China	Spot, avg. Blow Molding US$ / Metric Ton CFR China	Spot, avg. Injection Molding US$ / Metric Ton CFR China
2000	1,057.10	1,112.13	1,171.75	853.94	1,219.91	1,160.29	1,194.68	862.52	854.98	851.34
2001	936.13	990.00	1,043.88	714.83	1,113.47	1,025.92	1,070.82	715.85	712.80	696.00
2002	890.83	943.42	996.02	641.65	1,013.55	908.36	987.25	662.03	662.53	643.64
2003	1,142.06	1,193.77	1,245.49	742.84	1,241.18	1,137.75	1,219.63	752.61	752.61	740.89
2004	1,270.52	1,321.17	1,371.83	1,087.99	1,386.60	1,285.30	1,346.50	1,086.08	1,086.08	1,068.85
2005	1,534.63	1,583.90	1,633.18	1,190.36	1,657.81	1,559.27	1,608.54	1,165.92	1,165.92	1,154.74
2006	1,585.52	1,633.26	1,681.01	1,329.19	1,704.88	1,609.39	1,657.14	1,348.59	1,348.59	1,337.76
2007	1,578.76	1,655.87	1,702.14	1,401.64	1,694.42	1,601.90	1,648.16	1,429.62	1,429.62	1,419.13
2008	1,833.82	1,923.92	1,968.97	1,507.40	1,946.44	1,856.35	1,901.40	1,516.34	1,516.34	1,506.12
2009	1,383.39	1,471.57	1,515.66	1,134.67	1,480.76	1,392.57	1,449.52	1,149.43	1,145.26	1,135.26
2010	1,460.73	1,547.18	1,590.41	1,158.21	1,568.80	1,482.34	1,525.57	1,162.92	1,162.92	1,153.12
2011	1,428.73	1,512.26	1,554.03	1,205.15	1,533.15	1,449.62	1,491.38	1,208.60	1,208.60	1,199.13
2012	1,478.77	1,523.31	1,608.46	1,236.74	1,502.33	1,415.88	1,567.84	1,241.74	1,241.74	1,221.43
2013	1,505.92	1,550.45	1,635.60	1,263.12	1,520.66	1,434.20	1,594.98	1,268.12	1,268.12	1,247.91
2014	1,581.03	1,625.56	1,710.71	1,315.09	1,586.84	1,500.39	1,670.09	1,320.09	1,320.09	1,299.88
2015	1,627.59	1,672.12	1,757.27	1,362.10	1,633.37	1,546.91	1,716.65	1,367.10	1,367.10	1,346.89
2016	1,637.45	1,672.86	1,767.13	1,396.72	1,643.13	1,556.68	1,717.40	1,401.72	1,401.72	1,381.51
2017	1,631.96	1,667.38	1,761.64	1,389.06	1,637.68	1,551.22	1,711.91	1,394.06	1,394.06	1,373.85
2018	1,635.37	1,670.78	1,765.05	1,369.09	1,641.12	1,554.66	1,715.32	1,374.09	1,374.09	1,353.88
2019	1,612.84	1,648.25	1,742.52	1,354.19	1,618.59	1,532.13	1,692.79	1,359.19	1,359.19	1,338.98
2020	1,634.54	1,669.95	1,764.22	1,376.66	1,640.29	1,553.83	1,714.49	1,381.66	1,381.66	1,361.45
2021	1,658.08	1,693.49	1,787.76	1,398.65	1,663.82	1,577.37	1,738.02	1,403.65	1,403.65	1,383.44
2022	1,681.05	1,716.47	1,810.74	1,419.50	1,686.80	1,600.35	1,761.00	1,424.50	1,424.50	1,404.29
2023	1,705.61	1,741.02	1,835.29	1,440.73	1,711.35	1,624.90	1,785.55	1,445.73	1,445.73	1,425.52
2024	1,729.22	1,764.63	1,858.90	1,461.43	1,734.97	1,648.51	1,809.17	1,466.43	1,466.43	1,446.22
2025	1,750.87	1,786.28	1,880.55	1,481.33	1,756.61	1,670.16	1,830.81	1,486.33	1,486.33	1,466.12
2026	1,770.95	1,806.37	1,900.63	1,499.30	1,776.70	1,690.24	1,850.90	1,504.30	1,504.30	1,484.09
2027	1,790.66	1,826.08	1,920.35	1,513.66	1,796.41	1,709.95	1,870.61	1,518.66	1,518.66	1,498.45
2028	1,805.79	1,841.20	1,935.47	1,527.15	1,811.54	1,725.08	1,885.74	1,532.15	1,532.15	1,511.94
2029	1,818.42	1,853.83	1,948.10	1,538.37	1,824.17	1,737.71	1,898.37	1,543.37	1,543.37	1,523.16
2030	1,828.84	1,864.25	1,958.52	1,547.61	1,834.58	1,748.13	1,908.78	1,552.61	1,552.61	1,532.40

PETROCHEMICAL PRICE FORECAST
CURRENT U.S. DOLLARS

Product, Grade	Monoethylene Glycol, Fiber Grade				Ammonia	
Origin	North America	North America	Asia, North & South	Northeast Asia	North America	Northeast Asia
	Contract-Market	Spot	Contract-Market	Spot	Spot	Spot
Delivery Basis	US$ / Metric Ton FOB United States	US$ / Metric Ton FOB United States	US$ / Metric Ton CFR Asia/Pacific	US$ / Metric Ton CFR NE Asia	US$ / Metric Ton New Orleans Barge	US$ / Metric Ton CFR NE Asia
2000	568.30	510.89	567.50	534.38	230.84	0.00
2001	484.97	442.78	484.17	437.08	240.29	0.00
2002	456.66	416.83	456.67	433.75	178.66	169.56
2003	671.67	642.50	670.83	662.50	309.56	257.77
2004	919.17	928.47	919.17	953.04	343.03	319.68
2005	946.42	969.16	940.00	880.71	377.57	300.45
2006	905.67	826.09	907.50	858.79	348.69	344.03
2007	1,075.58	1,068.73	1,078.96	1,107.50	344.64	347.69
2008	1,175.83	996.71	1,178.75	942.59	648.62	570.84
2009	698.33	691.19	687.50	619.67	277.85	277.40
2010	740.00	708.75	720.83	659.17	297.84	288.03
2011	809.25	779.23	789.22	729.21	311.25	301.14
2012	825.28	803.84	803.84	763.84	309.75	298.02
2013	912.49	883.78	888.78	838.78	329.90	315.20
2014	1,013.26	981.93	986.93	936.93	357.76	340.05
2015	1,093.35	1,059.95	1,064.95	1,014.95	389.18	365.85
2016	1,104.57	1,070.87	1,075.87	1,025.87	393.92	372.86
2017	1,095.95	1,062.48	1,067.48	1,017.48	399.84	381.02
2018	1,061.91	1,029.32	1,034.32	984.32	406.13	389.63
2019	1,072.77	1,039.89	1,044.89	994.89	416.44	400.91
2020	1,108.63	1,074.83	1,079.83	1,029.83	433.78	415.03
2021	1,145.22	1,110.46	1,115.46	1,065.46	447.01	426.38
2022	1,182.15	1,146.44	1,151.44	1,101.44	456.79	435.67
2023	1,220.48	1,183.77	1,188.77	1,138.77	465.81	444.21
2024	1,259.52	1,221.79	1,226.79	1,176.79	474.75	452.69
2025	1,298.65	1,259.91	1,264.91	1,214.91	482.61	460.12
2026	1,337.33	1,297.58	1,302.58	1,252.58	489.48	466.58
2027	1,374.17	1,333.46	1,338.46	1,288.46	494.88	471.61
2028	1,411.22	1,369.55	1,374.55	1,324.55	499.44	475.83
2029	1,447.39	1,404.79	1,409.79	1,359.79	503.17	479.26
2030	1,482.58	1,439.05	1,444.05	1,394.05	506.12	481.95

The prices presented herein are strictly the opinion of CMAI and are based on information collected within the public sector and on assessments by CMAI staff. **CMAI MAKES NO GUARANTEE OR WARRANTY AND ASSUMES NO LIABILITY AS TO THEIR USE**.

PETROCHEMICAL PRICE FORECAST
CONSTANT 2009 DOLLARS

Product, Grade	Monoethylene Glycol, Fiber Grade				Ammonia	
Origin	North America	North America	Asia, North & South	Northeast Asia	North America	Northeast Asia
	Contract-Market	Spot	Contract-Market	Spot	Spot	Spot
Delivery Basis	US$ / Metric Ton FOB United States	US$ / Metric Ton FOB United States	US$ / Metric Ton CFR Asia/Pacific	US$ / Metric Ton CFR NE Asia	US$ / Metric Ton New Orleans Barge	US$ / Metric Ton CFR NE Asia
2000	709.33	637.67	708.33	666.98	288.13	0.00
2001	592.60	541.05	591.62	534.09	293.62	0.00
2002	544.73	497.22	544.73	517.40	213.12	202.26
2003	787.80	753.59	786.82	777.05	363.08	302.34
2004	1,055.92	1,066.61	1,055.92	1,094.84	394.07	367.24
2005	1,057.61	1,083.02	1,050.44	984.18	421.93	335.76
2006	980.69	894.52	982.68	929.93	377.58	372.53
2007	1,128.57	1,121.38	1,132.11	1,162.06	361.61	364.81
2008	1,201.32	1,018.32	1,204.30	963.03	662.68	583.21
2009	698.33	691.19	687.50	619.67	277.85	277.40
2010	725.49	694.85	706.70	646.24	292.00	282.38
2011	766.55	738.12	747.58	690.74	294.83	285.26
2012	758.97	739.25	739.25	702.46	284.86	274.08
2013	818.71	792.95	797.43	752.57	295.99	282.80
2014	891.29	863.73	868.13	824.15	314.69	299.12
2015	942.89	914.08	918.39	875.27	335.62	315.50
2016	933.88	905.39	909.61	867.34	333.05	315.24
2017	908.42	880.68	884.82	843.38	331.42	315.83
2018	862.95	836.47	840.53	799.90	330.03	316.63
2019	854.68	828.49	832.47	792.64	331.78	319.40
2020	865.94	839.53	843.44	804.38	338.82	324.17
2021	876.97	850.36	854.19	815.90	342.30	326.51
2022	887.50	860.69	864.44	826.91	342.93	327.08
2023	898.31	871.29	874.97	838.17	342.85	326.95
2024	908.87	881.64	885.25	849.17	342.58	326.66
2025	918.73	891.32	894.86	859.49	341.43	325.51
2026	927.54	899.97	903.44	868.76	339.49	323.61
2027	934.41	906.73	910.13	876.13	336.51	320.68
2028	940.78	913.01	916.34	883.01	332.95	317.21
2029	945.98	918.13	921.40	888.72	328.86	313.23
2030	949.97	922.09	925.29	893.25	324.30	308.82

Natural Gas Price Relationships for Cook Inlet

Constant 2009 Dollars/MMBTU

	USGC Henry Hub	Chicago City Gate	Alberta AECO Hub	Alaska North Slope	Alaska Cook Inlet	Differential (USGC - Allberta)	Differential (USGC - Alaska Cook Inlet)	Delta to Alberta AECO	Tariff (Alaska NS to Alberta)	Tariff (ANS to Fairbanks (or Delta Junction?))	Tariff (Faribanks (or Delta Junction?) to Cook Inlet)
2000	5.28	5.46	4.24			1.04					
2001	4.96	4.90	4.95			0.02					
2002	3.98	3.99	3.07			0.91					
2003	6.59	6.52	5.63			0.96					
2004	6.72	6.70	5.78			0.94					
2005	9.84	9.39	8.08			1.75					
2006	7.32	7.17	6.32			1.00					
2007	7.28	7.11	6.47			0.81					
2008	9.04	8.95	8.16			0.88					
2009	3.82	3.62	3.31			0.51					
2010	4.59	4.44	3.80			0.79					
2011	5.81	5.72	4.77			1.04					
2012	6.82	6.76	5.89			0.93					
2013	6.97	6.90	6.04			0.92					
2014	7.17	7.11	6.25			0.92					
2015	7.41	7.34	6.49			0.92					
2016	7.57	7.51	6.66			0.92					
2017	7.73	7.67	6.81			0.92					
2018	7.98	7.92	7.06	5.51	6.81	0.92	1.17	-0.25	1.55	0.55	0.75
2019	8.30	8.24	7.38	5.83	7.13	0.92	1.17	-0.25	1.55	0.55	0.75
2020	8.64	8.57	7.72	6.17	7.47	0.92	1.17	-0.25	1.55	0.55	0.75
2021	9.00	8.94	8.08	6.53	7.83	0.92	1.17	-0.25	1.55	0.55	0.75
2022	9.36	9.30	8.44	6.89	8.19	0.92	1.17	-0.25	1.55	0.55	0.75
2023	9.73	9.67	8.82	7.27	8.57	0.92	1.17	-0.25	1.55	0.55	0.75
2024	10.08	10.02	9.17	7.62	8.92	0.92	1.17	-0.25	1.55	0.55	0.75
2025	10.41	10.35	9.50	7.95	9.25	0.92	1.17	-0.25	1.55	0.55	0.75
2026	10.71	10.65	9.79	8.24	9.54	0.92	1.17	-0.25	1.55	0.55	0.75
2027	10.98	10.92	10.06	8.51	9.81	0.92	1.17	-0.25	1.55	0.55	0.75
2028	11.21	11.15	10.29	8.74	10.04	0.92	1.17	-0.25	1.55	0.55	0.75
2029	11.42	11.36	10.50	8.95	10.25	0.92	1.17	-0.25	1.55	0.55	0.75
2030	11.60	11.54	10.68	9.13	10.43	0.92	1.17	-0.25	1.55	0.55	0.75

Ethane Price Reationships for Cook Inlet

Constant 2009 Dollars

	USGC Mount Belvieu	Alberta AECO Hub	Alaska Cook Inlet Estimate	Differential (USGC - Alberta)	Differential (USGC - Alaska Cook Inlet)	Alaska Cook Inlet Delta to Alberta	Tariff (Alaska NS to Alberta)	Alaska North Slope	Tariff (ANS to Fairbanks (or Delta Junction?))	Tariff (Faribanks (or Delta Junction?) to Cook Inlet)	Alaska Cook Inlet
	$/MT	$/MT	$/MT	$/MT	$/MT	$/MT	$/MMBTU	$/MMBTU	$/MMBTU	$/MMBTU	$/MMBTU
2000	372.09	245.85		126.23							
2001	304.31	279.65		24.66							
2002	231.80	186.41		45.39							
2003	347.86	311.56		36.30							
2004	429.14	318.45		110.69							
2005	518.61	430.86		87.74							
2006	528.28	342.88		185.40							
2007	619.73	349.50		270.23							
2008	679.00	431.91		247.09							
2009	355.16	192.60		162.56							
2010	527.95	216.65		311.30							
2011	567.55	263.58		303.97							
2012	526.82	317.87		208.95							
2013	518.20	324.44		193.77							
2014	510.19	334.15		176.04							
2015	517.46	345.29		172.17							
2016	538.39	352.81		185.58							
2017	560.82	360.00		200.83							
2018	582.04	371.76	359.47	210.28	222.57	-12.29	1.55	6.01	0.55	0.75	7.31
2019	597.64	387.10	374.81	210.54	222.83	-12.29	1.55	6.32	0.55	0.75	7.62
2020	614.11	403.15	390.86	210.96	223.25	-12.29	1.55	6.65	0.55	0.75	7.95
2021	631.60	420.55	408.25	211.06	223.35	-12.29	1.55	7.00	0.55	0.75	8.30
2022	648.94	437.90	425.61	211.04	223.33	-12.29	1.55	7.36	0.55	0.75	8.66
2023	666.79	455.69	443.40	211.10	223.39	-12.29	1.55	7.72	0.55	0.75	9.02
2024	684.15	472.45	460.16	211.70	223.99	-12.29	1.55	8.06	0.55	0.75	9.36
2025	700.43	488.24	475.95	212.19	224.48	-12.29	1.55	8.38	0.55	0.75	9.68
2026	714.51	502.20	489.91	212.31	224.60	-12.29	1.55	8.67	0.55	0.75	9.97
2027	726.66	515.20	502.91	211.46	223.75	-12.29	1.55	8.93	0.55	0.75	10.23
2028	737.75	526.18	513.89	211.57	223.86	-12.29	1.55	9.15	0.55	0.75	10.45
2029	746.94	536.16	523.87	210.78	223.07	-12.29	1.55	9.36	0.55	0.75	10.66
2030	754.82	544.57	532.28	210.25	222.54	-12.29	1.55	9.53	0.55	0.75	10.83