

ALASKA LEGISLATURE COMMITTEE FILES 2007-2008 HRLS 1 2 3 20

Regulatory Commission of Alaska  
701 West Eighth Avenue, Suite 300  
Anchorage, Alaska 99501  
(907) 276-6222; TTY (907) 276-4533

1 regulation if current regulation is unduly burdensome and adversely affects the  
2 development of Alaska's oil and gas resources. However, we must balance the need  
3 for such regulatory charge with the public interest in open access to pipelines and  
4 reasonable transportation rates.

5 At our November 4, 2005, Public Meeting, we decided to open this docket  
6 to seek comments from interested persons on whether we should consider regulations  
7 establishing two or more classes of pipelines. In particular, we are interested in whether  
8 we can ease the burden of regulation on small, producer-owned pipelines that ship only  
9 the producer's products, while still adequately protecting the interests of unaffiliated  
10 producers, end-users and the public.

11 We seek comments on whether we should establish two or more classes  
12 of pipelines under AS 42.06. We also seek comments on the reporting, accounting, and  
13 other regulatory requirements we should prescribe for each class and how  
14 implementation of comments will encourage development, provide cost-effective  
15 regulation, provide open access to pipelines, and allow for reasonable transportation  
16 rates while protecting the public interest.

17 Comments must be filed by 4 p.m., January 13, 2006, with reply  
18 comments due January 27, 2006. We request that commenters reference Docket  
19 R-05-11. Since this is a regulations proceeding, commenters are not required to serve  
20 their comments on the other entities set out on the service list of this Order. We will  
21 post copies of all filed comments on our web site.

# STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR

## ALASKA NATURAL GAS DEVELOPMENT AUTHORITY

411 WEST 4TH AVENUE  
ANCHORAGE, ALASKA 99501  
TELEPHONE: (907) 257-1317  
FACSIMILE: (907) 646-5005

May 24, 2005

**FILE COPY**

Kate Giard  
Chairman, Regulatory Commission of Alaska  
701 West Eighth Avenue, Suite 300  
Anchorage, AK 99501-3469

Re: Statutory Changes to AS 42.06

Dear Chairman Giard:

As you know, the Alaska Natural Gas Development Authority (ANGDA) is reviewing the feasibility of constructing a pipeline to transport natural gas to various users, including Alaskan consumers. Should construction prove feasible, ANGDA anticipates applying to the Regulatory Commission of Alaska (RCA) for a Certificate of Public Convenience and Necessity. Since certification is required prior to commencing construction, any delay in certification could prove detrimental to the project.

Our review of AS 42.06 has raised concerns that the Commission may not have at its disposal the tools required to efficiently process our application within the statutory six-month time frame. Therefore, ANGDA would like to work with the RCA to advocate statutory changes that increase the RCA's discretion in streamlining certification proceedings for jurisdictional natural gas pipelines owned by the state that transport North Slope natural gas. The proposed changes, which we will be considering at our June 27<sup>th</sup> meeting, are detailed below. ANGDA invites the RCA's input regarding any concerns with these changes that we hope you will join us in advocating.

We consider this a matter of some urgency since Governor Murkowski has indicated that the Alaska Legislature could have the matter of moving North

Slope gas to market before it within a few months. We believe that these issues could and should be part of any special session that is called.

1. **Grant the RCA discretionary authority to exempt a pipeline owned by the state, or a public corporation owned by the state, from any provision of AS 42.06.** Currently, full regulation of pipelines is mandatory under AS 42.06.140(a)(1) regardless of any public interest determination the RCA might make with respect to any particular applicant, circumstance, or statutory provision. We believe that RCA forbearance authority will allow the Commission to fit its regulatory regime to the dictates of individual circumstances while effectively meeting public interest requirements.

2. **Exempt pipelines owned by the state, or by a public corporation of the state, from AS 42.06.240(f).** In addition to being unclear as to how it might be implemented, which could lead to delay in and of itself, this section of the statute specifies criteria the RCA shall use in determining the maximum and minimum amounts of gas a pipeline transporting North Slope natural gas shall be authorized to transport. ANGDA, considering the needs of potential shippers as well as potential financiers, needs the flexibility to propose to the RCA its own rules for determining whom it will transport gas for, how much gas it will transport, the terms and conditions for offering various levels of service, and how each type of offered service will be defined. ANGDA and the RCA should have the authority to rely on input from market participants to make these determinations rather than relying on what we believe to be obsolete statutory dictates.

3. **Repeal AS 42.06.370(c).** This provision requires that the structure of prices charged by a pipeline transporting North Slope natural gas be designed as if the pipeline were a distribution utility regulated under AS 42.05. ANGDA financial goals and optimal just and reasonable rate design may differ from a typical gas or electric distribution utility. ANGDA and the RCA should have maximum flexibility to design rates to meet public interest goals. It is unclear to us why flexibility in rate design for a North Slope natural gas pipeline should be more restrictive than that applying to other pipelines.

Chairman Giard, we appreciate your assistance in helping us to advance the goals of the Stranded Gas Act as well as Ballot Proposition Number 3 that brought ANGDA into existence. The ANGDA Board has expressed its interest in meeting with representatives of the RCA to discuss these proposals further.

**Stranded Gas Hearings**  
(0407281315 Minutes)

**Access to Capacity for Alaskan Communities**

*Charlie Cole, Board of Directors, Alaska Gasline Port Authority, July 28, 2004.*

MR. CHARLIE COLE, Board of Directors, Alaska Gas Pipeline Authority, said he wanted to talk about the Gas Act's provisions at Fairbanks.

I have to say preliminarily that I have some hesitation about speaking critically, you might say, about an item of legislation that passed the legislature by a vote of 20 – 0 in the Senate and 38 – 0 in the House. Obviously, any bill that passes the Alaska Legislature with votes like that has strong support and is viewed by informed legislators as good legislation for this state. So, with that caveat and that reservation, I want to speak a little bit today about the effect of that bill as I see it on Fairbanks and other Interior communities and in a sense, communities down river.

One, Alaska is cold and Fairbanks is, on occasions, very cold. It is one of the restraints on growth that we have in Alaska and we'll always have in Alaska – is the cold weather. With that given, low cost economic energy is vital for the economic development of, certainly, Interior Alaska and, as we have seen, how vital and how beneficial that has been to the Anchorage area. But, Fairbanks has not had that benefit and Fairbanks continues to struggle economically as respects quality of life for the high cost of energy there.

So, if one looks to the future of Fairbanks, if Fairbanks is going to have any economic growth... it must have cheap economic energy to offset the costs of living there.

The second given is that these Alaska resources should be primarily for the benefit of Alaskans. Isn't that what Governor Murkowski said? He said one of the fundamental purposes of the use of these resources of Alaska should be to benefit Alaskans.

Senator Seekins would know at times in Fairbanks when it's 50 degrees below zero, we have people there who buy 50 gallons of fuel oil to heat their house, to keep it from freezing, because that's all they can afford, if you can believe that. One of the givens for the Fairbanks community is we really need gas. There's only one place we're going to get that gas and that's off this gasline, if it's ever built. Presumably, it's going to be built.

Also, if we want to keep the military bases in Fairbanks – you know those base closure proceedings come up every once in a while. One of the criticisms we talk about keeping Eielson and Fort Wainwright there is how much it costs to keep those bases open. If we're trying to reduce the defense budget, maybe we're trying to, I'm not really sure that we are, but if we are, we've got to reduce the cost of power and heating at those bases. So, that should, in my view, be given as a policy.

So, what did the Stranded Gas Act do for Fairbanks in that regard? Given I think those unanimous policies – lets just read what AS 42.06.240 says in that regard.... starting with section (f).

In addition to the other requirements of (a) through (e) of this section, the provisions of this section shall apply to a certificate of public convenience and necessity for a North Slope natural gas pipeline carrier or a person that will be a North Slope natural gas pipeline carrier under this chapter.

(1) The person making the application shall dedicate a portion of the pipeline's initial capacity sufficient to transport the total volume of North Slope natural gas that has been committed by the producers and shippers of North Slope natural gas to tendering for intrastate firm transportation service at the time that the operation of the North Slope natural gas pipeline commences.

(2) Upon receipt of the certificate application under this subsection, the [RCA] shall issue a public notice inviting prospective intrastate shippers of North Slope natural gas to file a request for service. A request for service submitted by a shipper in response to the notice issued under this paragraph must include a proof of the shippers commitment to use the North Slope natural gas pipeline for intrastate firm transportation service, specifying the volume of North Slope natural gas that the shipper will tender for initial intrastate firm transportation service.

(3) In its review of an application submitted under this subsection:

(A) For the purpose of evaluating the total volume of intrastate transportation of North Slope natural gas to be accepted for initial intrastate transportation, the [RCA] commission shall determine the total volume based upon written commitments to tender North Slope natural gas for intrastate firm transportation service continuously for a period of not less than three years after the operation of the North Slope natural gas pipeline commences as follows (the RCA has to determine the total volume based upon written commitments (before the certificates of public

convenience and necessity are issued and before pipeline construction begins – day one):

(i) Each request for service by an intrastate shipper that is a public utility, as that term is defined by statute, for the purpose of furnishing natural gas for ultimate consumption within the state by its customers that individually consume an average annual volume of less than 20 million standard cubic feet of gas per day shall be supported by a written commitment by the public utility that sets out the utility's best current estimate of the average annual volume that the utility will require during the three-years period.

MR. COLE emphasized that a written commitment gives the sense of something that is binding and obligatory, but after reading the next sentence, it may not mean contract.

(ii) Each request for service by an intrastate shipper that is not a public utility, as that term is defined by law, and each request for service by a public utility for the purpose of furnishing natural gas for ultimate consumption within the state by a customer that individually consumes an average annual volume of 20 million or more standard cubic feet a day, that purchases North Slope natural gas from a North Slope natural gas producer must be supported by one or more contracts for the purchase of the North Slope natural gas on a take or pay basis that extends for a period of not less than three years after the operation of the North Slope natural gas pipeline commences.

MR. COLE explained that means that anybody who wants this natural gas, if it is not a public utility or it is a public utility with more than 20 million standard cubic feet per day, you have to reach a contract now to buy natural gas from the carrier on a take or pay basis. Fairbanks has no natural gas distribution system or facilities for converting natural gas to electrical energy; so, who in Fairbanks would enter into a contract like this, he asked. He didn't know how such a project would be financed and supposed that it would be impossible.

CO-CHAIR OGAN interrupted to say that LNG is being shipped from the Matanuska Valley to Fairbanks at \$7 per thousand CF and it wouldn't take too much to set up a turbine to turn the natural gas into electricity.

MR. COLE responded that it wouldn't be very practical to enter into a contract now without knowing what rates the RCA will set and approve as just and reasonable. Fairbanks needs a whole distribution system for homes to be heated and no one knows what that would cost and no one would finance it. However, he noted that was only part of the dilemma. The next section says:

(iii) The RCA may consider peak volume specified in written commitments

of the North Slope natural gas producers and purchase contracts; and

(B) The commission shall set out in its order granting a certificate of public convenience and necessity the total volume of intrastate North Slope natural gas that the North Slope natural gas pipeline carrier shall accept for intrastate transportation.

MR. COLE said that means the certificates of public convenience and necessity shall say the total volume of intrastate gas may not exceed the volume substantiated by written commitments and contracts that comply with the requirements of the chapter. Commitments have to be in place, then the RCA in the certificate of public convenience and necessity says, "You've got to send out X, but you can't ship any more for intrastate transportation."

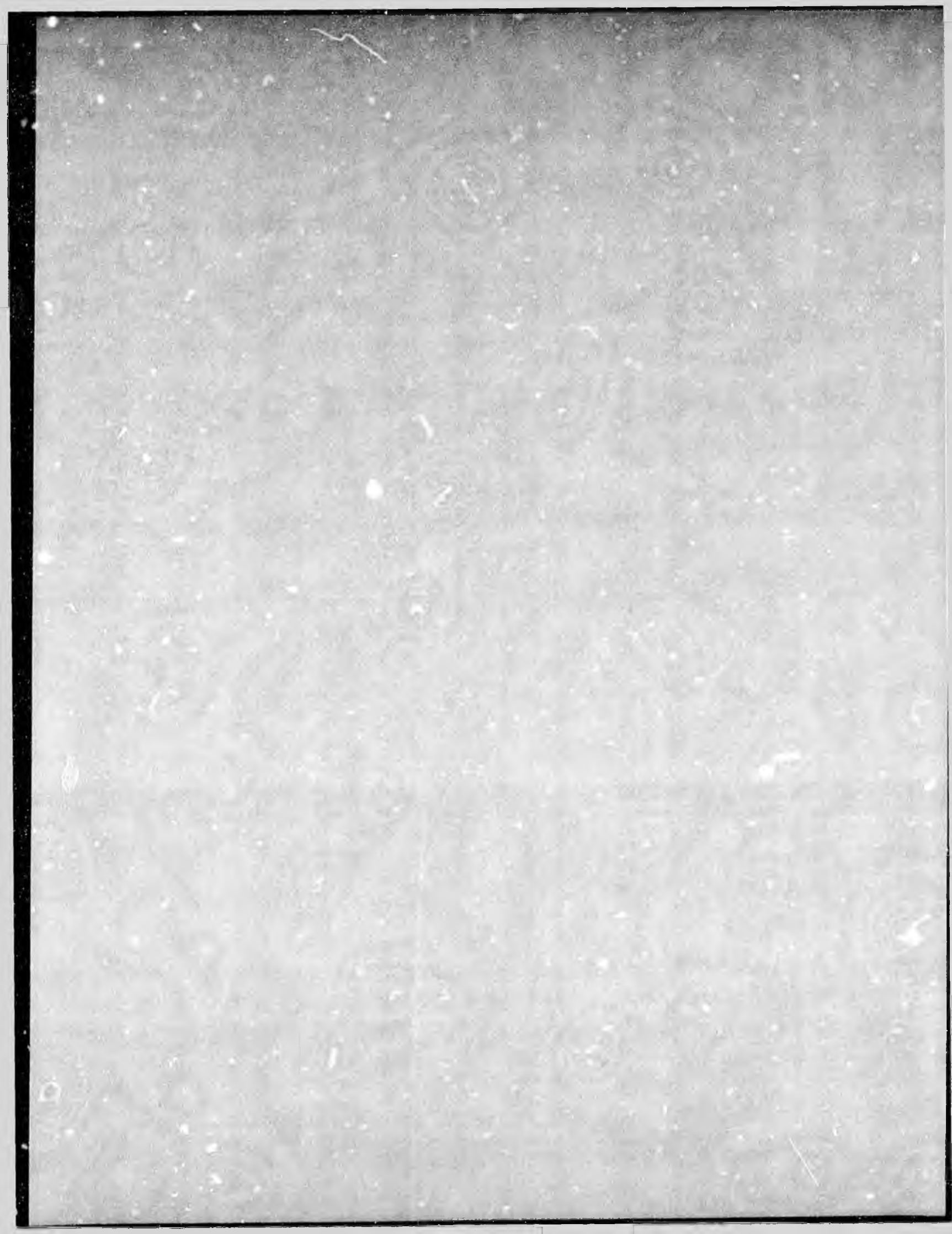
He emphasized that it gets worse:

If the North Slope natural gas pipeline carrier wants to transport gas in excess of the amount set forth in the statement of total volume of the pipeline carrier's certificate of public convenience and necessity, the pipeline carrier may apply for authority to transport more.

MR. COLE explained that means the carrier has to see if it can get authority to do that.

We're looking at a gasline that's going to potentially be running by Fairbanks for the next 30 years. How are we ever going to, for example, entice anyone else to come to Fairbanks and utilized this natural gas for a petrochemical facility? What about supplying natural gas to Fort Wainwright? Converting those bases? And how are we going to furnish natural gas to Eilson Air Force Base? Once, ten years down the road, it then becomes up to the gasline to decide whether they want to increase the intrastate capacity for Fairbanks. And I'm not talking just about Fairbanks and Eilson and Fort Wainwright, I'm talking about Tok, I'm talking about Delta Junction on the way down the Highway, but I'm also talking about the development of propane facilities to be able to ship propane down river to these other communities. I mean, once you do this, [it] is locked in. Then it's up to the pipeline, itseif, to decide whether it wants to increase the capacity – and that's over the next 10, 20 or 30 years or maybe 50 years.

This is legislation, which I think is ill-advised, if I may say. That's a little strong for people who voted 58 – 0; I realize that. But, I think for the reasons I've given you, this Legislature should take a look at it and decide whether it needs to be revised. Probably 90 percent of what you hear in these hearings you have no control over. It's under the control of FERC.



***“Connecting Alaskans To Their Natural Gas”***

# **Legislative Hearing - AGIA**

**Anchorage on June 20, 2008**

***In-State Use of North Slope Gas***

***“It’s the Open Season ...”***



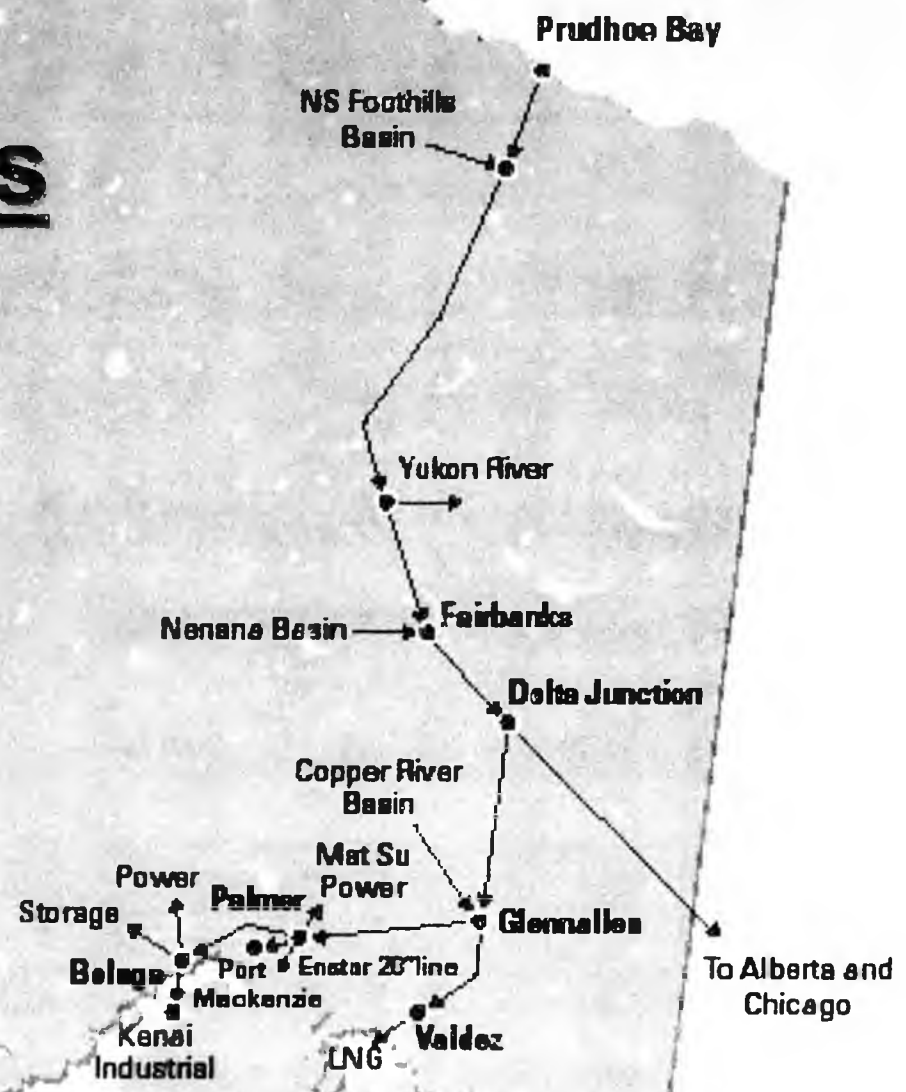
**Alaska**

**Natural Gas Development Authority**

# **In-State Gas Issues**

- **ANGDA “Spur Line” from Delta Junction to Beluga via Glennallen (370 miles of 20”)**
- **Alaska utility gas needs (250 mmmscfpd) & potential industrial demand**
- **In-State Project threshold & tariff sensitive to throughput commitments**
- **Changes needed in RCA Open Season Statute**
- **Preserve potential for gas based “value added” industries**

# Potential Elements Alaska Gasline System

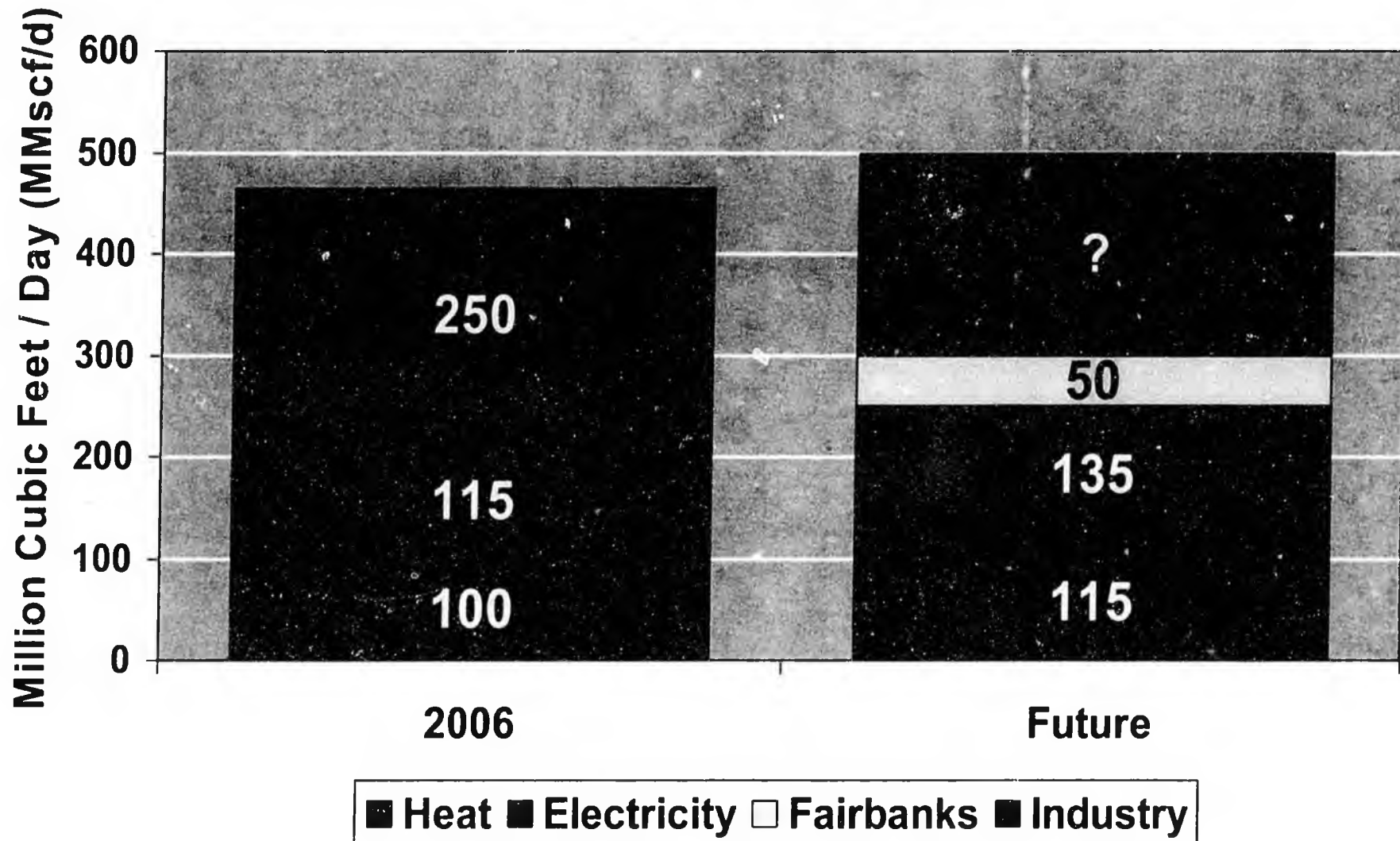






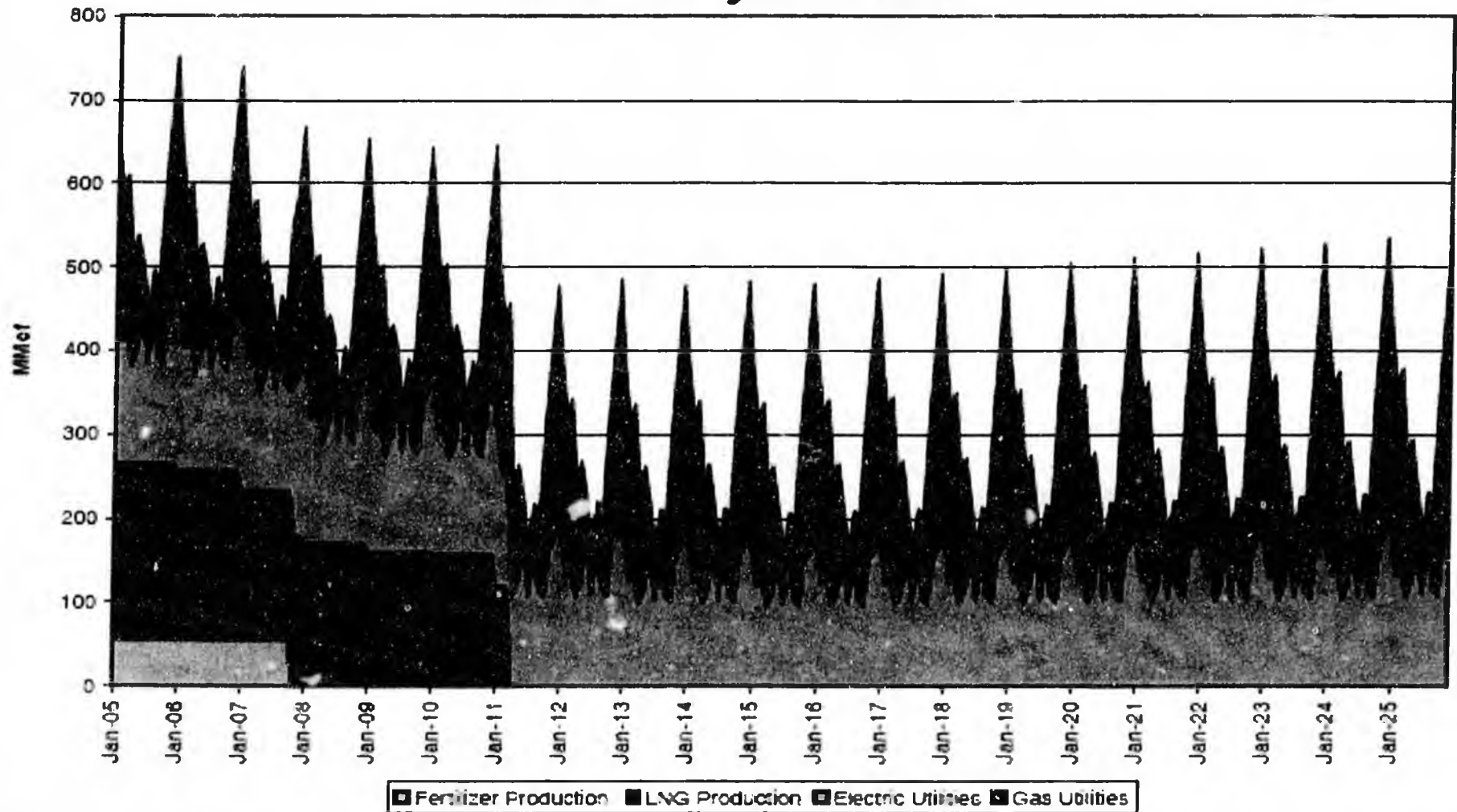


# Average Daily In-State Gas Uses (mmscf/d)



# Peak Daily Demand

## Natural Gas Demand Forecast Peak Daily Demand



# Gas Pipeline Cost of Service Estimates (\$/mmbtu)

|                          | <u>100</u><br><u>mmscfpd</u> | <u>250</u><br><u>mmscfpd</u> | <u>500</u><br><u>mmscfpd</u> |
|--------------------------|------------------------------|------------------------------|------------------------------|
| <b><u>Fairbanks</u></b>  |                              |                              |                              |
| Bullet Line              | \$10.00                      | \$3.50                       | \$2.00                       |
| Big Pipe                 | \$1.25                       | \$1.25                       | \$1.25                       |
| <b><u>Cook Inlet</u></b> |                              |                              |                              |
| Bullet Line              | \$15.00                      | \$5.25                       | \$3.00                       |
| Big Pipe                 | \$1.50                       | \$1.50                       | \$1.50                       |
| Spur Line                | \$5.00                       | \$1.75                       | \$1.00                       |
| <b>Total Spur</b>        | <b>\$6.50</b>                | <b>\$3.25</b>                | <b>\$2.50</b>                |

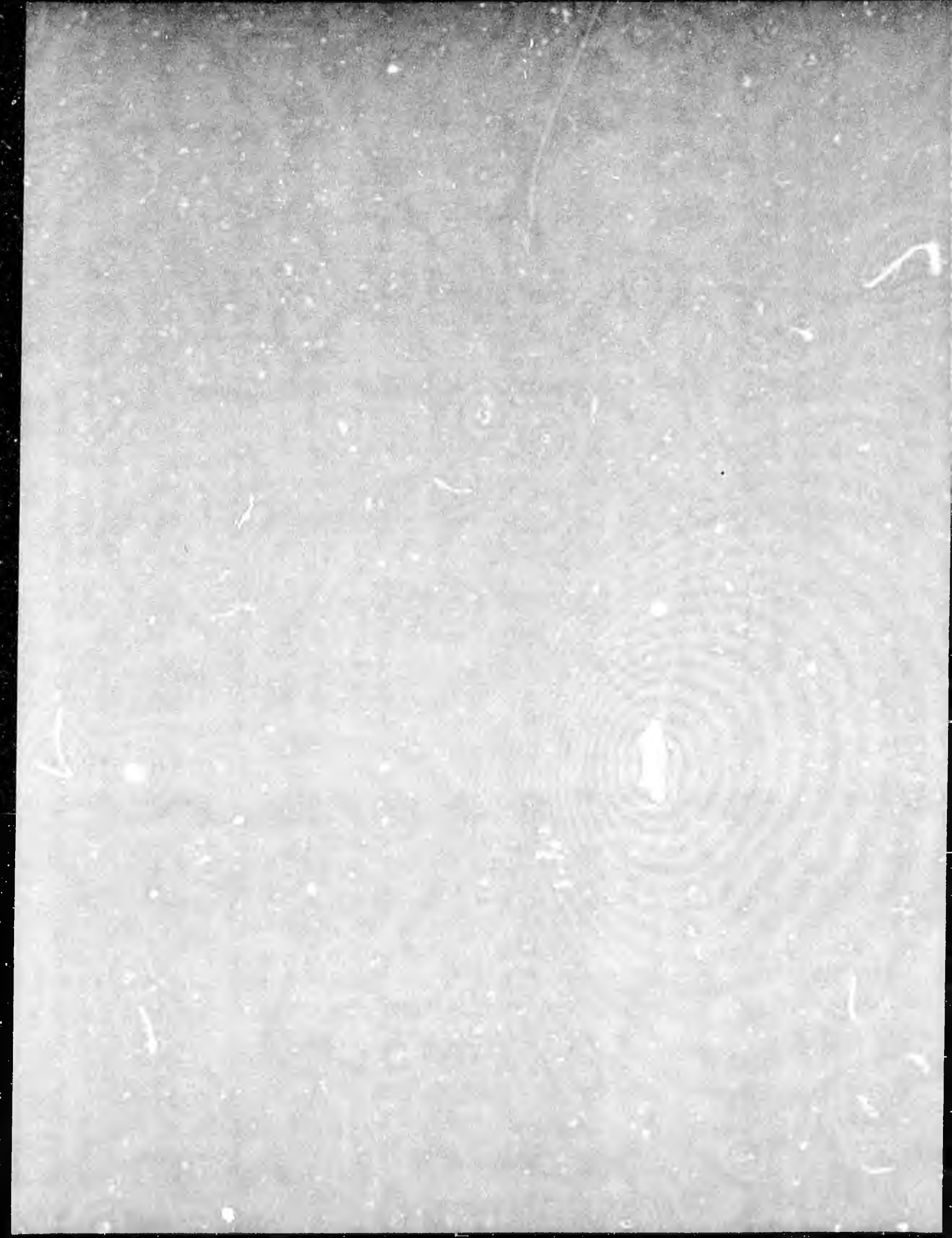
*Pipeline Costs Only - Comparable B & V Estimate would be \$3.50 to Alberta*

# **“It’s the Open Season ...”**

- **At the In-State Open Season:**
  - **The gas demand volume profile for various Alaska utilities will be known**
  - **Long term utility gas purchase and shipping commitments could exceed \$10 billion**
  - **An aggressive time line will allow Alaska utilities to strike the “best negotiated deals” before the FERC open season**

# Average Daily In-State Gas Uses (mmscfpd)

|                  | <u>2006</u> | <u>Future</u> |
|------------------|-------------|---------------|
| • Home Heating   | 100         | 115           |
| • Electric Power | 115         | 135           |
| • Fairbanks      |             | 50            |
| • Industrial     | 250         | ?             |





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**ANRTL PRESENTS AN  
ALASKA NORTH SLOPE GAS TO  
LIQUIDS (GTL) OPTION**

**“A LEGACY DECISION for ALASKA”**

**PREPARED FOR LEGISLATIVE BUDGET & AUDIT COMMITTEE**



**THE COMPETITION AGIA PROMISED BUT DID NOT DELIVER**

June 20, 2008



## AGIA Response to GTLs

- Gas-to-Liquids (GTL) is a promising technology.
- However, various market, cost, and technological issues (as demonstrated in the Cook Inlet pilot project) make the future of GTL technology uncertain.
- Further evaluation will be needed as this technology advances.
- It is important to recognize that the AGIA process was designed as a commercial vehicle for getting Alaska gas from the North Slope to market.



## AGIA Response to GTLs

- Alaska Gasline Inducement Act does not dictate market destinations or the use of particular technologies, but allows for these issues to be decided by the market.
- Does anyone see the irony in this statement?  
“The Alaska GASLINE Inducement Act does not dictate the use of a particular technology”.
- Then why not call it the Alaska Gas Development Inducement Act.



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## The main points we will make:

- It is important for the Legislature to know that there are other options for monetizing North Slope gas than with a gas pipeline, and that GTLs may well result in:
  - a much higher wellhead value for gas than a pipeline,
  - more long term jobs for Alaskans and
  - a larger tax base in Alaska.
- A GTL plant would most likely be built in stages, which has several important advantages.
- From the standpoint of Alaska employment and economic development the construction would be spread over a minimum of 14 years.



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## The main points we will make:

- The plant would require a substantial construction workforce. Although not as large as that needed for a gas pipeline, the construction workforce would be employed in Alaska for many more years.
- The GTL plant operations workforce would be much more substantial than that for a gas pipeline.



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## The main points we will make:

- All of the liquids remain in Alaska for marketing.
- Natural gas liquids can be transported through the TAPS pipeline along with GTL products.
- While a GTL project could use 2, 3, 4, 5, 6 billion cubic feet of gas/day or more if desired, the plant can be sized to use less gas, leaving gas production that could be transported south through a smaller “bullet” pipeline.



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## The main points we will make:

- If you are going to tax the Producers natural gas at a quasi crude oil price equivalent the Producers might as well convert their natural gas to a liquid product and actually receive a premium price above crude oil.
- We believe the GTL option gives Alaska high value transportation fuels badly needed in the U.S. along with economic benefits and flexibility not offered with a just gas pipeline.



# Abbreviations

- GTL - Gas to Liquids
- CTL – Coal to Liquids
- BTL – Biomass to Liquids
- F-T – Fischer-Tropsch
- NGLs - Natural gas liquids ( $C_3$  +)
- LNG – Liquefied Natural Gas
- CNG – Compressed Natural Gas



# Abbreviations

- KW – 1,000 watts of electric power
- KW-HR – 1,000 watts for 1 hour
- Heat Rate - Btu's needed per kilowatt hour of power produced  
(example 8,500 btu's will produce 1,000 watts of electricity for 1 hour)
- Vapor Pressure – pressure a product exerts at a specific temperature
  - Butane ( $C_4H_{10}$ ) has a vapor pressure of 47 psig at 110°F
  - Propane ( $C_3H_8$ ) has a vapor pressure of 204 psig at 110°F
  - Ethane ( $C_2H_6$ ) has a vapor pressure of 850 psig at 110°F



# Abbreviations

- 1 cubic foot of natural gas has 1,000 Btus
- 1 MCF of natural gas has 1 million Btus
- 1 Barrel of Crude Oil has ~ 6 million Btus
- Crude Oil Price Equivalent
  - Multiply the value of 1 MCF of gas by 6 or
  - Divide the value of 1 barrel of crude oil by 6
- 1 Barrel of F-T products has ~ 5.3 million Btus
- F-T Price Equivalent
  - Multiply the value of 1 MCF of gas by 5.3 or
  - Divide the value of 1 barrel of F-T by 5.3



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**CONVERTING  
NORTH SLOPE NATURAL GAS  
RESERVES INTO**

**“PROVEN”**

**F-T TRANSPORTATION FUELS**

**&**

**PETROCHEMICAL FEED STOCKS**

**WHILE SEQUESTERING CO<sub>2</sub>**

**“GREEN AS IT CAN BE”**



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**A GTL/CTL PLANT PRODUCES  
FISCHER-TROPSCH (F-T)  
TRANSPORT FUELS**

**SOME OF THE CLEANEST FUELS IN THE WORLD**

**BUT WHAT IS THE F-T PROCESS?**



# The Fischer-Tropsch Synthesis



Okay, don't let the  
chemistry scare you!

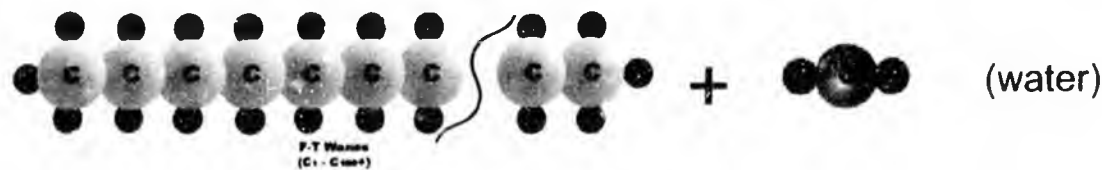
Let's take a look.....



## Three Steps in GTL/CTL/BTL Refining to make F-T Fuels

GTL/CTL/BTL Processes use 3 distinct steps, all commercially proven to convert a gas, liquid or solid into synthetic transport fuels:

- Step 1 - Syn-Gas generation ( $H_2$  & CO)  + 
- Step 2 - The F-T reaction (long paraffin chains  $\rightarrow$  wax)



- Step 3 - Product upgrading (hydrocracking of the long chain F-T paraffin to produce the desired end product – similar to a crude oil refinery)
  - Kerosene – Diesel – Gasoline - Jet Fuel – Naphtha

C<sub>10</sub>-C<sub>13</sub>

C<sub>14</sub>-C<sub>20</sub>

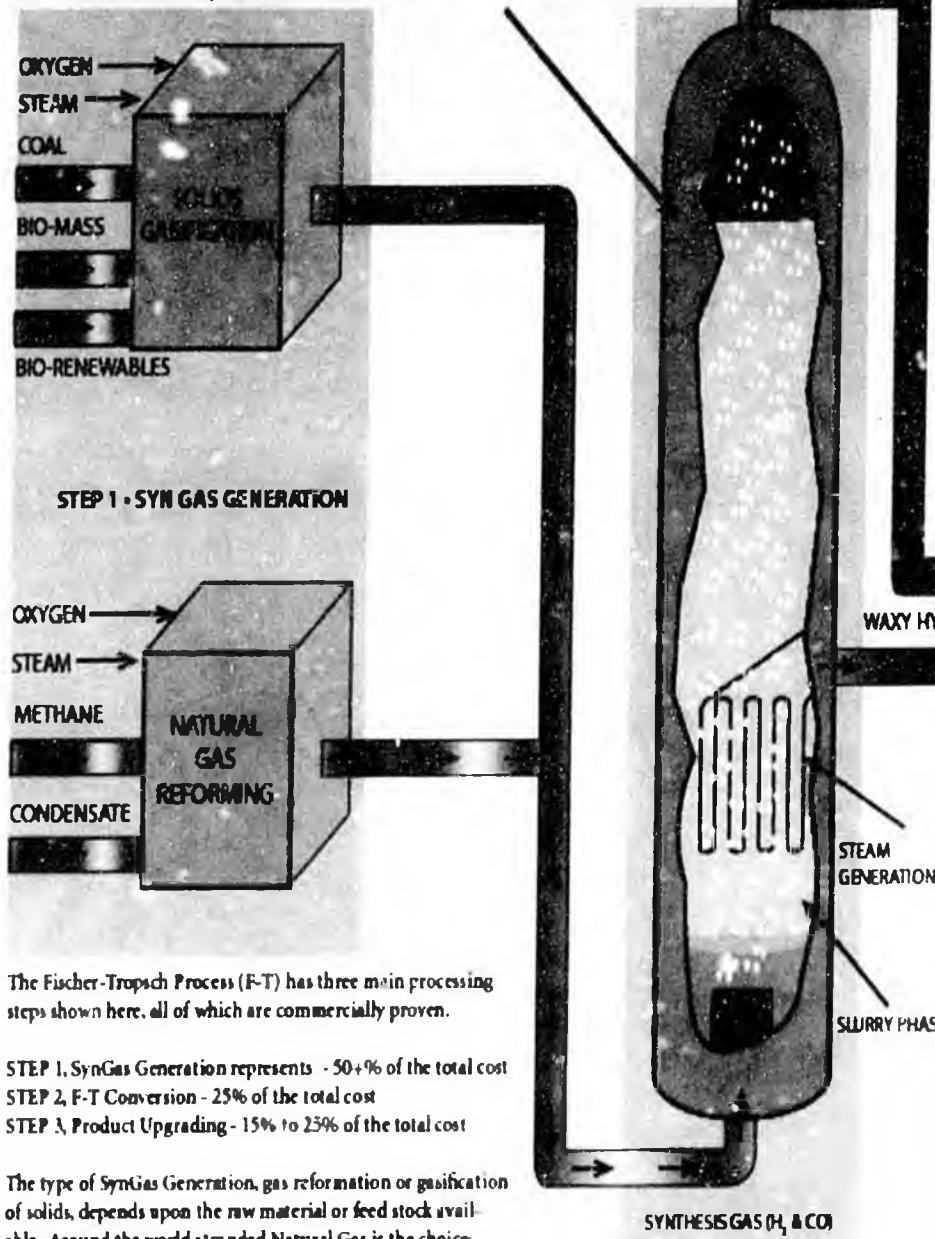
C<sub>5</sub>-C<sub>10</sub>

C<sub>10</sub>-C<sub>13</sub>

C<sub>4</sub>-C<sub>10</sub>

Note: Although the Sasol F-T reactor is illustrated here, the Shell F-T technology (SMDS) is also commercially proven

## FISCHER-TROPSCH REACTOR



# F-T FUELS THE ONE FUEL FOR OUR FUTURE

The first step converts natural gas, coal or bio-mass into synthesis gas, a mixture of carbon monoxide (CO) and hydrogen (H<sub>2</sub>) - syngas.

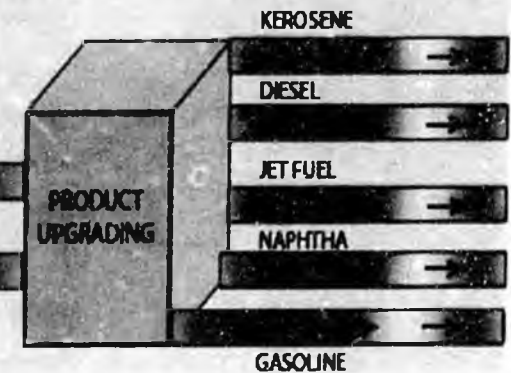


This mature process technology has been used in many commercial facilities as the first step for producing ammonia, hydrogen, methanol.

Sasol and Shell, the recognized world leaders in F-T technology use both gas reformation and coal gasification to produce syngas for its F-T production, called Gas-to-Liquids (GTL) and Coal-to-Liquids (CTL) respectively

F-T FUELS - THE SENSIBLE SOLUTION FOR A NEW GENERATION OF ULTRA CLEAN ENVIRONMENTALLY FRIENDLY DIESEL FUELS

### STEP 3 - HYDROCRACKING - PRODUCT WORKUP



WAXY HYDROCARBON PRODUCTS - C<sub>n</sub> +

CHOREN, a German company has been operating a bio-mass gasifier to produce syngas for methanol and electric production since 1998. This plant is considered the world's first bio-renewable energy gasifier and has the distinction of producing fuels and electricity with a net zero impact on the world's CO<sub>2</sub> and called Biomass-to-Liquids (BTL)

Step two, the Fischer-Tropsch conversion, discovered by the Germans in the 1920's, upgrades the syngas into a waxy hydrocarbon. Simplified this reaction is:



The length of the hydrocarbon chain (x) is determined by the composition (or ratio of H<sub>2</sub> to CO) of the syngas, the catalyst selectivity and the reaction conditions.

Sasol has pioneered several types of F-T conversion technologies to produce over 150 different products from their F-T plants in South Africa alone. The hydrocarbon stream (xCH<sub>2</sub>) is sent to product workup and the water (H<sub>2</sub>O) is sent to the water recovery unit.

The third step, Product Upgrading:

Upgrading can produce a wide range of commercial products from gasoline to diesel to candle wax. For a US based F-T program we would recommend middle distillate fuels: kerosene, diesel and naphtha.

This process makes use of standard hydrocracking and hydroisomerization processes commonly found in the refinery world. As with the First Step of syngas production, suitable technology is widely available from several licensors around the world.

The F-T process produces sulfur free fuels that contain essentially no aromatics or ring chain hydrocarbons that are toxic and harmful to the environment. The CTL/GTL/BTL process does produce CO<sub>2</sub> but it is in a pure stream and is easily contained for sale to third parties or can be sequestered for injection into underground wells.

F-T Fuels, clean fuels for our future that will reduce US dependence on foreign crude oil and products.

The Fischer-Tropsch Process (F-T) has three main processing steps shown here, all of which are commercially proven.

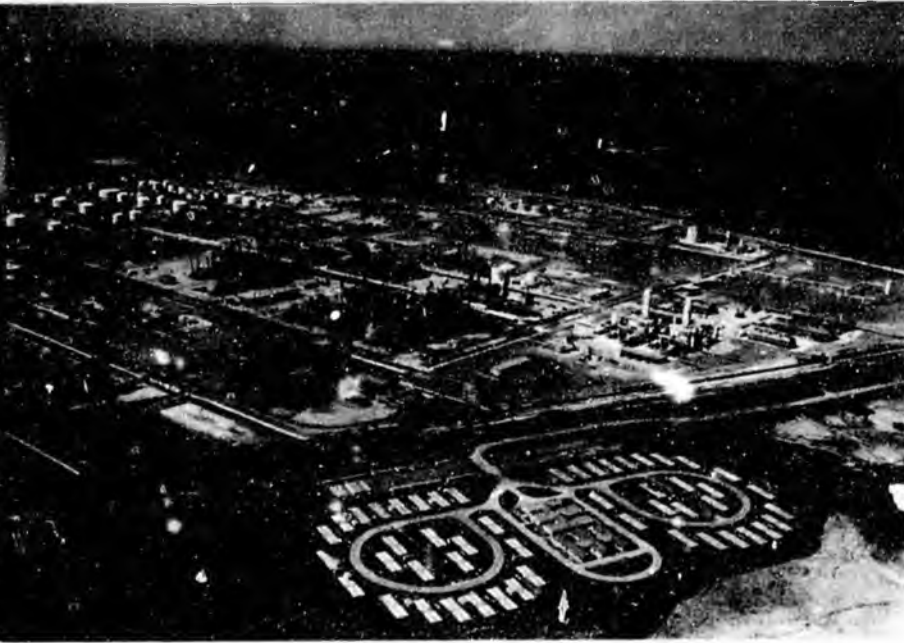
STEP 1, SynGas Generation represents - 50+% of the total cost  
STEP 2, F-T Conversion - 25% of the total cost  
STEP 3, Product Upgrading - 15% to 25% of the total cost

The type of SynGas Generation, gas reformation or gasification of solids, depends upon the raw material or feed stock available. Around the world's stranded Natural Gas is the choice; however, in the US with the exception of North Slope Natural Gas, coal, bio-mass (garbage), bio-renewables (trees and plants) represent the majority of available feedstock for a US based F-T program!

### STEP 2 - F-T CONVERSION



South African Secunda 150,000 BPD Coal to Liquids (CTL)



South African Mossgas 47,000 BPD Gas to Liquids (GTL)



Shell Bintulu 15,000 BPD Gas to Liquids (GTL)

## **THE F-T PROCESS IS COMMERCIAL**

**260,000 bbl/d already proven and  
operational in South Africa & Malaysia**

**500,000 bbl/d coming soon to Qatar**

**230,000+ bbl/d coming soon to China**

**China and India proposing 1+ million  
bbl/d in new CTL plants**



# SYNTHETIC DIESEL

**F-T DIESEL  
AS CLEAN AS CNG**

**U.S. EPA\*  
APPROVED  
NON-TOXIC**



**ZERO SULFUR  
ZERO AROMATICS  
>70 CETANE  
 $PM_{10} \leq$  CNG**

\*EPA Water Docket, EB 57 located at 101 M Street SW Washington DC, 20460 Reference Docket No. W-98-26 in UNOCAL data file 4.A.a.3, Vol 13



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# **GTLs**

# **Facts and Fiction**



# GTL FACTS and FICTION

- Majors not pursuing F-T technology
- F-T Process not Efficient
  - Value vs Efficiency
- Costs of F-T too high
- TAPS - Batching/Pigging can't be done
- American needs natural gas (market)
- Value of Alaska Natural Gas
  - Do the people know Alaska gas isn't going to be cheap?



# GTL FACTS and FICTION

- Majors not pursuing F-T technology
- F-T Process not Efficient
  - Value vs Efficiency
- Costs of F-T too high
- TAPS - Batching/Pigging can't be done
- American needs natural gas (market)
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  - Do the people know Alaska gas isn't going to be cheap?



# WHERE ARE THE MAJORS ON GTLs?

1. In December 2003 ConocoPhillips and in July 2004 ExxonMobil both signed agreements to build 160,000 bbl/day and 150,000 bbl/day GTL plants in Qatar.

They would not have made these commitments if they did not believe in GTLs and possess the skills to build world-scale GTL plants.

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2. Shell, a new player in Alaska, has a 15,000 bbl/d GTL plant in Malaysia, is building a 140,000 bbl/d GTL plant in Qatar as well as designing a 70,000 bbl/d CTL plant in China.
3. Chevron, Sasol's world wide GTL partner, is building a 34,000 bbl/d GTL plant in Nigeria and had proposed a 130,000 bbl/d GTL expansion with Sasol and a new 120,000 bbl/d GTL plant both in Qatar.
4. Marathon completed a pre-FEED study for a 120,000 bbl/d GTL plant in Qatar in 2003.
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Clearly, the North Slope majors possess all the skills necessary to build GTL (F-T) plants worldwide including in Alaska.



# GTL FACTS and FICTION

- Majors not pursuing F-T technology
- **F-T Process not Efficient**
  - Value vs Efficiency
- Costs of F-T too high
- TAPS - Batching/Pigging can't be done
- American needs natural gas (market)
- Value of Alaska Natural Gas
  - Do the people know Alaska gas isn't going to be cheap?





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# PROCESS EFFICIENCY

Some say the GTL process is not efficient with only 65% of the energy contained in the natural gas reaching the end market in the form of transportation fuels.

Like any manufacturing process that “adds value” to its products, the transportation fuels resulting from a GTL plant have a higher value.

Also of importance is that the “lost” 35% really isn’t lost.

It is captured as waste heat and is used to generate electricity, heat buildings and run other processes that need heat, saving valuable natural gas for other purposes.

# GTL vs LNG

## VALUE (\$) VS EFFICIENCY

IS THE LNG PROCESS MORE EFFICIENT - WITH 80 % OF THE WELL HEAD ENERGY REACHING THE MARKET ?  
IS THE GTL PROCESS LESS EFFICIENT - WITH 65 % OF THE WELL HEAD ENERGY REACHING THE MARKET ?

TECHNICALLY, LNG IS A MORE EFFICIENT PROCESS IF YOU JUST LOOK AT DELIVERED ENERGY TO THE MARKET  
IT IS HOWEVER TOTALLY FALSE IF YOU LOOK AT THE VALUE (\$) OF THE DELIVERED ENERGY IN THE MARKET

LNG BEGINS LIFE AS NATURAL GAS  AND ENDS LIFE AS NATURAL GAS 

GTL BEGINS LIFE AS NATURAL  AND ENDS LIFE AS A REFINED PRODUCT SUCH AS DIESEL 

WHILE BOTH ARE CARBON BASED, THEIR VALUES (\$) ARE TOTALLY DIFFERENT

AS AN EXAMPLE:

A LUMP OF COAL AND A DIAMOND ARE BOTH CARBON BASED. UNDER TREMENDOUS PRESSURE AND HEAT (A MANUFACTURING PROCESS), A LUMP OF COAL CAN BECOME A DIAMOND. WHICH HAS MORE VALUE, A LUMP OF COAL OR A DIAMOND? DOES IT MATTER THAT A DIAMOND IS A FRACTION OF THE SIZE OR WEIGHT OF THE ORIGINAL LUMP OF COAL?

IF GTL PRODUCED DIESEL IS MORE VALUABLE THAN LNG DERIVED NATURAL GAS SHOULD YOU CARE IF THE GTL PROCESS IS LESS EFFICIENT IN CONVERTING ENERGY SO LONG AS THE VALUE RECEIVED FOR THE ORIGINAL ENERGY IS GREATER.

WHICH WOULD YOU PREFER ?

A LUMP OF COAL



OR A DIAMOND



LNG PRODUCED NATURAL GAS 

OR GTL PRODUCED DIESEL 

THE CHOICE SHOULD BE SIMPLE  
GO FOR THE HIGHER NETBACK VALUE (\$)



# GTL FACTS and FICTION

- Majors not pursuing F-T technology
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- **Costs of F-T too high**



- TAPS - Batching/Figging

- American needs natural gas (market)

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## GTL PROJECT COSTS?

- 2003 estimate \$25,000/installed barrel
- 2007 actual cost \$32,000/installed barrel
- 2008 Shell Pearl GTL plant \$60,000/ installed barrel (under construction today)
- ANRTL completed a \$1.5 million Pre-Feasibility study for an 80,000 bbl/d CTL project for the Cook Inlet in February 2008. Cost estimates have risen from \$4.6 to \$12 billion from 2005-08.
- The CTL project still pencils out because product prices have risen even more.



## GTL PROJECT COSTS?

- Some of the estimated costs of this Cook Inlet CTL project were derived from the \$250 million Sasol/China engineering study completed in late 2007.
- North Slope GTL plant ~300% higher than the recently completed Sasol GTL plant in Qatar – we use a \$92,000/ installed barrel cost.
- If anything, we believe the projected costs of a North Slope GTL plant program are high.

MINIMUM INFORMATION REQUIRED TO DEVELOP ESTIMATES

| ESTIMATE CLASS        | I  | II   | III  | IV   |   |  |
|-----------------------|--|--|--|--|---|--|
| ESTIMATE TYPE         | <b>P<br/>R<br/>E<br/>L<br/>I<br/>M<br/>I<br/>N<br/>A<br/>R<br/>Y</b> | <b>F<br/>E<br/>A<br/>S<br/>I<br/>B<br/>I<br/>L<br/>I<br/>T<br/>Y</b> | <b>B<br/>A<br/>N<br/>K<br/>A<br/>B<br/>L<br/>E</b> | <b>D<br/>E<br/>F<br/>I<br/>N<br/>I<br/>T<br/>I<br/>V<br/>E</b> | <b>D<br/>E<br/>T<br/>A<br/>I<br/>L<br/>E<br/>D</b>                                  |  |
| ACCURACY RANGE        | +40%<br>To<br>-40%   | +30%<br>To<br>-20%   | +15%<br>To<br>-15%                                 | +10%<br>To<br>-10%   | <input checked="" type="checkbox"/> = Info Required to Obtain Stated Accuracy Range |  |
| PURPOSE               | Screen   | Study  | AFE  | AFE  |   |  |
| GENERAL PROJECT SCOPE | X  | X  | X  | X  | Project Scope, Design Basis, and Execution Strategy                                 |  |
|                       | X  | X  | X  | X  | General Geographic location and Site Requirements                                   |  |
|                       | X  | X  | X  | X  | Special Considerations that Impact Project Costs                                    |  |
|                       | X  | X  | X  | X  | Utilities and Other Infrastructure Requirements                                     |  |
|                       |  |  | X  | X  | Detailed Project Schedule   |  |
| PROCESS               | X  | X  | X  | X  | Block Flow Diagrams w/Primary Flow Steams and Utilities                             |  |
|                       |  | X  | X  | X  | Preliminary PFDs w/Heat & Material Balance  |  |
|                       |  | X  | X  | X  | Engineered PFDs w/Heat & Material Balance, and Preliminary P&IDs                    |  |
|                       |  |  | X  | X  | Engineered P&IDs  |  |



# GTL FACTS and FICTION

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# BATCHING / PIGGING

## Facts and Fiction

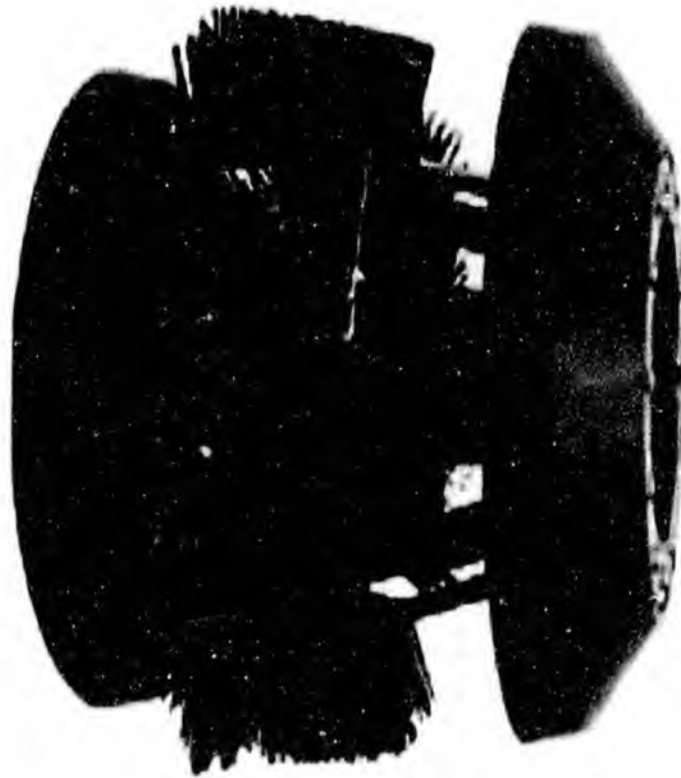
- Batching – Won't work - You can't pig in TAPS
- Batched products will be contaminated
- NGLs with high vapor pressure can't be moved in TAPS
- Ethane – what do you do with it?



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# BATCHING / PIGGING

▪ **YOU CAN'T PIG IN TAPS**



Typical cleaning Pig

▪ **THEY RUN PIGS IN TAPS TODAY**



## BATCHING / PIGGING

- There is no question that the TAPS line can be operated as a dual/multi products/crude pipeline.
- Explorer Pipeline, owned by several major oil companies has successfully operated a 1,400-mile large diameter pipeline carrying a full slate of refined products and crude oil. In fact the Explorer Pipeline model is used in many pipelines in operation today.
- Explorer Pipeline has offered to bring their expertise to Alaska to assist with the design and conversion of TAPS.



# BATCHING / PIGGING

- Batching F-T products and NGLs (Products) without a physical separation between the Products and the ANS crude oil will not work. Further batching of the Products without a physical separation between individual products is not recommended.



**“THE PIG TRAIN”**

- Physical Pigging will allow batch shipping of Products from the North Slope to Valdez.
- The outstanding question is how far can you batch/pig down the TAPS before you need to replace the pig due to wear?



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## BATCHING / PIGGING

- TAPS line can remain viable for moving crude oil produced on the North Slope to Valdez for 50 to 100 or more years.
- GTLs will provide the minimum throughput volumes to keep the TAPS line flowing.
- Incremental GTLs and NGLs will help lower the TAPS tariff resulting in a higher netback price and a higher revenue stream to the State.



## BATCHING / PIGGING

- Once TAPS is modified to carry both crude oil and products, the currently recycled gas stream can be processed to extract additional NGLs for batching to Valdez.
- This allows for the receipt of this NGL revenue stream within a few years, certainly long before a GTL plant could be on line or a gas line to the lower 48 could be built.



## BATCHING / PIGGING

- It is our opinion that the market for North Slope NGLs will be considerably higher at Valdez than at ACEO in central Alberta if for no other reason than the tariff on TAPS is at least 1/3 of the cost to ship on the proposed AGIA gas line.
  - TAPS tariff \$5/bbl (83.3¢/million btu)
  - AGIA tariff \$3/million btu (\$18/bbl)
  - AGIA tariff \$4/million btu (\$24/bbl)



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# BATCHING / PIGGING

- The interior of Alaska operates on a liquid energy economy.
- Batching products down TAPS will provide Interior Alaska with the opportunity to receive lower cost fuels at new delivery points along the pipeline without having to replace their existing energy infrastructure.



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# BATCHING / PIGGING

## **Batched products will be contaminated**

- One of the biggest advantages with a TAPS batching /pigging program is that butanes have been extracted from the gas stream and spiked into the crude oil stream since first flows.
- This same volume of butane will be placed in the front end of the pig train and used to clean the pipe walls of contaminants.



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# BATCHING / PIGGING

## **Batched products will be contaminated**

- The “dirty” butanes will be blended with the ANS crude oil at Valdez.
- If any batched products behind the “cleaning” butanes are also contaminated, the batching program will provide for additional processing at Valdez to remove sulfurs and color.



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## BATCHING / PIGGING

### **NGLs with a high vapor pressure can't be transported in TAPS**

- The lightest products we would recommend for shipping on the TAPS would be propane  $C_3H_8$ . Propane has a vapor pressure of 207 psig at 110°F. This is far below the operating pressure of TAPS.
- Keep ethane in the natural gas as there is no petrochemical industry on the US West Coast. Ethane will be converted into F-T products.



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## BATCHING / PIGGING

Batching / Pigging in TAPS could benefit the AGIA gas line if a gas line is the best option

- Modifying the TAPS line to batch crude oil and products will eliminate the need to transport liquids in the gas line.
- This will reduce the cost of the gas pipeline and make its operation easier, plus make delivery of in-state gas less complicated as you are not dealing with a dense phase gas.



# GTL FACTS and FICTION

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## OIL & GAS NEEDS IN THE U.S.

- The need for imported (additional) natural gas in the U.S. pales in comparison to the need for reducing imported crude oil and adding refining capacity.
- Natural gas has historically sold at a discount to the value of crude oil. Today that disparity is wider.
- Diesel has historically sold at a price at or below regular gasoline. Today diesel sells at a premium to gasoline.
- F-T diesel has in addition to the higher value of crude oil, the value of the refining margin plus a lower tax rate resulting in a market price premium of between \$33 to \$55/bbl over the value of crude oil. (*\$6.2 to \$10.3 / mcf*)



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## OIL & GAS NEEDS IN THE U.S.

- Virtually anyone we talk to has a different opinion on the volumes of natural gas, crude oil and refined transportation products produced, consumed or imported in the U.S. For the purposes of this report, we use information gathered from independent two sources.
- U.S. Energy Information Administration ([www.eia.doe.gov/](http://www.eia.doe.gov/)); and
- The BP Statistical Review of World Energy June 2007 ([www.bp.com/productlanding.do](http://www.bp.com/productlanding.do)).

*This latter document is an excellent summary of world energy and BP should be commended for providing this public service update each year.*



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## OIL & GAS NEEDS IN THE U.S.

- If we look at the six month period from August 2007 through January 2008 (the latest EIA numbers) the U.S. on average produced slightly more than 5 million barrels per day of oil. (note: the EIA data does not include NGLs in the crude oil).
- During the same time period the U.S imported over 10 million barrels per day of crude oil and another 3 million barrels per day of refined products.
- The significance of the latter number is that the nation lacks over 3 million barrels per day of refining capacity to meet current U.S. transportation fuel demands.



## OIL & GAS NEEDS IN THE U.S.

- While U.S. refiners have been adding capacity to existing refineries with process efficiency upgrades, no new refinery has been built in the U.S. since the 1970's.
- This could possibly be one of the reasons why refinery margins have crept up from the \$5 to \$6/bbl range in 1970 - 2000 era to over \$30/bbl in 2007.
- A North Slope GTL plant represents new refining capacity for the U.S. and a potential threat to these higher margins, especially on the U.S. West Coast.
- This is one potential reason GTL's are not be in the forefront of North Slope majors' gas development plans.



## OIL & GAS NEEDS IN THE U.S.

- The U.S. currently (2008) imports roughly 70% of its crude oil/transportation needs. With approximately 13 million bbl/d of transportation fuel demand almost 29% of this demand (approximately 3 million barrels per day) is imported in the form of finished products.
- On an energy content equivalent scale this represents approximately 18 bcf/d of natural gas being imported just to meet the U.S. refinery shortfall.
- This is four times the volume of gas to be delivered through a natural gas pipeline.
- ~78 bcf/d for total transportation needs – 20 times