# WHICH WAY WILL YOU CHOSE?
# ALASKA'S NORTH SLOPE NATURAL GAS
# "WORTH $90 BILLION AS LNG
## OR
# CLOSE TO $600 BILLION AS GTL's"

In a recent interview with Tim Bradner published in the Petroleum News, Alaska Gasline Development Corporation (AGDC) President Keith Meyer said: "Give us a chance" and "Realistically, the governor's initiative is the only game in town". Let's address these two comments.

**First, "Give Us a Chance"**

I wonder if Mr. Meyer realizes that his biggest obstacle in getting the Alaska LNG export project to work is Alaskan's. In Alaska, just because you have an agreement with the State or a taxing authority doesn't mean that next year a different Legislature won't change the rules or the Governor will veto a payment that was agreed to.
As an example Governor Walker should have gone to each company that invested its money to earn the tax credits the law provided and asked them to renegotiate because of the financial problems that the State was going through. He didn't. Companies may have agreed to waive or delay credits or payments. Those who didn't may not be welcome in the State but at least the world would have seen the State of Alaska honor its agreements. This is the single greatest obstacle to getting any mega billion-dollar project in Alaska financed.

*How do buyers or sellers or projects guard against the government changing the rules?*

Many years ago we would enter into natural gas sales agreements with a pipeline or customer and we included "FERC Outs" in the agreement. FERC or Federal Energy Regulatory Commission had the ability to change the rules at any time that could render an agreement uneconomic to a party or parties. Because of this, most natural gas sellers included a provision in the gas sales agreement that said if the FERC or any other regulatory authority introduced a new regulation that caused the seller to receive a lower value, then the seller had the right to re-open the agreement for negotiation. It could be possible that the seller could cancel the agreement.

An Alaska based project has at least two regulators who can change the rules almost at will. The FERC and the State of Alaska. There is always the possibility of the FERC introducing rules that could impact the net back price the seller receives for his natural gas or the price the market will pay for the delivered gas. Today, however the FERC doesn't regulate the transport and sale of exported LNG except if the pipeline crosses state borders – potentially not an issue for Governor Walkers proposed LNG export project. The Alaska Government can change at will the production (severance) tax a producer pays and it has over

the years. The State can also change the property tax a project pays and in fact Governor Walker as an attorney successfully raised the assed value of the Trans-Alaska Pipeline System (TAPS) from its depreciated value back to $9 billion so that communities (and State) could extract more money from TAPS.

In a free market with excess supply, the "end market" will chose to buy its natural gas from a different seller or cause the seller to receive a lower net-back price or the owner of the transportation infrastructure to receive a lower return with a lower tariff if the regulatory and or taxing authorities change the rules. No natural gas seller who has been in the business for more than 20 years is going to commit to sell natural gas without a "FERC Out" or an "AK Out" in the contract. No financial market is going to lend billions to an Alaska LNG export project unless the State of Alaska is prevented from changing the rules to collect more taxes/revenues (money) during the term of the debt service repayment. No end market is going to commit to buy LNG from an Alaska seller where the State can charge higher fees that will be passed on to the end market. Actually today, as Mr. Meyer says with so much competition to supply LNG, the end markets will only pay a competitive "delivered market price".

So for Mr. Meyer to have any potential chance to succeed with the Alaska LNG export project he will need Alaska to change how it does business. That means that the people of Alaska will have to stop saying "it's our resource" and we will change how we tax the project to meet our financial needs and start saying we will live with whatever contract the Administration and Legislature agrees to, for the term they agree to.

We are told this will take an amendment to the State Constitution. Something Administrations over the past 20 years have promised to pursue but haven't yet done so. Governor Walker had the opportunity to do this in early 2016 and chose not to. We hope Mr. Meyer can get Governor Walker on board with this issue because if he can, it will improve the chances of financing all mega projects in Alaska including a much better GTL option.

**Second, "Realistically, the governor's initiative is the only game in town", says Meyer**

***Really? We think there is as much as $600 billion or $500 billion more in additional revenues from a GTL program than from a LNG program.***

Unfortunately, Mr. Meyer's view may be governed by his three-year employment contract. Get an Alaska LNG project approved and we will add to your base $1.5 million employment contract. As the highest paid member of the Alaska Government, Mr. Meyer has a laser focus on this end goal. But is an Alaska gas line and LNG export project the best use of this resource? Will it netback the highest revenue to the North Slope – to the State of Alaska?

How does the State of Alaska see revenue from the sale of its oil and gas resources? The State of Alaska traditionally will earn revenue from four sources. Royalty, production tax, state income tax and property tax.

1) As a 1/8th royalty owner the State owns 12.5% of the natural gas. Royalty ownership is usually fixed for the life of production. Thus if you sell $100 worth of natural gas the State receives $12.5.

2) The State charges the producer a tax when the gas is produced and sold called a production tax. This is one area where the State has been adjusting the level of the tax over the years to support higher levels of government spending. When the leases were first sold to the majors back in the 1960's the production tax was around 4%. Today its 35% for oil and gas and nothing prevents the State from raising the tax to any number it wants to. The producers have been negotiating with the State on the production tax rate for natural gas with a target around 10% to 12%.

3) The third area for the State to receive income is through a State Income tax. The Alaska Corporate State Income Tax is among the highest in the U.S.

4) The fourth area where the State receives revenue from the North Slope natural resources is a property tax. That tax is on the assessed value of the facilities used to produce and transport the natural gas or crude oil to the State boundary line. The maximum property tax rate is 22 mils or 2.2% of assessed value. In the case of TAPS that is a maximum 2.2% of $9 billion or $198 million per year. In the case of the proposed Alaska gas line and LNG export project, even at the low estimate of $45 billion that could be as much as $990 million per year. Since many taxing authorities begin charging property taxes from the first day of construction even if the facilities are not placed into operation for years, the potential facility owners are negotiating with the State to lower the tax rate during the construction years when there is no sales from which to recover these costs.

What then is the gross value of the 35 trillion cubic feet of natural gas contained in the BP operated Prudhoe Bay Unit and the ExxonMobil operated Point Thomson Unit?

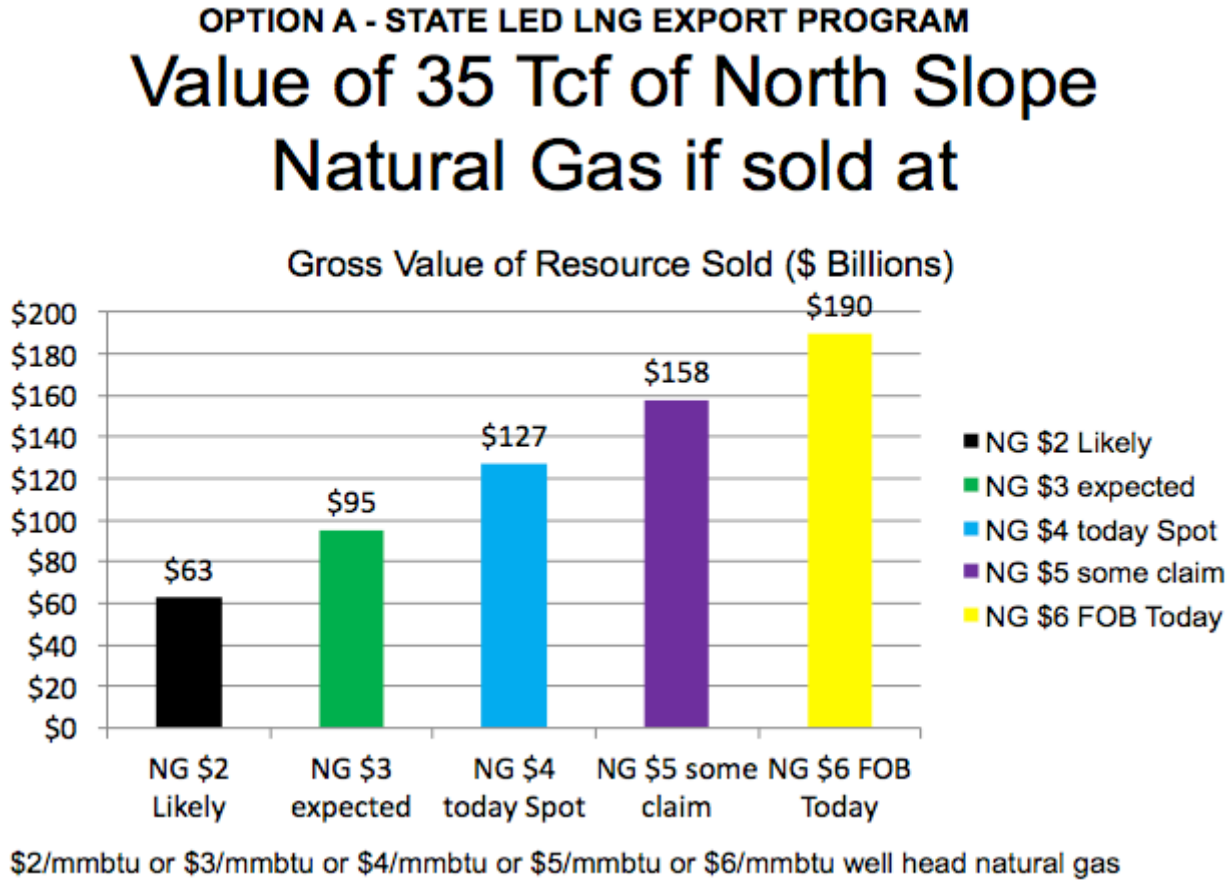
Let's understand how natural gas is sold.

Natural gas is sold on the basis of $ per 1,000 cubic feet. Gasoline for your car is sold on the basis of $ per gallon. So 35 trillion cubic feet of natural gas is really 35 billion units of natural gas for sale. In addition, the natural gas for the LNG project needs to be of pipeline quality. That is, free of water or other contaminates like $CO_2$. Since the Prudhoe Bay Unit natural gas has 12% $CO_2$ that has to be removed before the sale, effectively the 35 billion cubic feet is actually only 31.6 billion cubic feet of saleable natural gas. If one could sell the natural gas at $2/unit, it would generate $63.2 billion dollars of gross revenue.

Mr. Meyer said that if the Alaska project could peg prices to an index like Henry Hub that is tied to gas markets instead of linking prices to crude oil, "*This is attractive for a large utility which is very sensitive to the volatility in oil prices, and we've already gotten some positive feedback on that idea"*. Well what is the future price for natural gas at the Henry Hub? Some indices say that the forward price for natural gas is $4/unit in 2029. In 2015, Henry Hub prices were in the $1.65 range so this is a big improvement. Interestingly though August – September 2016, spot prices for LNG delivered to Japan are in the $4/unit range and long term contract prices are in

the $6/unit range – THAT'S DELIVERED TO JAPAN. At these prices the net back to the Alaska North Slope would be negative. Let's be optimistic and see what the gross revenue for natural gas sales would be if you received $2, $3, $4, $5 or $6 at the wellhead (North Slope).

The chart below illustrates these gross revenue streams.




So depending upon what you think natural gas will net back to the North Slope, you could expect to see from $63 billion to as much as $190 billion. Realistically with the forward price of natural gas at the Henry Hub in 2029 being $4/unit, maybe $3/unit is a reasonable price. If so, the project would see $93 billion in gross revenue from the sale of natural gas on the North Slope over the approximate 25 years of life.

*Where does the 25 years come from? Simply speaking, if the North Slope has 35 trillion cubic feet of proven natural gas (some say the number could be as high as 100 trillion) and the Alaska LNG project will take 3.5 billion cubic feet per day – their projected number, then you will run out of natural gas in 27 years. It's a lot more complicated than that in real life so who knows what the real project life will be.*

Back to the comment: ***"the governor's AK LNG initiative is the only game in town"***.

Well we say that's not absolutely true. While it has been the dream (Pipe Dream) of all Administrations all the way back to the startup of the Prudhoe Bay field in the 1970's, there has always been a potential alternative called gas to liquids or GTL's. Historically GTL's have been a terribly expensive process plus only a handful of companies had mastered the technology. Today only three companies in the world, PetroSA, SASOL and Shell have commercial scale GTL plants operating.

Both SASOL and Shell have completed GTL plants in the 2007 to 2012-time period. Sasol's 35,000 barrel per day Oryx plant cost about $1.4 billion or about $40,000 per barrel of installed capacity and Shell's 140,000 barrel per day Pearl plant completed in 2012, close to $10 billion or about $70,000 per barrel of installed capacity. Sasol had also proposed in 2012, a 98,000 barrel per day GTL plant for Louisiana costing close to $8 billion as part of a $20-billion-dollar petro-chemical complex but the crash in crude oil prices has placed most of that project on hold. Interestingly, ExxonMobil and ConocoPhillips both signed agreements in the 2003-4 era to build large scale GTL plants in the same region as Sasol and Shell but those projects were halted for a variety of reasons.

Many in Alaska still said GTL's are just too expensive to be a viable option. But then the price tag for the Alaska Gas Line and LNG Export came in. $45 to $60 billion dollars. Really, and people thought GTL's were expensive. The 140,000 barrel per day Shell Pearl GTL plant, far more complex than one would build on the North Slope, cost $70,000/installed barrel of capacity. Double it, triple it and the cost of a 210,000 barrel per day GTL plant in Alaska still costs less than the AK LNG project $45 billion low estimate.

***The capital cost of an energy facility is one big issue but the value of the products that the process makes and sells may be far more important.***

The LNG process starts as natural gas, freezes it to reduce transport costs, re-gasifies the LNG and sells the natural gas to the end market. It starts life as natural gas and ends life as natural gas. The GTL process takes the same natural gas and chemically changes it into a liquid such as diesel, jet fuel, a petrochemical feedstock or a simple synthetic crude oil. *Liquids usually have a higher energy density and sell for a higher value than natural gas.*

Using Sasol or Shell's existing GTL technology, 35 trillion cubic feet of North Slope natural gas will produce over 4.2 billion barrels of liquids. Even if you just sold these liquids as a simple crude oil at today's price of $50/barrel, you would generate over $210 billion dollars of gross revenue. Most people feel crude will stabilize at $70/bbl in the near future. If correct, the value of these liquids is more than $290 billion. If crude returns to $100/barrel this number is over $400 billion.

**Build a new expensive pipeline or use an existing underutilized pipeline.**

How do you get these synthetic crude oil products to market? Simple, use the existing Trans-Alaska Pipeline System or TAPS. Originally designed to transport over 2 million barrels per

day of crude oil to Valdez it's now running at less than ¼ of capacity. In fact, many have said that as TAPS volumes drop below 300,000 barrels per day, $ billions may be needed to modify the pipeline to accommodate the low flow. A North Slope GTL program may eliminate this very costly issue for the next 50 years.

GTL's are far more valuable than simple crude oil. They are closer in value to that of finished products at the tailgate of a refinery although many will say even more valuable. Why? Because GTL's are so much better for the environment. They contain no sulfur or aromatics which cause smoke in the exhaust. Many value GTL's at $30 to $50 per barrel higher than crude oil. However, to recover this higher value you need to isolate the GTL's from other products while being transported from the North Slope to Valdez in TAPS. While never envisioned in TAPS' initial design, it can be done and has been done in other large diameter long distant pipelines like the Explorer pipeline running from Houston to Chicago.

***There is even more potential! GTL's can help recover billions of barrels of heavy and viscous crude oil generating $ billions more for Alaska.***

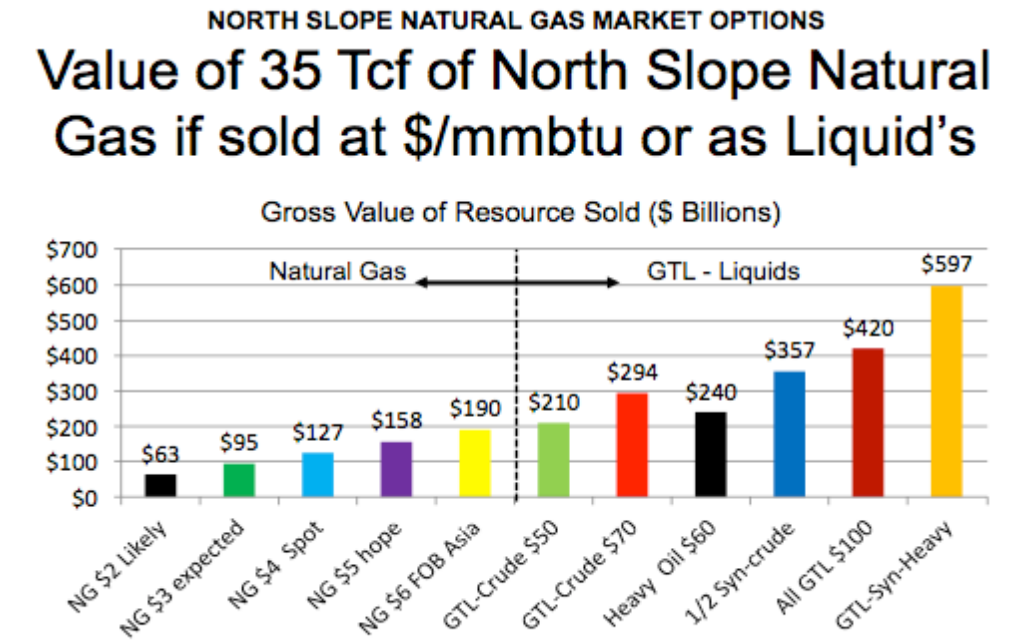
The North Slope contains from 12 billion to over 30 billion barrels of heavy crude oil. This heavy crude lies above the traditional Alaska North Slope crude reserves and in many locations too close to the permafrost so that heat, used in many locations around the world cannot be utilized. BP has employed mechanical heavy oil recovery programs with limited success. ConocoPhillips has been using a program with butane and propane with good success for viscous oils that could be improved with GTL liquids. Because the North Slope heavy crude resource is so shallow the use of a diluent may be the only way to recover it. Where do you get diluent if you are on the North Slope a thousand miles from a refinery?

The lighter end of the GTL product stream called naphtha is an excellent diluent. A diluent is mixed with heavy crude around the world to help it flow both underground and in pipelines. Have you ever used gasoline to wash away tar? Similar principle. The diluent is pumped down into the reservoir and you sort of melt the heavy crude so it can be recovered and brought to the surface.

Let's assume that you can only recover 1/3 of this heavy oil. That means at least 4 billion barrels of additional crude can be recovered from the North Slope. Heavy crude oil will sell for less than traditional Alaska North Slope crude oil. Let's say that heavy crude will receive $60 per barrel. This means that an additional $240 billion of revenue will be generated. The advantage of using a diluent to recover this heavy crude oil is that it can remain in the oil stream assisting this heavy crude as it flows down TAPS to Valdez. It is then recovered at the refinery and has a higher value than the base heavy crude oil.

If you value all of the GTL's as a synthetic crude oil at $70 per barrel and add in the additional heavy crude oil at $60 per barrel, you have generated close to $540 billion in revenue. If you utilize batch pigging to separate the different grades of products and crude oil in TAPS, you can generate close to $600 billion of revenue from the 35 trillion cubic feet of natural gas. Something to think about.

This chart below illustrates what we are talking about.




No it won't be easy to do. It will require a different approach to how natural gas is utilized on the North Slope and how TAPS is operated in the future. North Slope natural gas was utilized for the past 30 years to help recover over 4 billion barrels of additional ANS crude oil. It can still be used to aid in the recovery of billions more of heavy crude oil. A North Slope GTL program will also guarantee TAPS will be operating for 50 more years at a lower tariff than without GTL's.

The only thing a GTL program doesn't initially do is build a gas pipeline down through the Rail Belt. But it does generate 3 to 5 times more revenue for the State. A portion of that can be utilized to help build a smaller in-state gas line down through Fairbanks to Anchorage – "ASAP". Potentially a smaller scale GTL plant can be built in Anchorage to support a larger gas throughput, lowering the tariff plus produce jet fuel and diesel to supply the Anchorage area and U.S. Military Pacific Rim operations.

**So we like say that there is more than one game in town but you have to think outside the box.**