ALASKA STATE LEGISLATURE
LEGISLATIVE BUDGET AND AUDIT COMMITTEE
January 28, 2014
5:37 p.m.

MEMBERS PRESENT

Senator Anna Fairclough, Chair
Senator Kevin Meyer
Senator Donald Olson

Representative Alan Austerman
Representative Bob Herron
Representative Andy Josephson

MEMBERS ABSENT

Representative Mike Hawker, Vice Chair
Representative Scott Kawasaki (alternate)
Representative Bill Stoltze (alternate)
Representative Kurt Olson

Senator Click Bishop
Senator Cathy Giessel
Senator Mike Dunleavy (alternate)

OTHER LEGISLATORS PRESENT

Senator Coghill
Senator Huggins
Senator Dunleavy
Senator Wielechowski

Representative Feige
Representative Hughes
Representative Gara
Representative Gruenberg
Representative Thompson
Representative Saddler

COMMITTEE CALENDAR

PRESENTATION: NATURAL GAS MARKET OUTLOOK & FUNDAMENTALS OF THE LNG BUSINESS

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

JANAK MAYER, Partner
Enalytica
POSITION STATEMENT: Presented a PowerPoint titled "Natural Gas Market Outlook & Fundamentals of LNG Business."

NIKOS TSAFOS, Partner
Enalytica
POSITION STATEMENT: Presented a PowerPoint titled "Natural Gas Market Outlook & Fundamentals of LNG Business."

ACTION NARRATIVE

5:37:53 PM

CHAIR ANNA FAIRCLOUGH called the Legislative Budget and Audit Committee meeting to order at 5:37 p.m. Senators Fairclough and Meyer, and Representatives Austerman, Herron, and Josephson were present at the call to order. Senator Olson arrived as the meeting was in progress. Also in attendance were Senators Coghill, Huggins, Dunleavy, and Wielechowski, and Representatives Feige, Hughes, Gara, Gruenberg, Thompson, and Saddler.

Presentation: Natural Gas Market Outlook & Fundamentals of the LNG Business

5:39:03 PM

CHAIR FAIRCLOUGH announced that the only order of business would be a presentation on the outlook and fundamentals of the LNG business and the natural gas market. She clarified that the Legislative Budget and Audit Committee had cancelled the contract with PFC Energy after its acquisition by IHS during the previous year. She declared that the development of trust through years of consistency and professionalism had led the Legislative Budget and Audit Committee to authorize a contract with Janak Mayer and Nikos Tsafos for the 2014 State of Alaska legislative session. She reported that they were available to discuss the modeling and analysis of natural gas and LNG. She explained that the process for requesting information from these

consultants would be the same as in the previous legislative session.

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JANAK MAYER, Partner, declared that he was a partner in the newly formed energy advisory firm, Enalytica. He reported that this was his third year working with the Alaska State Legislature on gas and oil issues. He noted that he had previously consulted as an employee of PFC Energy "on issues of oil fiscal terms and fiscal terms reform." He explained that the core of his work was based on modeling for fiscal terms analysis and understanding with governments and international companies for different oil and gas portfolios in different regimes and environments.

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NIKOS TSAFOS, Partner, shared that he had spent 7.5 years working with PFC Energy in global gas practice, and he had worked globally with companies consulting "on every single aspect of the oil and gas industry." He expressed his excitement to advise the State of Alaska on its "path to commercializing gas from the North Slope."

CHAIR FAIRCLOUGH specified that all of the documents were currently available on BASIS, as well as on the Legislative Budget and Audit Committee website.

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MR. TSAFOS declared that he would talk about natural gas markets and fundamentals of the Liquefied Natural Gas (LNG) business. He noted that he would finish with a focus on the implications for Alaska.

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MR. TSAFOS directed attention to slide 2, "Gas and LNG Market Fundamentals are Strong." He noted that gas was "a great part of the energy mix," and that the world was becoming more aligned with natural gas. He shared that the expectation for energy demand would grow at 1.2 percent, while the demand for gas would increase by 1.6 percent. He stated that 24 percent of the total energy would come from natural gas, up 3 percent from 2011. He projected that the growth of demand for natural gas from now until 2035 would be 31 percent. He opined that this was a good

time for the state to develop its natural gas, sharing that 70 percent would be consumed near the production point and 30 percent would be transported. He pointed to this market for transported gas, projecting that 67 percent would be delivered through the pipeline and 33 percent would be LNG. He reported that LNG demand was the fastest growing part of the gas market, growing four times faster than overall gas demand in the last decade. He projected that the future demand for LNG would be twice as fast as the overall consumption of natural gas. He suggested that the projected gas market should include Asia, as its proximity would be a great advantage for the state in supplying the region. He offered his belief that a lot of suppliers were trying to capture that market. He stated that a key question for both buyers and investors was "Why Alaska?" He reported that gas was very different from oil in many ways, and the most profound difference was for pricing. He declared that, while the world oil market traded primarily around a determined price, there was not a similar pricing for gas. He explained that there were huge disparities for gas pricing.

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MR. TSAFOS moved on to slide 3, "LNG Projects Are Big, Complex And Multi-Layered," and highlighted that the history of commercial LNG projects in Alaska reflected both similarities and differences from pipeline projects. He stated that, although both were natural gas, the business structures were different. He pointed out that, although LNG projects take years, even decades, from first discovery to commercial production, the investors only make an initial huge investment and then enjoy its benefits. The key question was whether it was worth making the initial investment. He opined that, after the initial investment, there would be long term revenue. He stated that there was not a standard way to structure an LNG project. As each project was big, complex, and different, everything comes from negotiation, which allowed an enormous potential for a win-win situation to all investors. He shared that research on state project involvement reflected that an entire range of outcomes was possible. He noted that states could be regulators and tax levying authorities with no equity or participation, or they could have complete ownership. He emphasized that there was not a given path to participation or investment.

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MR. TSAFOS described a long precedent of LNG projects to local markets. He pointed to the gas which had been sitting without an outlet for development, stranded gas, but was now being developed for local markets, as well as for export. He described a key for these projects to be risk management and mitigation, including finance, marketing, and price review clauses. He declared that the flexibility of negotiations using risk mitigation methods could allow for a comfortable risk - reward structure.

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MR. TSAFOS pointed to slide 4, "Alaska Has Many Ways To Participate In LNG Project." He explained that the broad point to highlight was that there were a lot of decisions for the amount of state participation, and that there was not a precedent for involvement. He clarified that this only required willing counterparts. He pointed out that he knew of two LNG projects with only one owner, as most projects involved many equity partners, governments, and banks.

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MR. MAYER explained that he would offer an overview of the fundamentals of the natural gas market and its future outlook, slide 6, "Energy Demand Has More Than Tripled Since 1960." He stated that gas was an increasing part of the energy story, and that this was a good time for a state with substantial gas resources to study ways for bringing it to market. He declared that energy demand had more than tripled since 1960, with oil being used primarily for transportation, while coal and gas were used more for power. He added that nuclear and hydro power contributed about 7.5 percent of the overall power. He noted that 10 percent of worldwide power was provided by biomass, most often wood and waste for heat and cooking fuel in developing countries. He pointed out that, with development, the use of biomass fuel would gravitate toward coal and gas.

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MR. MAYER discussed the projected increase in population and energy use for the next 20 years, slide 7, "Strong Fundamentals Support Higher Energy Use." He noted that the majority of population increase would be in cities, and would desire energy producing materials. He suggested that this would bring greater energy efficiency. Moving on to slide 8, "IEA Forecasts Energy To Grow At 1.2% by 2035," he stated that gas would account for

31 percent of the growth, an annual 1.6 percent growth rate. This would increase the gas share of total energy use from its current 21.3 percent to 23.7 percent. He allowed that there would be a lot of need for a gas resource, which was good for the state.

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MR. MAYER displayed slide 9, "Gas Units And Conversions," which translated the terms for future conversations, emphasizing the conversion of barrels [of oil] to cubic feet and the subsequent conversion of cubic feet to heating units. He explained slide 10, "Only 30% Of Global Gas Is Traded [Vs. 64% Of Oil]," noting that only 30 percent of gas ever crossed an international border, as the remainder was consumed in the country from which it was produced. He reminded the committee of the difficulty for transporting gas, all of which required large amounts of capital, in either a pipeline or LNG flasks. He reported that Europe and Asia were the biggest import markets for gas, accounting for 71 percent of gas imports. The former Soviet Union had the greatest surplus of gas, exporting 26 percent. He recounted that the United States, Mexico, and Canada produced and consumed about 27 percent of the world's natural gas. He stated that, of the 30 percent of natural gas transported across borders, almost 70 percent was via pipeline, with the remaining 30 percent being LNG.

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MR. MAYER introduced slide 11, "More Than Half [58%] Of Gas Trade Within Regions," and detailed that most of the 30 percent of gas transported across borders stayed within a region. He offered examples of trade from the former Soviet Union to Europe and to Asia, and gas from the Middle East and North Africa to Europe.

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MR. MAYER addressed slide 12, "IEA Puts Gas Demand Growth At 1.6% Through 2035," stating that the overall energy demand would grow at 1.2 percent, but that the demand for gas would grow at 1.6 percent. He pointed out that there would be 18 percent growth in the developed countries, but 82 percent growth in developing countries, with 44 percent of this demand in Asia and almost 20 percent in the Middle East.

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MR. MAYER moved on to slide 13, "LNG Market Was 31.7 BCF/D In 2012," and explained that Alaska had a potential to supply 2 billion cubic feet per day of LNG to the world LNG market demand of almost 32 billion cubic feet each day. He stated that the Middle East had the largest surplus of LNG, while Asia had the biggest deficit, requiring 70 percent, with Europe requiring 21 percent. He added that South America and the Middle East had also recently begun importing LNG, about 6 percent of the total. He pointed out that Africa, namely Nigeria and Algeria, exported about 16.5 percent of the surplus LNG.

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MR. MAYER furnished slide 14, "Qatar Is By Far Largest LNG Exporter [32.6% Total]." He established that Qatar was "by far the world's biggest LNG exporter at the moment" with almost 80 million tons in 2012. He predicted that Australia, with its current production schedule, would surpass Qatar in production by 2025 to become the largest LNG producer worldwide. He listed Qatar, Malaysia, Australia, Nigeria, Indonesia, and Trinidad as the primary suppliers of LNG, almost 75 percent.

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MR. MAYER offered slide 15, "LNG Demand Concentrated Among Few Buyers," which listed Japan and Korea as the two markets for almost 50 percent of the demand for LNG. He pointed out that inclusion of China, Spain, India, and Taiwan accounted for 75 percent of demand, and that, except for Spain, all were in Asia. He indicated that 15 other countries imported less than 2 percent each of global demand, but more and more countries were importing LNG.

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MR. MAYER summarized slide 16, "LNG Demand To Grow 3.8% A Year To 2030," observing that Asia was the dominant market with almost 75 percent of the growth for LNG demand.

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MR. MAYER described slide 17, "Many Possible Suppliers, Many Risks To Manage" and detailed that, although there were many potential supply countries, all of them had many challenges, including permitting, high costs, and local demand priorities.

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MR. MAYER reviewed slide 18, "Gas Pricing Structures Highly Variable," declaring it was important to understand that, although oil had a mostly single worldwide price, gas price varied enormously around the world, "between countries and even within countries." He listed several key approaches in the pricing of gas: price is set solely on the balance of supply and demand, per the Henry Hub gas price in the US, and the national balancing point in UK; price is set against a substitute fuel, as in Japan, or for its end use, as in Trinidad; price is set solely against an arbitrary fixed price, such as Equatorial Guinea.

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MR. MAYER confirmed slide 19, "No Such Thing As A Global Gas Price," reporting that the price in 2012 ranged from an average of $2.76 Henry Hub price in the U.S., more than $11.03 in Germany, and $16.75 in Japan.

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MR. MAYER presented slide 20, "No Such Thing As An "Asian" Gas Price," explaining that there was a substantial difference to price ranging from $17.81 in Japan to $11.52 in China in 2012. He noted that the range in price was often determined by when the contracts were signed.

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MR. MAYER directed attention to slide 21, "Pricing Can Vary Even Within Countries," noting the enormous disparity of individual contracts for import costs of LNG to Korea, $6.40 from Russia to $19.25 from Norway.

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MR. MAYER assessed slide 22, "Gas Pricing Is Undergoing Fundamental Changes," and explained that there were surplus cycles within the global gas market, which could create great times for buyers as suppliers were in competition with each other. He analyzed that these surplus cycles allowed movement toward "mechanisms that are about the marginal cost of supply," which he defined as the capital the supplier had to invest for production, with a reasonable rate of return. He considered the times of shortage to be a seller's market, which allowed the

price of gas to be only slightly lower than the cost of a substitute fuel. He declared that timing was "absolutely everything." He projected that the outlook for post 2020 would be driven by the "outlook for all the other projects that are coming on-line, how quickly we see those moving forward, how the strategy of importers changed during that time." He pointed to the excitement of the large Asian utilities for gas prices linked to the Henry Hub, rather than to oil prices. He observed that the response of the large existing suppliers would also fundamentally affect the price outlook. He concluded that fundamentals for gas, specifically the LNG market, were very strong, and that this was a great time to have a large gas resource and to be looking for a market.

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MR. MAYER reviewed slide 23, "Gas And LNG Market Fundamentals Are Strong". He pointed out that, although the demand for gas, 1.6 percent, was growing faster than the demand for energy, 1.2 percent, the demand for LNG had been growing four times faster than the overall demand for gas during the last decade. The demand growth in Asia makes it the focus of the Alaska market; however, there were many supply options, which could create a downward pressure on pricing. He reiterated that suppliers must compete in the pricing, as gas pricing was "still about the micro, rather than the macro. There's no global price, there's no regional price, there isn't even a country price. Micro is everything."

CHAIR FAIRCLOUGH affirmed that it was necessary to understand the big picture, and that this report was a summary of an earlier five day presentation. She relayed that the earlier presentations were available to review on the Legislative Budget and Audit Committee website.

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MR. TSAFOS, presenting the fundamentals of the LNG business, emphasized that the details really mattered. He indicated slide 25, "Big Upfront Investment, Long-Term Revenue," which was a graphic representation of the initial investment for long term benefits. He highlighted that generally the long-term economic risk was for a subpar, or less than optimal, rate of return rather than the outright loss of money.

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MR. TSAFOS commented on slide 26, "LNG Projects Move On Many Parallel Fronts." He established that many of the project pieces moved together, and required a lot of time before construction. He spoke about the front-end engineering and design studies (FEED and pre-FEED) which preceded the final investment decisions (FID). He emphasized that, prior to construction and FID, most of the worries should have been studied and answered, before any great investment.

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MR. TSAFOS stated that, as the overall objective of an LNG project was for sales, it was key to secure a counter party which committed to buy the gas, slide 27, "Basics: LNG sales and purchase agreements (SPAs)." He explained that the sales and purchase agreements (SPAs) were long term contracts with many components, including destination, duration, start date, quantity, flexibility, and pricing structure. He specified that the conflicts between states and companies were often based on an understanding of the destination clauses, where the gas was allowed to go and under what conditions. He explained that this was crucial as it reflected a share of value under different conditions. He explained that most contracts were "take or pay" which meant that payment was for how much gas was taken, and not based on its use; otherwise, any commitment to sales volume which could be reduced or cancelled made the contract worthless from a stability and predictability perspective. He listed gas quality, whether it contained liquids, CO2 or other impurities, profit sharing related to destination, non-compliance, renegotiation clauses in contracts for either periodic review or changes in fundamentals, and when the title of gas ownership transfers from seller to buyer as important components of the SPAs.

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MR. TSAFOS indicated slide 28, "LNG Exports Often Linked To Domestic Gas Sales" and relayed that a large number of LNG projects had a domestic component, including Yemen, Angola, Malaysia, Australia, and Indonesia, requiring that a certain percentage of gas be sold to the local market.

MR. TSAFOS moved on to slide 29, "Integrated Projects Distribute Value Internally," focusing on the importance for the distribution of value in the pricing. He described the three structures for a project. First, he detailed an integrated project which included ownership of the upstream production and

the liquefaction facility, with sales to another buyer. He pointed out that, as the facilities all belonged to the same company, the only important price was that to the buyer.

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MR. TSAFOS directed attention to slide 30, "Infrastructure Owner Drives Pricing." In this second scenario, the liquefaction facility bought the gas from the upstream producer and then later sold it to a buyer. The profit was determined by the price to buy and the price to sell. He presented three examples which each reflected that the amount of the profit depended on the economics of your place in the line of transaction. He emphasized that the same commercial structure could have very different outcomes for the distribution of value.

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MR. TSAFOS discussed slide 31, "LNG Akin To Pipeline: Pay A Fee To Use Facility," which described a tolling structure, in which the pipeline owner and the liquefaction owner were simply paid a fee with no ownership of the gas, therefore the relevant pricing was between the supplier and the buyer.

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MR. TSAFOS focused on slide 32, "There Is No "Right" Project Structure" as the project was driven by the resource base. He explained that an integrated project was simple, as there was one transaction point, but it was not very flexible as everyone was in the same ownership. He stated that a merchant project could accommodate new gas supplies, but, as it required two transactions, this could cause tension if there was inconsistency between the supply and the demand price. He pointed out that a tolling project was adaptable and scalable, but it was necessary to agree on the tolling fee as well as access to the infrastructure. He declared his desire to familiarize the committee with the range of material to allow for deeper discussions at a later time.

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MR. TSAFOS examined slide 33, "State Participation In LNG Projects Varies Greatly," and stated: "You name it, it happens." He clarified that government equity ranged from not interfering other than to tax or regulate the companies to full

government ownership. He highlighted that government equity was most often managed through national oil companies.

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MR. TSAFOS referred to the aforementioned development risks, slide 34, "LNG Takes Time, Often Decades, From First Discovery," noting that Alaska was not peculiar as other projects had taken 20-30 years to be developed. He focused on the fact that very few LNG projects had ended with the same project structure from which they started, slide 35, "Partner Alignment Crucial For LNG Development." He shared that, most often, partners pulled out and others came on, which he declared to be "a crucial element of getting everyone on board" in order for the correct partnership to develop.

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MR. TSAFOS assessed the most serious risk, prior to start of the project, to be delays and cost overrides, which he listed on slide 36, "Development Risks." He suggested that the tendency was for "late and over budget." This accounted for the current variation in the cost analysis for Alaska.

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MR. TSAFOS relayed his desire to clarify the risks involved in this equity venture, as it would better explain the economic modeling, slide 37, "Technical Challenges Can Lead To Frequent Outages." He reported that outages were a risk, as project utilization ranged from 60 - 90 percent. He reminded the committee that these outages could lead to subpar returns; though not losing money, not earning as much as projected. Introducing slide 38, "Supplying Local Markets Can Divert Gas From LNG," he stated that a local market could take political priority over exports, and should be considered in the economic assessment.

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MR. TSAFOS said that natural decline, as on the Kenai, had to be managed to meet contractual obligations, in order to mitigate any penalties, slide 39, "Feedstock Maturity Can Lead To Rapid Decline." Moving on to slide 40, "Demand Shock Led To Output Losses- But Long Ago," he reflected that during the 1980s and early 1990s, if the demand diminished, then production was curtailed; however, in the LNG market today the risk was greater

for a lower price, rather than for output demand, slide 41, "Price risk more important than volume risk."

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MR. TSAFOS suggested that mitigation for this volume risk in half the LNG projects included sales to a project partner. Although underperformance did not lead to any penalties, it often led to third party financing, slide 42, "Buyers Often Take Equity| Partners Off Take LNG."

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MR. TSAFOS explained that collateral for LNG project financing was based on the future revenue stream, slide 43, "Project Finance Well Established In LNG". He noted that this allowed access to third party financing from commercial banks, private sectors, and credit agencies. He suggested that a large portion of financing for an Alaska LNG project could come from third party financing, as reflected on the list on slide 43.

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MR. TSAFOS explained that there could be any pricing structure, especially if the downside risk was reduced by providing a ceiling on prices, slide 44, "Pricing Formula Can Reduce Price Volatility." He declared that should there be a dispute or if there were imbalances, LNG contracts could always be renegotiated, slide 45, "Worst Case, There Is Always Renegotiation."

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MR. TSAFOS discussed slide 46, "LNG Projects Are Big, Complex And Multi-Layered," and stated that there was investment for long term revenue, and the structure needed to address risk and risk mitigation. He pointed out that it was often necessary to forego some upside in order to defend some downside. He declared that the implications for Alaska, slide 48, "Path Forward Requires Answers To Key Questions," included the questions for how should Alaska take its share, should the state take equity in the project, what to do with gas taken in kind, what risk and risk mitigators was the state willing to make, and how to begin the project without locking in a specific structure. He explained that it was necessary to correctly plan for and define both the present and the future LNG projects. He

pointed out the need to question how the LNG project would fit into the state revenue needs.

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MR. TSAFOS concluded with slide 49, "Alaska Has Many Ways To Participate In LNG Project." He summarized that there was "a huge range of possibilities in terms of where you invest, how much you invest, how actively you participate ... " He declared that the design possibilities were endless, as the only necessity was for comfort between the state and the other parties involved.

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REPRESENTATIVE HERRON, referencing slide 3 and noting that each project was custom designed, asked if there were any examples for world class model projects.

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MR. TSAFOS, in response, stated "yes, for the circumstances they faced," offering his belief that this was the key caveat. He presented Qatar as a model which had one massive field with a major national company. He opined that merchant and tolling projects were the most adaptable, as it was necessary to serve both today and tomorrow's projects, citing Trinidad as a good example. He emphasized that thinking through the permutations in the beginning would save a lot of time along the way.

REPRESENTATIVE GARA expressed that, although he basically supported the concept of state ownership of the pipeline, he was cautious. He questioned if it was common that minority owners had to make payment for transportation through the pipeline, even if no gas was shipped, and, if so, how extensive was this risk.

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MR. TSAFOS replied that it was necessary to separate ownership from [pipeline] capacity, and that these did not "have to be identical." He explained that it was possible for arrangement of a commercial structure to have ownership in the pipeline without any commitment to ship gas. He stated that he was not aware of an example for ownership with a commitment to ship gas while there was no control over the gas going into the pipeline.

He suggested that with payment of gas in-kind, there would be control.

7:04:00 PM

MR. MAYER opined that there was still quite a bit to be determined, as it was quite possible for the state to have equity in the pipeline and/or the liquefaction facility, or to take its gas in kind, and ship it through both the pipeline and the liquefaction facility. He declared that the state could have active engagement, and not outsource the sales, but instead, develop its own marketing operation. He offered other possibilities which included agreements with one company or many companies for marketing.

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REPRESENTATIVE AUSTERMAN commented that he was impressed with the presentation, but that he needed more time to absorb all the information. He offered his belief that there was value in applying and comparing the presented issues to "what is currently on the table."

CHAIR FAIRCLOUGH clarified that the presenters were available for recall to the committee. She pointed out that both the Senate and House Resources Standing Committees would also be accessing this information. She acknowledged that this presentation had been "a fire hose approach" to the variables, as these variables were very different than the oil market. She declared that there would be a lot of opportunity for further discussions with these consultants during the session.

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ADJOURNMENT

There being no further business before the committee, the Legislative Budget and Audit Committee meeting was adjourned at 7:08 p.m.