ALASKA STATE LEGISLATURE
HOUSE RESOURCES STANDING COMMITTEE
April 15, 2011
2:20 p.m.

MEMBERS PRESENT

Representative Eric Feige, Co-Chair
Representative Paul Seaton, Co-Chair
Representative Peggy Wilson, Vice Chair
Representative Alan Dick
Representative Neal Foster
Representative Cathy Engstrom Munoz

MEMBERS ABSENT

Representative Bob Herron
Representative Berta Gardner
Representative Scott Kawasaki

OTHER LEGISLATORS PRESENT

Senator Thomas Wagoner

COMMITTEE CALENDAR

PRESENTATION(S): GIGAMETHANOL AND GAS TO GASOLINE

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to report

WITNESS REGISTER

THOMAS P. ROCHE
T.P. Roche Company
Kemah, Texas
POSITION STATEMENT: Testified during the discussion of GigaMethanol and Gas to Gasoline presentation.

DEO VAN WIJK, Chairman
Janus Methanol Ltd.
Porter, Texas
POSITION STATEMENT: Testified during the discussion of GigaMethanol and Gas to Gasoline presentation.

CHARLES SINK, Director of Enterprise & Trust Services
Chugachmiut
Anchorage, Alaska
POSITION STATEMENT: Testified during the discussion of the GigaMethanol and Gas to Gasoline presentation.

SENATOR TOM WAGONER
Alaska State Legislature
Juneau, Alaska
POSITION STATEMENT: Testified during the discussion of the presentation on GigaMethanol and Gas to Gasoline.

ACTION NARRATIVE

2:20:50 PM

CO-CHAIR PAUL SEATON called the House Resources Standing Committee meeting to order at 2:20 p.m. Representatives Seaton, Feige, Foster, Dick, P. Wilson were present at the call to order. Representative Munoz arrived as the meeting was in progress.

PRESENTATION(S): GigaMethanol and Gas to Gasoline

2:21:06 PM

CO-CHAIR SEATON announced that the only order of business would be a presentation on GigaMethanol and Gas to Gasoline.

A brief at-ease was taken.

2:23:34 PM

THOMAS P. ROCHE, T.P. Roche Company, introduced himself.

2:23:43 PM

DEO VAN WIJK, Chairman, Janus Methanol Ltd., related that he has built eight methanol plants around the world. Of the last three, two are mentioned in the presentation, including in Frankfurt.

2:24:16 PM

CHARLES SINK, Director of Enterprise & Trust Services, Chugachmiut, stated that Chugachmiut is a regional non-profit

for the Chugach Region. He said he persuaded Mr. van Wijk to come to Alaska to do a scoping of his technology and explain how it would fit in Alaska.

2:24:52 PM

MR. VAN WIJK indicated this presentation was prepared and given during the National Petroleum Refinery Association (NPRA) in San Antonio in March 2011. Janus Methanol AG, a Swiss-based company has offices in Germany, the Netherlands, Porter, Texas, and his role is as Chair of the company [slide 2].

2:25:10 PM

MR. VAN WIJK stated that the company has been considering at complexes in the Netherland, Russia, Mozambique, Texas, and possibly Alaska. The project needs is huge volumes of natural gas, minimum of capacity of 640 million or two-thirds of a bcf of natural gas [slide 3].

2:25:59 PM

MR. VAN WIJK stated that his company worked with British Petroleum (BP) to develop the plants in Trinidad and Tobago. He explained that having one of the major oil and gas producers involved immediately makes the project viable. He further stated that his company is one of the smaller companies so being creative and at the forefront of technology is important to convince larger companies that the company brings something special to the projects. Thus far Janus Methanol AG has been successful in doing so. His group has collectively in excess of 500 years of methanol experience. No other group has ever had that much experience to offer [slide 4].

2:26:40 PM

MR. VAN WIJK turned to the 2009 photograph of Trinidad and Tobago, noting that in 1984 this space was empty sugar cane country [slide 5]. Today, about $15 billion has been invested in the country, thousands of people find employment. He suggested people can learn from their mistakes, noting the photograph shows a hodgepodge of industries, including ammonia, methanol, and steel industries. No one thought through the design, but the area has been very successful in attracting industry.

2:28:05 PM

MR. VAN WIJK explained that Janus Methanol AG was the first company to build a 5,000 tons methanol plant in Trinidad and Tobago using the MegaMethanol technology [slide 7]. Thus far, six plants have been built. He said that due to financial reasons he sold his company Saturn to a large corporation, Methanex. He was then absent from the business for ten years, during which time Methanex developed the technology going from 5,000 to 10,000 tons of methanol per day. The plants are built in clusters of two, so 20,000 tons of methanol per day or 7 million tons of methanol per year. He identified one problem, which is that the chemical market for methanol is 31 to 32 tons million per year and including China the market totals 46 million tons per year. He offered that if a company built four clusters of plants it would dominate the world of methanol, but producing such a large amount of methanol would ultimately reduce the price of methanol [slide 7].

2:29:33 PM

MR. VAN WIJK related he attended a conference in Russia where ExxonMobil Corporation unveiled its methanol to gasoline technology (MTG). ExxonMobil Corporation's first plant was built in New Zealand in 1982. He reminded members of the 1979 oil crisis and surmised that New Zealand feared being left out so it developed the methanol to gasoline technology (MTG). The technology was technically success but commercially in the 1990s oil prices fell to $10 per barrel and ultimately the project failed. Exxon bought Mobil and the technology was forgotten, he said. He related that China has built an MTG plant based on coal, noting all petrochemical projects in China are based on coal. However, one disadvantage of coal is the expense. He pointed out that it is much cheaper to use natural gas in the MTG process [slides 8 and 9].

2:31:03 PM

MR. VAN WIJK turned to the photographs of the ATLAS plant in Trinidad [slide 10-11]. In 2008, it was the best performing plant ever built. He identified the components of the plant, including the distillation, fired heater, syngas compressor, syngas generation, and methanol synthesis. The engineers determined the best place to save costs would be in the syngas generation plant. He said the steam reformer represents about 20 to 25 percent of the total investment but the costs for the syngas compressor alone is 25 million euros (€), yet the syngas compressor has been very vulnerable to breakdown.

2:32:36 PM

MR. VAN WIJK said the engineers at Janus Methanol AG worked to skip the steam reformer, which in 2004 deemed unnecessary to methanol gas production [slide 12]. He identified that the right one is gas cooled and the left one is water cooled [slide 13]. The advantage bypassing the syngas compressor and not needing the huge compressor only three vessels would be required to produce a total of 10,000 tons of methanol per day.

2:33:37 PM

MR. VAN WIJK stated one additional advantage has been gained during distillation using this method since the steam reformer could only run at 40 to 44 bars but the new method can run at 60 bars. The same size of plant could produce double the volume [slide 14]. Mr. van Wijk stated that the syngas compressor is gone in this photograph [slide 15]. Instead of the 25 million (€) cost for the syngas compressor, the booster only costs 4 million euros (€). This process also changed the fired heater and sea water cooling system, but the one depicted is a much larger system than would be necessary in the Gulf of Alaska [slides 16 and 17].

2:34:55 PM

MR. VAN WIJK summarized that Janus Methanol AG has been able to reduce the cost of the per ton annual capacity [slide 18]. He predicted that if a 3,000 ton methanol plan was built today it would cost $1,000 per ton of annual installed capacity or about $1 billion in total. However, the ATLAS plan would cost $600 per ton of annual installed capacity. He predicted that taking steps to increase production to 20,000 tons per day (tpd) using this technology would reduce the cost to $300 per ton. Thus, a total of 7 million tons of methanol could be produced annually for about a $2 billion investment. In response to a question, he answered that these costs are in dollars.

2:36:19 PM

MR. VAN WIJK stated Janus Methanol AG already has a big plant but it would like to build more plants. He outlined the known methanol conversion technologies as methanol to gasoline (MTG), methanol to Propylene (MTP), and methanol to olefins (MTO), but that in his view the MTP and MTO are technically proven but not commercially proven [slide 20].

2:36:59 PM

MR. VAN WIJK pointed out the plant photograph in New Zealand and the process it uses [slides 22 -25]. He turned to the world's first coal to liquids plant using MGT in Shanxi Province in China [slide 26].

2:37:18 PM

MR. VAN WIJK reported the specifications of MTG gasoline properties and composition which is high in octane at 92 percent without producing any sulfur [slide 27]. He related two products are produced in the Janus Methanol AG plants. Out of 7 million tons of methanol, three million tons of gasoline and 4 million tons of water are produced. The water byproduct is pure enough that it could be used for cooling purposes or agriculture. Additionally, the MTG yields meet all U.S. specifications, he said.

2:38:30 PM

MR. VAN WIJK stated one important aspect is that all of the majors have investigated billions on gas-to-liquids using the Fischer Tropsch method. That process produces fuel, LPG, naphtha, distillate/diesel, but also a large amount of wax. The MTG route produces some LPG, but yields approximately 89 percent of gasoline [slide 29]. The process does not produce any other byproducts except water and meets all U.S. specifications. In response to Co-Chair Feige, he agreed the two columns represented the outcome using cobalt and iron catalysts.

2:40:06 PM

MR. VAN WIJK, in response to a question, agreed that the temperatures listed as 220 C and 340 C refer to the centigrade temperatures used.

CO-CHAIR SEATON inquired as to the temperature that the MTG process uses.

MR. VAN WIJK answered that the methanol pod runs at a temperature of 1200 degrees centigrade (C) for syngas. The gasoline pod uses a substantially lower temperature. He described several steps necessary: first methanol is made, which contains 56 percent water; next the water would be separated through a small-dimethyl ether (DME) plant; and finally, the

methanol would be converted by using the methanol to gasoline (MTG) process.

2:41:04 PM

MR. VAN WIJK provided liquid transportation fuels from coal and biomass figures from ExxonMobil [slide 30]. He estimated the cost to build a Gulf Coast plant at $2.6 billion, including the cost of the methanol, DME, and MTG plants.

2:42:07 PM

CO-CHAIR SEATON asked whether the $2.6 billion is for the MTG with carbon capture or without carbon capture.

MR. VAN WIJK answered that the cost estimate included carbon capture.

CO-CHAIR SEATON related his understanding that would result in 20,000 tons of methane per day.

MR. VAN WIJK agreed, noting it would result in about 8,600 tons or 63,000 barrels of gasoline per day.

CO-CHAIR FEIGE presumed the carbon dioxide would be reinjected.

MR. VAN WIJK agreed.

2:43:03 PM

MR. VAN WIJK turned to the last slide that illustrates the proposed plan for a plant in Mozambique [slide 31]. He said he was unsure this would be suitable for Alaska. He pointed out the right side of the slide depicts two methanol plants with the total capacity of 10,000 tons and on the left side. The plan would be to build two ammonia plants with the capacity of 7,500 tons each. He related the whole range of downstream products made partly based on methanol and partly based on ammonia, including formaldehyde and gasoline. He characterized Mozambique as the fifth poorest country in the world with a population of 23,500,000 and a life expectancy of 37 years of age. Only 350,000 people have jobs, and of those 150,000 are government jobs. He identified this complex as a C1 petrochemical complex, which would consist of 25 plants. The workforce needed would encompass between 40,000 and 50,000 people on site. The amount of land needed is huge, but little

else exists in Mozambique. He predicted the plant would need a community of about 300,000-350,000 people in size to support it.

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MR. VAN WIJK passed out a handout which compared North Slope costs to Gulf Coast costs. He acknowledged that he has little knowledge of North Slope construction costs so he made some broad assumptions. He estimated the total project cost at $5.2 billion, with depreciation over 15 years, which would equate to a cost of $116 per ton. He calculated the return on investment at 20 percent after tax, which "boils down" to a return of $347 per ton. He provided estimates and cost per ton on items, including a 35 percent tax estimate of gross revenues or $186 per ton the oxygen plant at double the cost or $84 per ton, an estimated 225 employees for actual operation, and 2,500 to 3,000 employees during construction. He estimated $150,000 person for wage or $11.25 per metric ton of gasoline and operating expenses at $50 million or $49.50 per ton and the catalyst cost per ton at $15.25.

2:48:13 PM

MR. VAN WIJK estimated total operation expenses based on a per ton cost of gasoline of $810, noting this estimate includes a gross margin of $533 per ton. He said gasoline equals 367 gallons per metric ton. He estimated the natural gas feedstock cost at $2.00 per MCF or $160.00 per metric ton, which equates to $2.20 per gallon excluding the natural gas. Adding the cost of natural gas would bring the total feedstock cost to $2.64 per ton, which includes a profit of $1.45, he said. The real cost of 2.00 MM/BTU would be $1.20, including depreciation, he added.

2:50:22 PM

MR. VAN WIJK pointed out that an argument could be made over the profit margin and while he was unsure what it should be he believed it would depend on market value. He summarized that the potential to produce gasoline, even by doubling construction costs of $2.65 to $2.85 would allow a $1.45 per gallon margin. He compared that to today's wholesale prices which are in excess of $3 per gallon so the margin would increase to about $2.00 per gallon at today's prices.

2:51:40 PM

MR. VAN WIJK speculated as to how this is possible. He said 80 percent of the investment is for the methanol component and 20 percent for the production cost of DME gasoline. He acknowledged that the costs are extremely sensitive at the front end, but once those are under control, the rest would follow.

2:52:23 PM

MR. VAN WIJK recalled the proposed estimate in Alaska is that an estimated at 4.5 bcf of gas would be available on the North Slope which represents the equivalent of 14 plants with the capacity in methanol of 1.12 million barrels per day. He stated that another advantage of methanol is that it can be blended with oil and it still keeps the oil fluid. He has heard wide ranging estimates, in terms of the Trans-Alaska Pipeline System, anywhere from 2 MMbbl to 4 MMbbl per day. Currently, he thought the volume produced was 640,000 barrels per day. He outlined problems encountered with low volumes of oil including viscosity issues unless methanol or gasoline is injected. He said this problem exists in Siberia, where lots of oil that cannot be moved because it freezes up. However, that does not happen when the methanol is added, he said.

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MR. VAN WIJK related that the plan would be to ship the oil/methanol slurry to Valdez, distill the methanol out, and then ship the gasoline to Japan and other countries in the Far East. The Far East is the likely market due to the restrictions and costs of the Jones Act. He predicted that if producers were forced to sell to California the gas price would be lower than if it is shipped to the free market. He surmised that Alaskans must be unhappy with the Jones Act since it costs them money.

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MR. ROCHE suggested further discussion on the potential with the 4.5 bcf per day design basis for use with the TransCanada pipeline. He estimated that if that gas was used for this application, it would mean 14 trains instead of 2 trains, so the investment would be spread over 15 years and could fully use the TAPS.

2:56:11 PM

MR. VAN WIJK agreed. He estimated 1,500 people would be need in 7 complexes and a construction force of about 3,000 people for

about 15 to 18 years. He predicted the plants would produce about 140,000 tons of methanol per day or 450,000 barrels of gasoline per day. He offered his belief that this would change the low-priced gas into a huge money maker. He compared that to exporting natural gas to the Lower 48 since he predicted that natural gas would remain in the next 10 to 15 years at $4 to $6 per million. A variety of possibilities for using natural gas exists, such as to produce gasoline or develop a C1 chemical complex. These are tools currently available and are technically proven, but the North Slope is not an easy climate to build in. However, the pipeline has already been built so it made sense to him to use the TAPS for delivery, he said.

2:59:09 PM

MR. VAN WIJK offered his belief often the best solutions are the simplest solutions. He said he found this solution by pure accident. He detailed several other meetings he has attended and concluded that this technology is promising and will change geopolitical, geoeconomical, and geosocial aspects worldwide. He concluded that the U.S. has tremendous potential to increase gasoline production and eliminate its overall debt. He estimated that the first plant could be online in in five years.

3:02:40 PM

SENATOR TOM WAGONER, Alaska State Legislature, asked him to repeat the one formula for conversion and whether it pertained to 450,000 gallons or barrels.

MR. VAN WIJK answered barrels. In further response to Senator Wagoner, he said he used 140,000 tons per day.

CO-CHAIR SEATON wanted to be certain to get the comments on the record.

SENATOR WAGONER reiterated his question was on the conversion from the 140,000 tons per day throughput on the estimated maximum number of trains to 450,000 barrels per day.

3:04:01 PM

MR. VAN WIJK, in response to a question, answered that the oil would most likely be blended because of the importance in keeping the oil fluid. He detailed that he envisioned a total of 14 trains, with each train consuming 320,000 BTU. However, noting his preference in building tanks in pairs so the total

consumption would be 640,000 BTU. Fourteen trains could produce up to 140,000 tons of methanol per day, which converted to barrels would equal 1.12 MMbbls of methanol per day. The yield would be 43 percent, since methanol contains 56 percent water, which would result in a production of about 450,000 barrels of gasoline per day. He characterized the proposed project as "one heck of a refinery." He reported that a world-scale refinery would produce 200,000 barrels per day and would cost at least $10 billion to build, if a permit could be had. He related his understanding that a permit for a refinery has not been issued for more than 25 years. He offered his belief that the proposed project as described would be "permittable."

3:06:03 PM

SENATOR WAGONER inquired as to whether the water used would be pure enough that it could be used for hydro-fracking.

MR. VAN WIJK answered absolutely. He said it is so pure it would be drinkable. He explained that Janus Methanol AG will build ammonia and urea plants in Africa, but that the continent has a shortage of available water so any byproduct water would be used for irrigation.

3:07:21 PM

MR. VAN WIJK distributed a handout of his calculations to committee members labeled "A" and "B."

3:07:37 PM

REPRESENTATIVE P. WILSON asked the reason that the jobs stop at 15 years.

MR. VAN WIJK reviewed the employees for construction and operation. About 1,500 employees would be needed indefinitely to run the plant. Approximately 3,000 construction jobs would disappear after construction but construction would last between 15 and 20 years. He acknowledged he does not have experience building on the North Slope, but normal construction time for a project of this size is 36 months and it would take another two years to obtain financing, he said.

3:08:56 PM

MR. SINK clarified that Mr. van Wijk's projections are for the proposed two-train plant.

MR. VAN WIJK explained that the output would be 640 million per day, with $300 per gallon capacity based on the Gulf Coast model. In response to Co-Chair Seaton, he agreed the figures are based on a proposed two-train Atlas-sized plant.

MR. VAN WIJK clarified for Representative Munoz that he just doubled the capital costs. He referred to his handout, labeled "A" and the figure of $810, which contains $533 per ton gross profit, of which 35 percent represents taxes. He estimated $558 million in taxes, not counting and production royalty costs.

3:10:39 PM

CO-CHAIR SEATON inquired as to whether the calculations have been made.

MR. VAN WIJK answered yes.

3:10:50 PM

CO-CHAIR SEATON reviewed his calculations. He referred to the handout previously referenced to the second line down which projects the return on investment of 20 percent at $2.6 billion, and tax at 35 percent.

MR. VAN WIJK said he doubled the oxygen cost and adjusted the labor to $150,000 per person, increased the operating costs to $100 million, and added in the catalyst's cost. He divided the total of $810 by 367 and arrived at a total cost of $2.21 per gallon excluding natural gas.

3:11:55 PM

MR. VAN WIJK reviewed his figures on chart "B" again. He related that 367 gallons per metric ton using 80 MM/BTU would be required to produce 1 gallon of gasoline. He said that he added $.436 per gallon to the $2.21 for a total of $2.64, which includes $1.45 gross margin less the 35 percent taxes. He concluded the real cost would be $1.20 per gallon based on a $5.2 billion investment.

3:12:55 PM

REPRESENTATIVE FOSTER asked for an explanation of a train.

MR. VAN WIJK returned to slide 11 and identified a train.

3:14:27 PM

REPRESENTATIVE FOSTER asked for involvement of Chugachmiut in the project.

MR. SINK answered that his involvement has been loosely based on my acquaintance with Mr. Roche. He brought Mr. van Wijk to Alaska and he serves as his contact in Alaska. He offered that Chugachmiut is a Native non-profit serving health and social services. His division has the Village Protection Safety Program, but he also deals with real estate and forestry, as well as economic and business development for individual tribes.

3:16:22 PM

MR. SINK related that Chugachmiut been working on the quality and sustainability of jobs, which is a topic he has discussed with Mr. van Wijk.

CO-CHAIR SEATON commented two villages are in his region.

MR. VAN WIJK said it has always been his philosophy to train and use as much local personnel as possible on projects.

3:17:21 PM

SENATOR WAGONER asked how many acres each train would require.

MR. VAN WIJK responded that each train uses approximately 40 acres, which includes the tank farm.

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MR. VAN WIJK referred to slide 11 and pointed out the various tanks.

CO-CHAIR SEATON inquired as to whether methanol is commonly known as wood alcohol.

MR. VAN WIJK answered he is correct. He provided a brief history, noting that window washing fluid is 50 percent methanol. In the 1980s California tried to introduce M85, a blend of 85 percent methanol with 15 percent unleaded premium gasoline, and M100, which is pure methanol. He anecdotally stated that "big oil" did not like that effort. He reported

that methanol is used to produce 4 percent of the products made in the U.S., including nylon, formaldehyde, and glue.

3:20:47 PM

MR. VAN WIJK characterized GigaMethanol as so simple and so revolutionary that the process could change the future of this country, not just the state of Alaska. A hundred years of natural gas reserves exist in the U.S. The U.S. can produce its own gasoline. He said that ExxonMobil did not disagree with his notes and he surmised that the company knows this technology is forthcoming. He predicted the first plant would likely be built in Texas. In response to Co-Chair Seaton, he concluded that the first plant of this dual design would be built since Janus Methanol AG has already built four functioning plants around the world. He also predicted that four dual-design plants would "kill" his current business.

3:23:06 PM

CO-CHAIR SEATON related his understanding that Mr. van Wijk's vision is to create methanol on the North Slope, run it down TAPS to Valdez, through a natural gas conversion plant, and ship it to market.

MR. VAN WIJK agreed.

CO-CHAIR SEATON inquired as to whether the project would be constructed in conjunction with the producers/owners on the North Slope.

MR. VAN WIJK answered he has met with three of the four producers, ExxonMobil, BP Exploration Alaska, and ConocoPhillips. He pointed out that ExxonMobil suggested that he travel to Alaska to discuss and convince other producers to join. He offered his belief that he could go to the bank for financing the moment one or two of the producers were on board, but at this point his company needs partners. ConocoPhillips said it would not sell the natural gas since it wants to sell gasoline, but BP Exploration Alaska has expressed some interest in the project. He opined that does not make sense to keep pumping the gas back down into the well since the producers want to earn profits and could do so with his technology. He estimated that the proposed project would produce $1.28 million per day for the producers and it could be up to seven times greater than that based on natural gas alone, he said.

3:25:38 PM

CO-CHAIR SEATON indicated the legislature has been reviewing gas-to-liquid (GTL) technology, although it has not yet looked at Janus Methanol AG's technology. This technology appears to be more efficient than other processes. The legislature has been aware of the wax issues using the Fischer-Tropsch process. He related his understanding that methanol does not seem to have those same issues. The legislature has also been discussing royalty and tax methods with the Department of Revenue, including discussions on point of production and not taxing up-front. He appreciated today's presentation as it represents one potentially good option to consider how to monetize North Slope's natural gas.

3:27:46 PM

SENATOR WAGONER suggested having a joint meeting in Anchorage at a future date.

CO-CHAIR SEATON agreed that would be advisable. He indicated the committee has two photographs that were recently donated.

CO-CHAIR FEIGE described the photographs as one of the Delta barley fields and another of hay fields on the Kenai Peninsula donated by the Alaska Farm Bureau.

3:29:41 PM

ADJOURNMENT

There being no further business before the committee, the House Resources Standing Committee meeting was adjourned at 3:30 p.m.