ALASKA STATE LEGISLATURE
JOINT MEETING
SENATE RESOURCES STANDING COMMITTEE
SENATE SPECIAL COMMITTEE ON ENERGY
HOUSE RESOURCES STANDING COMMITTEE
Anchorage, AK
October 9, 2009
9:05 a.m.

MEMBERS PRESENT

SENATE RESOURCES

Senator Lesil McGuire, Co-Chair
Senator Bill Wielechowski, Co-Chair
Senator Charlie Huggins, Vice Chair
Senator Hollis French
Senator Thomas Wagoner

SENATE SPECIAL COMMITTEE ON ENERGY

Senator Lesil McGuire, Chair
Senator Bill Wielechowski

HOUSE RESOURCES

Representative Craig Johnson, Co-Chair
Representative Mark Neuman, Co-Chair
Representative Paul Seaton
Representative David Guttenberg
Representative Chris Tuck

MEMBERS ABSENT

SENATE RESOURCES

Senator Bert Stedman
Senator Gary Stevens

SENATE SPECIAL COMMITTEE ON ENERGY

Senator Lyman Hoffman
Senator Albert Kookesh
Senator Bert Stedman

HOUSE RESOURCES

Representative Bryce Edgmon
Representative Kurt Olson
Representative Peggy Wilson
Representative Scott Kawasaki

OTHER LEGISLATORS PRESENT

Senator Johnny Ellis
Senator Fred Dyson
Representative Jay Ramras
Representative Bill Stoltze
Representative John Harris
Representative Mike Chenault
Representative Mike Kelly
Representative Les Gara

COMMITTEE CALENDAR

OVERVIEW COOK INLET REGIONAL INC. - NEW ENERGY PROJECT
HEARD

PREVIOUS COMMITTEE ACTION

No Previous Action to Report

WITNESS REGISTER

MARGIE BROWN, President and CEO
Cook Inlet Regional Incorporation (CIRI)
POSITION STATEMENT: Delivered introductory welcome remarks.

ETHAN SHUTT, Sr. Vice President
Land and Energy Development
Cook Inlet Regional Incorporation (CIRI)
POSITION STATEMENT: Gave the presentation on Underground Coal Gasification (UCG) and answered questions.

ACTION NARRATIVE

9:05:05 AM
CO-CHAIR LESIL MCGUIRE called the joint meeting of the Senate Resources Standing Committee, the Senate Special Committee on Energy and the House Resources Standing Committee to order at 9:05 a.m. Present at the call to order were Senators Wielechowski, Huggins, French, Wagoner and McGuire; Representatives Neuman, Seaton, Guttenberg, Tuck and Johnson.

Overview Cook Inlet Regional Inc. (CIRI) - New Energy Project

CO-CHAIR MCGUIRE said that CIRI has an exciting announcement today about a new project here in Alaska that will move the state forward in the next 100 years.

MARGIE BROWN, President and CEO, CIRI, delivered introductory welcome remarks. She feels that there is a greater awareness now of a possible gas shortage in their region and they are all looking for a shared view on how to handle the energy situation, particularly in the Railbelt. Their project is very exciting; they have been quietly investigating this technology for one year. They traveled to South Africa to look at a pilot project with some skepticism, but they became convinced that this is an understood and safe technology that can do something for the energy situation in Alaska. It can harness the energy in a coal seam and produce electric power and perhaps other value-added products without the negative effects of mining. It is not the energy solution for every energy need in the Cook Inlet, but it adds a diverse supply of energy to the Railbelt so they are not so dependent on one fuel source, natural gas. She mentioned that their Fire Island wind project is another solution.

9:11:56 AM
ETHAN SHUTT, Sr. Vice President, Land and Energy Development, CIRI, gave the presentation and answered questions. The first phase of the project is a Underground Coal Gasification (UCG) facility and a 100 mgW combined cycle power plant. It will be located on CIRI land in the Beluga area. UCG produces a product stream called syngas that has also been referred to as “town gas” or “coal gas.”

9:12:57 AM
It can be used in its simplest form without refinement to generate electricity by burning it through a control modified natural gas turbine or it can be upgraded through known and commercially available processes to synthetic natural gas or clean liquid fuels. This project is committed to doing carbon capture and sequestration (CCS) for environmental and economic reasons. The primary target for the CCS is to do enhanced oil recovery in the legacy oil fields in Cook Inlet, an additional benefit for the project.

While four other projects have been announced in Alberta and Wyoming, CIRI has a good chance of being the first commercially operational project in North America. But because they are

proposing to have an integrated CCS piece, it is almost certain they will be a world first project of this kind.

CIRI has a lot of landholdings in the Cook Inlet area, and the Beluga field is a world class coal resource that hasn't been developed commercially yet for a variety of reasons. UCG addresses both economic and environmental concerns of such a development. The site is near the Beluga area and close to natural gas fields and has access to gas and electrical generation infrastructure put in by Force Energy about 10 years ago when they drilled a dry hole. The specific project area is remote and not near any populated areas. The nearest community is Tyonek, about 25 miles south.

9:16:47 AM
He said the that UCG technology has been around for more than 100 years and has been operational on a commercial scale for 50 years internationally. It harnesses the energy in a very deeply buried coal seam and does it without mining. Roughly, you have coal, water, oxygen, and heat. That starts a set of chemical reactions that yields syngas composed of hydrogen and carbon monoxide. It creates a substantial amount of carbon dioxide (CO_2), methane and other trace gas elements. Coal seams have methane in them and gasification creates more methane, but this is not coal bed methane technology.

9:18:18 AM
MR. SHUTT emphasized that syngas is an energy-rich gas product; it can be handled and used like natural gas, but it is not natural gas. It's most simple use is to fuel a gas turbine that has been modified to generate electricity. It is a very valuable gas product for a number of value-added upgrades. It can be converted through a process called methanation to make natural gas. If you manufacture it instead of producing it out of a well in the ground, it is called synthetic or substitute natural gas; but it is chemically the same product. An upgrade like that would make it available to put directly into the Enstar transmission system on the west side of the Inlet.

9:19:43 AM
Alternatively, another target in the longer run is to do a value-added upgrade process to make liquid fuels. A number of well known processes exist for that; one is called the Fischer-Tropes process, which upgrades syngas as a feed stock into synthetic crude oil which can be refined through a basic refinery process into synthetic fuels like gasoline, diesel and aviation fuels. An alternative liquid fuels route makes methanol

first as the feed stock; methanol has value in the Pacific Rim where it is used in China as a fuel additive in their liquid fuels for transport fuels and automobiles. Methanol is a two-stage process, and Exxon has a patented liquid fuels refinery process that runs off of methanol and produces synthetic gasoline.

9:20:19 AM
MR. SHUTT said it's important to note that UCG-produced syngas has environmental attributes, and they have promised to do a CCS regime integrated with their UCG project. Natural gas is the gold standard for environmental purposes when people talk about fuel-fired generation.

If you have CCS, you can have equivalent or lower CO_2 emissions out the back end of the combined cycle natural gas power plant. Other tracked emissions – sulphur and nitrogen compounds, mercury and a few other things that come out of the flu gas from a power plant - will be comparable to or favorable with natural gas as well. CIRI plans to install a modern and highly efficient combined cycle power plant. Most of power generation in the Railbelt is old, and therefore the proposed power plant will compare very favorably to the existing infrastructure.

Slide 12 depicted the drilling process from the ground level to the underlying rock. They used a two-well design for illustration purposes, but in fact it is not simply two wells. Basically, two wells are drilled into a deeply buried coal seam and a connection is created between them so that they can communicate (flow gas from one well to the other). At one well an oxidant is injected; for power generation (in this case) you simply compress air and inject that. This starts a combustion reaction that creates heat and pressure that starts to expand the cavity into a reaction chamber. A series of chemical reactions gasifies the coal through. It's not as simple as burning a portion of the coal underground and having an exhaust stream. You are burning a portion of the coal and the heat and pressure that creates gasifies the rest by driving certain chemical reactions. The process consumes about 20 percent of the energy content in the coal and the other 80 percent is produced and comes out the production well through the gasification process.

MR. SHUTT explained:

> Because you're gasifying the coal in the coal seam, itself, you leave a lot of the ash and slag and

particulate and other toxic by-products of the coal in the ground where it started. One of the reasons people don't like coal, and it's referred to as a four-letter word in the environmental community, is because – while coal is very energy-rich - it is about what people say is two-thirds junk and one third energy. The two thirds junk is not all just solids that you have to deal with; the solids are also laden with heavy metals, and volatile organic compounds and other carcinogens. So, the beauty of this process is that those things that are incumbent in coal are less at the end in the coal seam where they started, not produced up to the surface where you have to handle them and store them for long periods of time.

9:24:54 AM
MR. SHUTT further explained:

Slide 13: The gas has to be cleaned up and this facility has a relatively small footprint, about half the size of this room. Some of the product stream will also be steam, which will condense into water as the temperature goes down at the surface, but not large volumes like coal bed methane. When the stream has been cleaned it is ready for carbon sequestration.

9:26:04 AM
Slide 14: Site characteristics for a UCG development: Department of Energy has rule of thumb best practices. One of those is that the coal is at least 200 meters down, more than 650 feet deep and below the fresh water aquifer. The most important characteristic is that the fresh water aquifer is isolated from the coal seam. It will be and remain below the fresh water aquifer if you find strong and impermeable overlying rock layers. Cook Inlet has shales and mud stones, which are both structurally strong and impermeable.

Another beneficial layer to find is clay which Cook Inlet has. It has very high impermeability, but it needs other impermeable rocks as well. Before any development, extensive testing is done to validate the site; and the process is monitored.

9:27:59 AM
Slide 15: Mitigating Hazards: The two principal environmental hazards are linked – surface subsidence and ground water contamination. Surface subsidence means that you've caused a vertical column above the steeply buried coal seams to collapse from 900 ft. deep all the way up to the surface. This will

create a set of vertical fractures through which water can move. Surface subsidence is managed through very careful site selection and site characterization, through extensive drilling at the site and core sampling. Then in certain cases 3-D seismic is used. Gathering that data set allows one to do careful project design and set operational parameters; and always following through with subsequent monitoring.

MR. SHUTT said it is important for risk mitigation to manage the process pressure in the gasification chamber, which is operated at a pressure that is slightly less than the hydrostatic pressure in the coal seam. High pressure flows to low pressure, so the water in the coal seam flows into the process. The process needs some water and the water coming in supports the process, itself; that is why water is not injected at the surface. Another important environmental reason that is helpful is that means that the water and the contaminants are flowing into the process chamber itself. The ones that are liberated or created by the process remain in the chamber. When they are in the chamber they can be predicted and controlled.

In a reverse scenario and an over-pressurized process chamber, carries gas products with contaminates out into the coal seam; and there is then the possibility of losing control and not being able to predict where they would go. So, it’s important to operate the process at a pressure slightly less than the pressure of the water in the coal seam. Operators control or halt the process of combustion by managing oxygen supply from the surface. There is very little risk of uncontrolled coal seam fires, because the chamber is 800-900 feet deep in a wet coal seam with strong impermeable rock layers above.

9:32:05 AM
The final two bullets on mitigating hazards are important, but are soft people elements: First, to pick the right technology provider; theirs’ has a proven track record for UCG development. They were the technology provider of probably the most prominent commercial pilot scale project in Australia called Chinchilla, where they developed and operated for three years. It was shut down and monitored by independent environmental audits. It was found to not cause any ground water contamination and no noticeable subsidence at the surface.

9:33:36 AM
He said that UCG is a simple concept, but it requires a technical expertise. Lawrence Livermore National Laboratory is CIRI's independent technology consultant (not a consultant to

the project). This company is the scientific body of the DOE that ran the U.S. government's UCG program in the late 70s and early 80s.

9:36:00 AM
Slides 16 & 17: Why UCG? It is a proven energy technology to access an abundant local resource. It is new to Alaska, but it has been deployed at commercial scales in China and India as well as private projects starting up in Australia. It produces syngas which is a flexible feed stock for generating electricity or upgrades to synthetic natural gas or liquid fuels. Because of Cook Inlet's positioning at tidewater on the Pacific Rim, it would provide local manufacturing jobs, a secure domestic energy supply and a bridge fuel for the future. It is a very efficient process.

9:37:53 AM
Slide 18: It is a safe and proven technology. The reaction is controlled and can be stopped at any time. Risks are mitigated by careful site selection and characterization, project design and operation, and ongoing monitoring. More than 50 commercial UCG projects have already been completed around the world. It's cutting edge technology that harnesses a world class resource that is here now.

9:42:03 AM
Slides 19 & 20: UCG is low-impact energy production because it requires minimal surface infrastructure; it eliminates risks/problems associated with coal mining handling, transport or waste. It is not coal mining; it leaves most tradition negative coal byproducts safely contained deep underground. In the process it enables carbon capture and sequestration (CCS).

9:43:48 AM
Slide 21: The UCG process produces syngas at temperatures and pressures with CO_2 concentrations that allow relatively easy, low-cost carbon removal at the surface prior to burning. Carbon capture is usually discussed in the context of retrofitting traditional pulverized coal plants and scrubbing carbon dioxide out of the flu gas; people don't like it because it is very expensive in that context. The reason it is expensive in the retrofitting context is because the parameters are all inverted and backwards. A flu gas stream has very high temperatures, very low pressures, and very low concentrations of CO_2; so you have to handle massive quantities of hot gas at low pressure to try to get the CO_2 scrubbed out. Carbon capture equipment is enormously

energy parasitic; it can consume 40-45 percent of the energy going into the plant.

The UCG process produces syngas in a composition that has almost the ideal circumstances for carbon capture in an energy efficient manner – moderate temperatures, high pressures and relatively high concentrations of CO_2. UCG with CCS leaves a very manageable carbon footprint that is far smaller than any traditional coal technology and is similar to natural gas. CO_2 in this form is easily separated by existing commercially available technologies that several manufacturers are working on improving. The ones that are commercially available are for scrubbing CO_2 out of a syngas stream are an absorbent type technology that requires absorbing and then an energy consuming process to desorb the CO_2 out of the absorbent. A much more efficient technology would be a membrane-based separation, and several companies are working to commercialize this technology. An example of such a facility is in North Dakota that has a surface gasification facility that ultimately methanates the syngas stream and makes synthetic natural gas for local distribution. This method sends its CO_2 stream by a 250-mile pipeline north across the border into Canada for enhanced oil recovery at Weyburn in Canada.

The other place with carbon scrubbing technology applied to a syngas stream is an integrated gasification project at the surface In West Virginia where they gasify and then produce electric power. They are doing a deep saline sequestration experiment with the CO_2 stream with federal funding.

9:47:49 AM
Slide 22: Their primary target for carbon management is through enhanced oil recovery (EOR) in the depleted oil fields of Cook Inlet. There are a number of sequestration options, but enhanced oil recovery is the only that has been proven and is well understood. The oil industry in Louisiana and Texas has been doing EOR for 25-30 years. They understand how to put CO_2 back into the ground and get more oil and keep the CO_2 in the ground when they put it there. Other methods, like deep saline, are science experiments and the impacts are not totally understood.

EOR is the one proven method of sequestration, and it is the economically preferred method. It extends the productive life of existing oil fields.

9:49:40 AM

Slide 23: EOR maximizes use of existing oil field infrastructure by maximizing production out of an area that has already borne the environmental impact of development. This, in turn, reduces the pressure to develop additional resources. So, environmental impacts of EOR are largely positive, not negative.

CIRI met with a number of national and local environmental groups leading up to today, and with one exception that wasn't necessarily negative, the response has been positive. Most believe EOR is a preferred first step toward carbon management on a commercial scale for the very reasons CIRI believes CCS should be the primary target.

9:50:57 AM
Slide 24: UCG is not coal mining. There are no open pits, mountaintop removal or tailing piles, no surface water pollution or impact. It reduces or eliminates most of the traditional pollutants that accompany coal mining; there is no surface ash and slag waste handling. The project site is small and easily restored upon project completion. It is not coal bed methane extraction.

9:53:33 AM
CIRI's commitment: They will only begin building a UCG facility after a deliberate thoughtful process and performing all necessary due diligence, completing an EIS, securing all necessary permits, and after reaching agreements with world-class technology partners and evaluating input from local and national stakeholders.

9:55:30 AM
Slide 28 Preliminary Timeline:
December 2009: Resource assessment drilling begins
February 2010: Preliminary resource assessment results; preliminary site selection
March 2010: Pre-feasibility drilling begins
August 2010: Site characterization drilling begins
November 2012: Project permits received
January 2013: Above-ground project construction begins
January 2014: Commercial operations begin

9:58:34 AM
CO-CHAIR MCGUIRE thanked them for presenting to the Legislature first rather than holding a press conference or any of the other ways they could have done it. She asked if CIRI has been in touch with the Department of Defense that is looking at a pilot

project in Alaska. They need synfuel to fulfill a contract by 2014.

MR. SHUTT replied no; that could be a potential logical second phase; but they are intent on getting the first phase off the ground.

10:00:42 AM
CO-CHAIR MCGUIRE asked if the project would change if Exxon decided to further develop natural gas.

MR. SHUTT replied probably it wouldn't affect their project because energy prices for UCG are competitive now.

10:03:54 AM
CO-CHAIR WIELECHOWSKI asked if they would build a completely new power plant or retrofit the existing one.

MR. SHUTT answered build a completely new 100 mgW combined cycle power plant. Beluga turbines are so old that it doesn't make sense to feed a highly efficient fuel source into an inefficient old facility. It's also very expensive to retrofit an existing facility compared to new construction.

SENATOR WIELECHOWSKI asked who would operate the plant.

MR. SHUTT answered they hadn't talked to other utilities about that, so CIRI would operate it; but they might take on additional investors moving forward.

SENATOR WIELECHOWSKI asked the impact of this project on a bullet line in Cook Inlet.

MR. SHUTT answered that is not the intent of this project, but phase one of this technology will offset 9 bcf/yr. quickly, which substantially defers the energy shortfall. And, more importantly, he said, they can supply energy at prices competitive with today's prices without asking the state for money.

10:07:16 AM
SENATOR WIELECHOWSKI asked if he anticipates expanding this project to extract gas for Enstar, Agrium or for possible export to Fairbanks and other communities.

MR. SHUTT replied yes; but the first phase is to do something for the Railbelt.

10:09:06 AM
SENATOR WIELECHOWSKI asked if this project would affect other proposed projects like the Chuitna strip mine.

MR. SHUTT answered no.

CO-CHAIR MCGUIRE asked if he considered applying this technology to North Slope oil.

MR. SHUTT answered yes.

10:10:06 AM
SENATOR FRENCH said being first carries prestige, but also first problems. What causes him worry?

MR. SHUTT answered the single biggest worry is permitting. This is the first project of its kind in the U.S., and neither state nor federal regimes apply to this technology. They apply to coal as the resource, and certain oil and gas types of regulations loosely fit. Underground injection permitting looks at things like oil and gas fields or waste disposal wells, but those don't apply very well for UCG development where the first phase would be only injecting compressed air. If the project is successful, the state and federal government will have to develop statutes and permitting regimes that are tailored to address development and environmental concerns of the process and the technology.

SENATOR FRENCH asked him where the crossover point for price is for their project versus natural gas for Armstrong/Enstar, for instance.

MR. SHUTT replied as long as natural gas prices don't fall below $5/bcf. There is a lot of risk being the first UCG project here and he didn't want to go below that figure.

10:13:48 AM
SENATOR FRENCH asked if this technology could be taken to the YK Delta, one of the most energy starved regions in the state.

MR. SHUTT replied that he didn't know for sure.

10:14:14 AM
REPRESENTATIVE JOHNSON said he liked the concept of no public money. He asked if they had figured out what their cost is per kilowatt hour.

MR. SHUTT replied that they hadn't directly modeled what the cost of power would be, but the fuel is the single largest component, the capital recovery is the second, and operating costs are the third. They believe their fuel price is very competitive with today's natural gas price in Cook Inlet; capital equipment is capital equipment. They estimate it will take $30 million to build the UCG aspect of the development; and $150 million for the power plant aspect.

REPRESENTATIVE JOHNSON asked what they can do as a legislative body to help.

10:16:57 AM
MR. SHUTT answered that they thought a lot about permitting issues, but he didn't know if changing the regulatory scheme this session actually advances the process, because it would take a regulatory development process to follow a statutory change. They have had a meeting with the commissioner of the Department of Environmental Conservation, and flagged their concern about the application of regulations to make sure the state and public interests are protected, while making sure the project is advanced. They will meet with state and federal regulatory agencies to figure how to proceed early next month. If it can't be permitted through existing regulations, they will ask the legislature for help.

REPRESENTATIVE JOHNSON said he appreciated no public money especially for such an ambitious project.

10:20:09 AM
REPRESENTATIVE RAMRAS said the project sounds practical and doable and asked at what point his leadership would sanction the actual commencement of the project.

MR. SHUTT replied that there are a couple of phases to go through before committing. They will need an actual budget with real analysis behind the numbers; their drilling program will commence this winter that will be followed by two subsequent rounds of drilling that validate the geology and make sure a UCG development can be responsibly done. There is no single benchmark point. They spend more and more as they get further down the trail.

10:22:53 AM
REPRESENTATIVE RAMRAS asked if the scope of the project is $100 million, how much they will have spent on all pre construction pursuits.

MR. SHUTT answered they don't have a budget worked out, but they will have spent less than $10 million before permits are obtained.

REPRESENTATIVE RAMRAS asked after their first commercial success, is it expensive to create other products. How much would syngas production cost and what would the timeline be?

10:26:19 AM
MR. SHUTT answered they have a sense of some of the capital required for the build out for second phase operations, but they are focused on the first. The second phase is more capital significant than the first phase even in the cheapest option. The most expensive option would be synthetic fuel plants at commercial scale; those would be multiple billions for just the capital process for setting up a refining process.

Another very important factor is that this is not a project that can be financed with commercial financing. Banks are unwilling to take technology risks. Proving the technology will require successful operation of the project for probably a year. The step-out development for additional UCG production, for syngas, is not expensive. Most of the UCG development expense is in the initial site development and some of the control systems and other infrastructure that support the project as a whole.

REPRESENTATIVE RAMRAS said other projects have problems because they are hard to scale down for state use. Does CIRI's UCG process seem to be scalable to smaller communities?

MR. SHUTT said there are a couple of answers. It can be scaled to a pretty small level, but the economics don't scale down, because of the technical expertise that is needed. He said the South Africa project is an example of this that he saw.

10:32:26 AM
SENATOR WAGONER asked how much methane is produced per ton of coal burned.

MR. SHUTT replied that he didn't know the answer, but one factor that increases methane production is the chemical reaction that takes place in the gasification chamber that produces the methane, which is pressure dependent; so going deeper in the coals, the more pressure you would have in the gasification chamber, and that would produce more methane as a component of the gas stream.

SENATOR WAGONER asked if he had talked with oil companies about tertiary EOR.

MR. SHUTT answered not yet, but Chevron is the producer in the Inlet.

10:34:22 AM
SENATOR WAGONER asked how long after the first project was done would it take to get another 100 mgW project going.

MR. SHUTT replied that it wouldn't take long to start up a new module. With the large coal resource, additional UCG development is not a big step. From there it is just a matter of additional development for the end use.

10:35:12 AM
SENATOR WAGONER asked what maximum depth is being produced now.

MR. SHUTT answered he didn't know; but some projects in various parts of the world are proposing depths in the range of 3,000 ft.

SENATOR WAGONER asked how long it would take to extinguish a problem if it comes up in this process.

MR. SHUTT answered that is a question they asked in South Africa. It is a slow process to change; so they had technicians monitoring - similar to an oil and gas operation. A more complicated response might require getting a UCG expert. In South Africa these UCG technical experts don’t stay on a project 24/7; they basically do office hours. The changes take place in timeframes of hours and days, not minutes and seconds. So if a technician on site notices a trend in the middle of the night, he can call an expert who might typically respond that he would look at it in the morning.

10:37:23 AM
SENATOR WAGONER asked how they plan to get infrastructure materials – barge them down to Tyonek and truck them up? The state may need to build a bridge across the Susitna River. What about winter transport?

MR. SHUTT replied they hadn't looked at construction logistics yet, but those are a couple of the options.

10:38:33 AM

SENATOR HUGGINS said he was heartened by Mr. Shutt using the term "diversity of our resource development." His question was about infrastructure, and he wanted him to facture in that the Susitna ferry will arrive in that neck of the woods next spring. He asked if there is some place for the Railroad in this project.

MR. SHUTT replied he didn't see much role for the Railroad since the project is at tide water.

SENATOR HUGGINS asked how far out the phases extend.

MR. SHUTT replied today's target is to execute a plan to get into production within a couple of years. The value-added piece is their objective down the line.

10:42:26 AM
SENATOR HUGGINS said an extensive road network already exists and he hoped that would reduce the environmental impact for accessibility.

MR. SHUTT replied that most of basic road access is already in place. They are optimistic that their site will be close to the existing road.

10:44:16 AM
SENATOR HUGGINS asked where they will hook into the grid.

MR. SHUTT answered at the transmission infrastructure at Beluga.

SENATOR HUGGINS asked if the present power transmission lines are adequate for the additional load.

MR. SHUTT replied that he didn't know.

SENATOR HUGGINS asked for an estimate of the life span potential of the coal resource.

MR. SHUTT answered thousands of years.

10:45:12 AM
SENATOR DYSON remarked on how valuable CO_2 is for the oil lift in EOR and asked the business and tax advantages of CCS done through reinjection.

MR. SHUTT answered that is an important aspect of the project, but they have done only the preliminary steps of looking at it.

If they produce large quantities of CO_2 at relatively low costs in Cook Inlet, EOR is an obvious target there. So that has been identified as a key project component. A number of technical steps are behind that that will require the participation and cooperation of the oil producers and the people who run the fields. Most of the fields in Cook Inlet are operated by Chevron; so they need to have some "robust sessions" with them. The economics of the commodity pricing play a big role. CIRI believes they have the core elements for producing CO_2 at low cost in large volumes.

SENATOR DYSON asked what the government does to reward sequestration of carbon presently.

MR. SHUTT replied that the federal government has tax credits for CO_2 use for EOR, but he wasn't familiar with how that works.

CO-CHAIR MCGUIRE mentioned that SB 31 has a production tax incentive for renewable energy capital investment; CCS is in it.

10:49:13 AM
REPRESENTATIVE STOLTZE asked if CIRI's business partners are public.

MR. SHUTT said Laurus Energy is their developing partner; it is an affiliate of the technology company called Ergo Exergy based in Montreal. They provided the technology to do UCG development around the world. Negotiations on deal terms are being finalized now and that is why they are a little sensitive about how that is presented.

10:50:47 AM
REPRESENTATIVE STOLTZE said he knows that Mat-Su has transmission line and power plant ordinances.

MR. SHUTT said that is a consideration of where infrastructure ultimately gets sited. The Kenai Peninsula Borough is just a little south of the project area and they are aware of Mat-Su's power plant ordinance.

REPRESENTATIVE STOLTZE asked how many set net sites are along that corridor. Is this compatible?

MR. SHUTT answered yes; he said this project won't use surface water or be in riparian areas.

10:53:02 AM

REPRESENTATIVE HARRIS asked if CIRI will be able to get the necessary permits to achieve their timeframe of December 09/February 10.

MR. SHUTT replied yes. They will prefile for permits while completing the preceding stage.

REPRESENTATIVE HARRIS stated that this is not a renewable energy project even though it will possibly provide power for the Mat-Su Valley, and the administration has asked for 50 percent of our energy produced by 2025 to be renewable. If their project comes to fruition, he asked where renewables would fit in.

MR. SHUTT replied that the project, particularly at the scale they are looking at now is consistent with the objective of getting more renewables. CIRI is working to get more renewables into the mix with their wind project on Fire Island, for one, as well as others. He believes that truly renewable generation is beneficial, in part, because it delinks the state from commodity prices around the world. The 100 mgW scale is significant by Alaskan standards; it represents around 10 percent of Railbelt generation in the winter and up to 25 percent in the summer. But it is not so large that it will become the only generation source.

REPRESENTATIVE HARRIS asked what other renewable energy projects they are interested in.

MR. SHUTT replied that they looked at low-impact hydro on the Kenai, but those sites aren't commercially viable, and they are winding down serious involvement in that. He said the projects have to be locally acceptable as well as commercially viable, and these projects don't appear to be either.

They have also identified a significant potential geothermal resource on CIRI land on the west side of Cook Inlet that would have to be very significant to reach commercial development. It's in an isolated area pretty far away from infrastructure.

He said they have explored for wind resources in a number of Railbelt locations – two on the Kenai Peninsula, Hatcher Pass (not commercially viable) and one north of Healy (that does look commercially viable).

REPRESENTATIVE HARRIS asked if they were interested in Chakachamna.

MR. SHUTT answered no.

11:01:03 AM
REPRESENTATIVE SEATON asked what number of wells he anticipates for a 100 mgW project.

MR. SHUTT replied about two or three injections wells for the initial development of the UCG module, and six to eight production wells. Over time additional production wells would be drilled as the coal resource is gasified. It becomes a long rectangular development pattern. Another 100 mgW plant would require all new injection and production wells, but it could go in an opposite direction; and it would all come back and feed into the same surface infrastructure.

11:03:21 AM
REPRESENTATIVE SEATON asked if they are also going to recover CO_2 from the surface generation plant for sequestration.

MR. SHUTT answered no; they are not planning on "scrubbing" the CO_2 closed combustion out of the turbine. The reason the pre combustion sequestration is so attractive is because the cost to operate the scrubbing is manageable and relatively low compared to post combustion carbon scrubbing technology that is "enormously parasitic." It would require large physical pieces of equipment handling large volumes of very hot gas to scrub a minor a 1-2 percent of the overall gas stream.

REPRESENTATIVE SEATON asked if the coal seam is at 950 ft.

MR. SHUTT replied that their initial thought was to look at coal in the 900 ft. depth. In discussions with their perspective partner, they have started looking at doing something around 2,500 ft. – more of a scientific technical experimental aspect. An unknown option you see on the web is the proposal to use closed out gasification chambers already developed by the UCG process as a sequestration source for the carbon created by latter development in the same project. But it is simply a theory at this point, and it might get federal funding at some point.

REPRESENTATIVE SEATON asked if their project was in the range of $200 million.

MR. SHUTT replied no; their place holder is $30 million for the UCG development including the pre-permitting expense of $10 million and $150 million for the power plant. They need to do

further analysis for the carbon handling necessary to do EOR, something probably north of $100 million – largely depending on which field and how far away it is.

11:08:15 AM
CO-CHAIR MCGUIRE invited them to the Energy Council this spring and to the PNWR meeting in Calgary next July. She also hoped that this project could "value-add" onto the University of Alaska in terms of becoming a leader in UCG.

11:09:51 AM
REPRESENTATIVE NEUMAN said he understands "town gas" describes a lower btu type of gas and asked the value of coal gas per btu per cubic foot compared to that of natural gas.

MR. SHUTT answered that syngas is lower calorie gas on a cubic foot basis than natural gas. Depending on the coal resource and the depth and injectant used to make it, it will be in the nature of 10-25 percent of the calorie value of natural gas. That is why you have to go through the "methanation process" to get to pipeline quality gas. This does not impact the usefulness of the syngas product to make electricity through a turbine.

REPRESENTATIVE NEUMAN asked for a direct comparison of the CO_2 produced between coal gas and natural gas. And how much would CCS cost per ton?

MR. SHUTT didn't have numbers for how much CO_2 is created per ton of gasified coal, but it is not proportional to that of natural gas. The calorie isn't the right factor to apply in trying to rough those numbers out. They haven't begun modeling the price per ton for CCS.

REPRESENTATIVE NEUMAN said he looked forward to working on moving any type of energy programs out there forward.

11:14:51 AM
REPRESENTATIVE KELLY asked if CIRI intended to be regulated by the RCA.

MR. SHUTT replied that the proposed structure would be regulated by the RCA that would try to figure out what their cost of operation is to produce an mmbt. It would then give them some utility type mark up, which could completely undercut their economics and risks they are taking in trying to do something that has not been done before. While they respect the RCA's role, its structure doesn't work well for them.

REPRESENTATIVE KELLY asked if they are unable to get customers for the CO_2 flange for EOR, what would they do.

11:16:47 AM
MR. SHUTT answered that CO_2 is not a regulated substance, so it could be emitted. But they have made the commitment to not do that and will find another solution. Other carbon sinks are available, as well as depleted and abandoned reservoirs in the area. The federal government would have to figure out a way to reward it or it would become a federally funded science experiment.

REPRESENTATIVE KELLY asked how much CO_2 would be released into the atmosphere without sequestration as compared to what a combined cycle turbine is doing in Chugach now.

MR. SHUTT answered that without scrubbing the CO_2 out of the syngas stream and putting it through the turbine you'll have a significant carbon footprint over a natural gas combined cycle turbine. It would be better than coal-fired generation and worse than natural gas. Eskom in South Africa isn't doing anything with its CO_2, but they believe they will get a 16-25 percent reduction in their emissions on an energy equivalent basis just because the process is so much cleaner and efficient.

REPRESENTATIVE KELLY said if he were on CIRI's board, he might question the wisdom of committing to not letting it go into the airstream given some of the problems with the national economy and cap and trade.

11:21:35 AM
CHAIR MCGUIRE asked about their plans for waste heat recovery.

MR. SHUTT said that is the second part of a combined cycle plant. You burn gas through a primary gas turbine and do a heat recovery steam generator at the back end. "In another stroke of dumb luck, the 100 mgW they have been using as a placeholder meshes up well with a Seamons turbine that is being developed for Eskom's first commercial application, a 40 mgW single cycle gas turbine. Two of those driving a heat recovery steam generator will get close to the 100 mgW of power.

CO-CHAIR MCGUIRE asked what that translates to in terms of electrification.

MR. SHUTT replied that the Railbelt is somewhere in the 400 mgW in the summer and up to 1,000 mgW in the winter. It's a meaningful piece of new generation with a new fuel.

CHAIR MCGUIRE said the first phase of Susitna is 250-300 mgW and it has the potential of getting to 1,000. They are all significant.

11:23:39 AM
REPRESENTATIVE RAMRAS said $100 million for a 100 mgW project. What is the difference if a conventional power plant were built?

MR. SHUTT replied that a ballpark figure is $1 million per mgW for gas turbines. The fuel source is a capital and operating expense, so it isn't part of the equation.

REPRESENTATIVE RAMRAS asked how much of the coal source under the impermeable overburden is "just good luck" or good leadership. Is it typical across the state or are those characteristics unique to that site?

MR. SHUTT said it is both. It's not unusual to find UCG development potential; five other potential sites were found in the Lower 48. Finding the right type of overlying rock in the geology for deeply buried coal seams is not that unusual. Their technology developer can make a lot of different site characteristics work well. The one they just worked on in South Africa with Eskom was a difficult site. The giant traditional pulverized coal plant was across the street from the UCG plant, which was supposed to be an underground mine. The mine failed almost immediately because they had not found or accounted for the fact that the coal seam was interrupted by dolomite intrusions that cut the coal seam. Now they have to truck coal from seven miles away to feed the 420 mgW power plant. Site characteristics for UCG development were a little tricky because the same things that cut off the traditional mine cut off the module development for UCG. Impermeable rocks over the coal are necessary, but that is not hard to find.

REPRESENTATIVE RAMRAS stated the permitting concern and the recent trend of the state being the applicant. Would CIRI be interested in a state sponsor, not as a participant in the program, to help expedite the permitting process? This might be better than legislative hearings about delays.

MR. SHUTT said that the DNR has been helpful, but CIRI's first preference is to work with the system as it is. If there are

unreasonable permitting delays, they would like help. He thought the existing framework would work for now.

11:31:09 AM
CHAIR MCGUIRE asked if wholesale generation – from Fire Island or the UCG plant - were not regulated by the RCA, would that eliminate a lot of red tape, and would they come to the Legislature for that.

MR. SHUTT answered that part of the RCA function is to protect the rate payer. If you are an independent power producer, you have to negotiate with the utility that has the same charge over their customers. So layering another time consuming process over the top to second-guess that commercial negotiation doesn't seem to serve anybody.

11:32:41 AM
CHAIR MCGUIRE observed that the RCA is already burdened with their dockets. There being nothing further to come before the committee, she adjourned the joint meeting at 11:32 a.m.