STANDING COMMITTEE ON CROWN AND CENTRAL AGENCIES

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STANDING COMMITTEE ON CROWN AND CENTRAL AGENCIES

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Lloydminster

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Carrot River Valley

Mr. Dan D'Autremont
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Mr. Randy Weekes
Biggar

Mr. Trent Wotherspoon
Regina Rosemont

Published under the authority of The Honourable Don Toth, Speaker

Inquiry Into The Province's Energy Needs

[The committee met at 10:00.]

The Chair: — Well good morning. This is this second day of our hearings into electricity options for Saskatchewan. I've got a couple procedural matters to go through first, and then we'll get on with hearing from our first witness.

I have a short prepared statement wrapping up a couple of things. All of the committee's public documents and other information presenting to the inquiry are posted daily onto the committee's website. The committee website can be accessed by going to the Legislative Assembly of Saskatchewan website at www.legassembly.sk.ca under What's New and clicking on that link to the Standing Committee on Crown and Central Agencies. The hearings will be televised across the province on the legislative television network with audio streaming available for the meetings outside of Regina.

Check the website for information regarding locations, cable companies, and channels. The meetings will also be available live on the website with past proceedings archived on the website as well.

Unfortunately there were streaming issues yesterday. As a result the complete meeting archive of yesterday's proceeding will be posted on Thursday evening. We have been told by broadcast services staff that they believe the problems have been resolved and live video streaming should be available today.

I recognize the member.

Mr. Taylor: — Thank you very much, Mr. Chair. Just one more question along those lines. Obviously there will be a printed committee *Hansard*. Do we have any idea when the printed *Hansard* will be online?

The Chair: — The estimation is that yesterday's proceedings will be up either late today or early tomorrow. The committee had decided that all written materials will be published by the 19th and on an ongoing basis. As the staff gets the printed document, they will be uploaded immediately. Mr. Wotherspoon.

Mr. Wotherspoon: — Thanks, Mr. Chair. Thanks for the information as well. Just as a note, this certainly highlights some of the concerns we've raised along this period of time as it relates to ensuring the information's available to individuals who are going to be presenting in the subsequent days.

We had talked about a period of time that would be needed to allow stakeholders to digest the information as it relates to our power needs that were presented yesterday, really intensive information yesterday. And it's, I guess, predictable that we're here today, that we have individuals possibly engaging in meetings that weren't able to reference or access those materials. And I think that's too bad, and I think this was something that was predictable and could have been planned for. But that being said, we have an agenda before us and good questions to ask.

The Chair: — I appreciate the partisan shot here, but I would like to inform the member that it was the first run of a new broadcasting technology. It was in fact not the committee that you're pointing at right now, it's the staff. And I think they're doing the best job they can in implementing a new system.

I'm going to move on at this point to finish my statement. I'm now going to introduce the members. Today we have Mr. Weekes, Mr. Allchurch, Mr. Bradshaw. Substituting in for Mr. D'Autremont is Mr. Hickie. We also have the Vice-Chair Mr. Belanger, Mr. Wotherspoon. And joining us today is Mr. Taylor as well.

We have documents that will be tabled today, a number of documents and written submissions. For our witness process, before we hear from our first witness, I would like to advise witnesses of the process for presentations. I will be asking all witnesses to introduce themselves, anyone else that may be presenting with them. Please state their name and, if applicable, your position within the organization represented.

If you have a written submission, please advise that you would like to table your submission. Once this occurs, submissions will be available to the public. Electronic copies of tabled submissions will be available on the committee's website.

I will then ask you to proceed with your presentation. Once your presentation is complete, the committee members will have questions for you. Your presentations, the committee has decided, will be approximately 15 minutes with 10 minutes of questions afterwards. With the scheduling, there might be slightly more flexibility of questions if the committee decides questions want to go longer.

I will direct the questioning and recognize each member that is to speak. Members are not permitted to engage witnesses in any debate, and witnesses are not permitted to ask questions of the committee members. Our agenda allows for a prescribed time period for each presentation which will include both presentation and question and answer afterward.

I would also like to ask witnesses that any written submissions presented to the committee will become public documents and will be posted to the committee's website for public viewing.

I recognize the witness from NuCoal.

Presenter: NuCoal Energy Corp.

Mr. Cruikshank: — Well good morning, Mr. Chairman, and members of the committee. I would like table my presentation for the committee which I think you all have a package in front of you. It is my honour to present this to this committee and also to introduce to you our NuCoal and our south 50 project. My name is Alan Cruikshank. I'm the president and CEO [chief executive officer] of NuCoal Energy.

NuCoal is a widely held private company based in Saskatchewan in Saskatoon. It's made up primarily of Saskatchewan investors, however we do have investors from the balance of Canada and a couple of token American investors.

I am also joined by Mary-Lynn Charlton of Charlton Communications who is working with me in regards to communicating the benefits of coal to clean energy. However she's not presenting today, but she is working with us.

NuCoal was formed in 2008 by three founders: Tom MacNeill out of Saskatoon who has been active in the resource business for 25 years and is an active participant in the junior resource business in all aspects of the resource development; Steve Halabura who is the P. Geo. [Professional Geoscientist] from Saskatoon, and he's recognized worldwide for his contribution and his knowledge in regards specifically in potash, but in terms of sedimentary geology. He also has 25 years-plus experience. And myself, I've been active in the resource financing for over 25 years. And we're all from Saskatoon, and we're proud to be able to work on developing Saskatchewan's resources.

In my opinion, coal has been unfairly put into the penalty box as we call it, not because of the coal per se, but because of how we process it. Invariably we're using a very simple technology — which I call the shovel, truck, and burner — which we think is a very primary stage of being able to develop coal resources. We think we can do better; we know we can do better.

With the introduction of technologies that were initially invented in the early 1900s that have been developed over the years, we can apply technology that is demonstrated at scale around the world and apply it to our coal deposits here in Saskatchewan.

And it's our objective to be able to transform this coal into clean energy. And our objective today is to tell you about not only what we have in terms of the coal, the technology that can process it, but how we can develop Saskatchewan into an energy powerhouse for now and in the future.

Here is a chart that comes right from this book, which we effectively know as the green bible. This document comes from a tremendous amount of work that was done in the 1970s and '80s under the national coal inventory — 4,631 drill holes were drilled into the area which we call south 50. And the name of that comes from the property what you see before you which is between the 49th and 50th parallel. The land that we have under stake is in the areas of the red box minus the land that is currently held for power production and some other additional landholders. But for the most part, we have 2.2 million acres in this area, which is a vast amount of that deposit.

The wisdom of being able to have this work that was done, that demonstrated that this is probably one of North America's, or certainly Canada's, largest lignite deposit in one area that can be developed and mined, and that has set the stage for us to be able to develop this resource.

It has not developed much beyond the current mining that we have done — and I'll talk about that in a minute — but for the most part this deposit has sat here, not only for the 60 million years in which it has been done, but for the 35 years where we have known about it. And I would like to add for the record that we consider coal as ancient biomass. So we think that there's an opportunity there as well.

Also in this book, it outlines the chart of just how much was initially found. In the measured or proven category is 2.1 billion tonnes. And including the indicated, inferred, speculative, and total category, it comes to six and a half billion tonnes. And in addition in this book there's also an area of a future interest, what outlines another four and a half billion tonnes. So we think that the possibility of 10 to 20 billion tonnes of coal is very realistic and very opportune for Saskatchewan to be able to develop this resource. There is a large amount of coal.

[10:15]

Saskatchewan is an excellent jurisdiction to be mining this coal. First of all, we have a very light overburden, 25 to 30 metres of clay and sand. The seam thickness is 44 to 5 metres, representing a 5:6 strip ratio, which is very attractive and it represents very low mining costs. In addition this area has excellent infrastructure that has been developed: grid lines, pipelines, railways and highways. A long history of mining, and of course the US [United States] border represents the biggest market for production.

So our objective is really to outline how we can take that coal deposit, bring the technology, equipment, and financing from the Chinese — who I will outline shortly — combine that with a polygeneration plant where we can produce fuel, chemicals, and power in a very clean way. And that will equal economic growth, job taxes, royalties, and exports which we think are essential for a growth strategy of being able to utilize this coal for our production.

So what does the technology look like? Well here's a picture. This is Todd Pugsley, professor at the University of Saskatchewan who is actively pursuing gasification. Here he is outlining — and this was in an article that was in the *Leader-Post* and *StarPhoenix* recently — outlining how important gasification is for our future. This technology, being able to technically combust a gas or coal inside a pressurized container with no emissions, is catching the world's attention. And the University of Saskatchewan really is at the forefront of a lot of additional research.

A gasification plant, and it's our objective to integrate or engage with Sinopec to be our EPCM contractor — which stands for engineering, procurement, construction, and management contractor — as they have been and are in the business of gasification in China. We want them to bring their technology and access to world-class technology, and their financing, which they've indicated that they would do, to be able to bring a plant to southern Saskatchewan. But with this plant, we can transform this low-rank stranded coal into a high value-added finished products for export. And it's really the only way, as I see, for us to be able to bring significant wealth to a deposit that has sat here for quite some time.

A polygeneration plant is capable of cleanly producing many products. Transportation fuels. It's our expectation to produce full spec unleaded gasoline with lower sulphur and lower particulate matter than many of the fuels that are produced from our traditional source of refineries. Chemicals, fertilizer, and electrical power are all additional products that can be produced from a polygeneration plant.

Electrical power. This plant will produce on a total of 1.4

gigawatts, or 1400 megawatts, of power. Most of that power is utilized in the production of fuels, but from time to time we will have access to 3 to 400 megawatts of power that could be available to the grid from this polygeneration plant.

And polygeneration, the point I would like to make is that it's a combination of being able to produce fuels, chemicals, and power that is going to be able to integrate and provide the best economics for this plant.

And we have invited SaskPower to be the operator of the power island that's inside that. We know of no one that would have more knowledge or ability to be able to produce the power than SaskPower. So we think that SaskPower would be an ideal candidate for that. Here's a chart that comes from SaskPower directly, indicating the size of the issue that's going to be before us. Our generating load has been originally built in the 1950s, '70s, '80s, and '90s. And consequently our fleet is recognized to be needing updating.

So one of the things that's evolving is Saskatchewan is attracting growth from all sectors, but one in particular that should catch all of our eyes is the potash production. We have numerous large international companies that are coming to Saskatchewan that are going to be demanding additional power, combined with the big three companies — Potash, Mosaic, and Agrium — that are expanding their own production. So clearly there is a growing divergence.

I won't take too long, but I just want to outline, this is a very highly simplified process flow diagram, but essentially how the process works, coal is put into a gasifier, such as a number of products out there — Siemens, GE [General Electric], Shell, ECUST [East China University of Science and Technology], and Uhde are all major world-class producers of gasifiers — combined with oxygen to produce a syngas.

Out of that, also from the syngas, you can take the sulphur off and the carbon dioxide can be separated. That carbon dioxide can go to fertilizer, a nitrogen fertilizer plant, or can go to a place like the Weyburn-Midale miscible flood, which is really only a few miles away relatively speaking, for enhanced oil recovery so we can additionally increase the production of oil.

That syngas can then go off into various streams into the Haldor Topsoe and other catalytic processes, to the ExxonMobil methanol to gasoline to produce full spec gasoline, or can be used as a combination of electrical power or into the chemical stream.

The economic benefits. Essentially this plant . . . Each module which we expect will produce about 15,000 barrels a day, our phase 1 plant would include 10 modules. So each module is about $650 million, so we would be attracting a $6.5 billion investment to the province over a number of years. We feel we're building a new industry, and we feel that we will be able to transform this coal into transportation fuels, chemicals, and electrical power in a completely clean with carbon fully managed — and we'll talk about it in a second. The investment will come in stages over a number of years, as I outlined, at 15,000 barrels per day. Modulized production represents a capex [capital expense] of $650 million — plus or minus 30 per cent.

Job creation. These are some early stage numbers, but 1,500 skilled construction workers and 500 plus or minus permanent jobs during the 150,000-barrel-a-day plant's mine life. And of course we'll be creating significant royalties and taxes for the province.

But here's one of the most important criteria for us, is that it's a near-zero environmental impact. Our goal to produce a clean transformation of coal to power chemicals and fuels where the carbon is fully managed. It's all a pipeline spec, virtually pharmaceutical grade with no sulphur or contaminants in it, near-zero gas, water, and solid emissions. Everything is in a sealed unit. All products would be utilized. Sulphur would go to sulphuric acid. The slag that comes out of the bottom would be utilized either as aggregate for road building or as mine fill to put back into there. No tailings ponds. Expanding coal operations and mines operate in an exemplary fashion.

So we're creating a new, major industry for the province producing electrical power, transportation fuels, and chemicals. And we're adding to Saskatchewan and North America's energy security.

In short, when we talk about the near-zero environmental impact, and while the global debate on energy and environment continues, it is my opinion that we really need to ask three questions. Is the energy clean — not just the carbon, but the air and the water — and is the waste properly utilized and disposed of? Is it sustainable: can we produce energy for many years to come? What is the impact on all stakeholders? What will the children of tomorrow think of our decisions today? What will the First Nations elders' opinion be? And what would be the impact on all the rest of society? Have we met our test, and is this work being done?

I look forward to your questions and comments. Thank you.

The Chair: — Thank you for your presentation, Alan. One thing that I was planning to do before I asked you to present is we, as a committee, had put together a question that we were to pose to each presenter. And I feel very fortunate that you answered the question almost directly. I'm going to read it out now just for process.

It is, how should the government best meet the growing energy needs of the province in a manner that is safe, reliable, and environmentally sustainable while meeting any current, expected federal environmental standards and regulations and maintaining a focus on affordability for Saskatchewan residents?

So I read that out now. My intention is to read that out at the start of presentations, but yours directly addressed the energy future of our province. So I thank you.

I'm now going to open it up to the committee members for questions. Mr. Taylor.

Mr. Taylor: — Well thank you very much, Mr. Chair. I appreciate the presentation. Thank you very much, Mr. Cruickshank, for making this available to us.

I do want to come back to the question that the chairperson

posed because there's a number of components to it that in fact the presentation about your project, I think, hasn't quite given us a complete answer here. For the most part what I see is you're interpreting energy in the broad picture — that includes transportation, fuels, and other things like that.

The presentation from SaskPower yesterday talked about energy in terms of the production of electricity for the province of Saskatchewan. Your presentation indicates a potential electricity or power component that can provide some possible addition to the grid, generally 3 to 400 megawatts I think you indicated. So to a certain extent you're building a proposal that can provide some addition to the grid, and maybe even as much as what SaskPower says their long-term need is, around 4000 megawatts. So perhaps 10 per cent of SaskPower's long-term needs.

But SaskPower yesterday in their presentation indicated a challenge with coal. And the challenge was primarily federal regulations. Our question does talk about expected federal environmental standards and regulations. And I'd like to have a little broader perspective from you as to what you see happening over the course of the next 10 to 15 years from our federal counterparts.

SaskPower was quite concerned about what federal regulations could impose upon them. And in fact every time SaskPower mentioned coal, they used the word may. In other words, they may be able to develop it; they may not be able to develop it. There seemed to be a considerable amount of concern from SaskPower about the ability of this province to utilize coal. What are you hearing from Ottawa? And what gives you confidence that in fact expected standards and regulations will prove beneficial to you and, as you're suggesting then, to the province of Saskatchewan?

Mr. Cruickshank: — Well thank you. First of all I think that, from my understanding, the federal government has indicated that after 2012 there will be no new coal-fired power plants without a carbon management system. Now I think a big part of your question is really how do you manage carbon. So there is a couple of types. One is post-combustion carbon capture which is being investigated by SaskPower aggressively, and that's very attractive, and to be able to take a look at existing facilities and how do you deal with the carbon from that.

Our approach is a bit different, where we believe that a new technology called gasification is really the way to go. For our project — not having any impact in regards to anybody else's project, but from our point of view — we can completely manage the carbon emissions. And therefore I ask the question: if we can produce energy from coal with no emissions, are you in favour of coal-fired power?

My guess is that the federal government and other jurisdictions will be able to say, if you can do this — manage the carbon, manage the air emissions, and manage water emissions — that we will be much more likely to be able to go forward in this new environment than one that does not have a carbon management system.

You also talked about SPC [Saskatchewan Power Corporation] or SaskPower in regards to their issues about power. And it's our opinion that . . . Remember that power is the least value driver in regards to any production from a fossil resource. We are — in Saskatchewan at this point and have been — committed to the lowest possible price. The lowest possible price technically is the shovel, truck, and burner and that is the way that the world tends to produce energy from coal at the current time.

[10:30]

We think that we need to move beyond that and, being able to still keep energy affordable, we're going to have to do what we call a hybrid plant where you're going to produce more than just electricity at the plant. You'd be able to produce chemicals and fuels as well. And that's identified by Professor Pugsley in this document or in this article that was written that was in the paper. So our objective is to be able to advance the production of power at the same time as producing other higher valued drivers for export, such as gasoline and other products. Does that answer your question?

Mr. Taylor: — To a certain extent. Just to be a little bit more specific, you have an understanding of what the federal folks might be looking at after 2012. Have you had discussions with federal regulators or federal political representatives who have given you the confidence to make the comments that you have?

Mr. Cruickshank: — We have not had discussions extensively with federal regulators. We believe that the world leaders in this technology are the Chinese. And so without the Chinese, their expertise, their knowledge, their engineering, and their abilities to produce these plants and bring all that skill set to Saskatchewan, we will not have a plant.

There are some small gasification plants in the United States; however for the most part the technology, while utilized around the world, is dominated by the Chinese. So until we have the Chinese to be able to participate with us, we need that process to be able to connect with the coal to move forward.

But again we still believe that the jurisdictions, once we have the ability to process or to manage all of the carbon emissions, we think that that will be the inception of how we look at bringing a plant of this nature forward.

Mr. Taylor: — Just two further questions, Mr. Chair. The first one, and I'll do them separately, but the first one is, Mr. Cruickshank mentioned there are other gasification plants — one just south of us, actually, in Beulah. Have you visited the Beulah plant? Can you give us any indication as to whether or not, or how the Beulah plant differs from the circumstances that you are presenting?

Mr. Cruikshank: — The Beulah plant produces essentially syngas and sells the synthetic natural gas into the pipeline, so it doesn't add additional value drivers. And it is a plant that is quite old, and there needs to be evolutionary technologies utilized. And that hasn't happened at that plant.

Mr. Taylor: — And my second question, and you've led into it nice with evolutionary technologies. Essentially you've made some comments about SaskPower and some of the differences between what they're currently doing, what federal regulations

may be. What impact do you see the federal regulations having on SaskPower's operations today? They were quite concerned yesterday. Do you have any advice for SaskPower with regards to coal and to a certain extent, their operations in Estevan, Coronach, and that part of the province?

Mr. Cruickshank: — I'd like to have no comment on their existing operations. I would like to go forward to be able to have discussions with them about connecting with the Chinese, our coal — or the coal — that we have in southern Saskatchewan, and technologies that can produce energy in clean ways.

Mr. Taylor: — Thank you very much, Mr. Chair.

The Chair: — Mr. Weekes.

Mr. Weekes: — Thank you, Mr. Chair. Thank you very much, Mr. Cruickshank, for your presentation. It raises lots of questions and I think you've supplied many of the answers.

I'd just like to go back to the concept. We're going to have a clean coal pilot project in Saskatchewan, and you referred to Chinese technology. Could you just elaborate on, is there any connection between the pilot project that the province is going to be involved with and your plans? I believe if I read this right that you haven't got a plant up and running yet. This is a proposed plant using Chinese technology. Could you just explain a bit more and is that applicable to our clean coal pilot project that we're going to be developing?

Mr. Cruickshank: — No, we haven't. We're not involved in the province's clean coal project. Our project would be a separate project. The technology that we are anticipating utilizing isn't necessarily Chinese technology. It is technology the Chinese are utilizing. One of them is ExxonMobil's technology; Haldor Topsoe is another one, and the gasifiers are predominantly American- and German-made units. So the technology is worldwide; it's world-class. The Chinese Sinopec engineering has been the one that has put all these plants together and is utilizing them in China.

Mr. Weekes: — The potential cost of producing electricity from your project that you envision and using those technologies, what do you see? Where would it fall in the range of cost of electricity?

Mr. Cruickshank: — Our initial plant doesn't contemplate producing electricity just for electricity. So it's a very difficult question to answer. Our primary objective is to produce transportation fuels, which is the highest value driver from the production of coal. So here you have a coal resource that costs us very little to be able to mine. It's very safe, straightforward, and the remediation is very good.

To take that raw material and produce energy from it, clean energy from it, the highest value driver is fuel. So if you work backwards from there, is there a way we can produce electricity? Absolutely. How is the pricing of it established? Well that has to be essentially drafted out. But remember that there's not just the fact of the price of electricity. The province is going to return additional significant royalties, taxation, and exports. So it's very difficult to always come up with a number. But I think it's fair to say that the number is going to be higher than the cheapest form, which is the shovel, truck, and burner method.

Mr. Weekes: — If I may, just one more on the carbon imprint of your project. I think you said it's low emission or zero emission under your process. Could you elaborate on that?

Mr. Cruickshank: — It's . . . [inaudible] . . . Go ahead.

Mr. Weekes: — Well that's my question. When you say low emission or zero emission, just could you just elaborate on that, compare it . . .

Mr. Cruickshank: — Right. The carbon comes off of the gasifier and it comes off under full pipeline pressure and temperature, so it's fully managed. So the carbon needs to go in a pipeline for an EOR [enhanced oil recovery] plant project such as at Weyburn or potentially into a fertilizer plant where it's combined with a nitrogen from the air separation unit. So those things . . . We have no carbon emissions per se, so we would have a near zero emissions.

Mr. Weekes: — Thank you very much.

The Chair: — Mr. Wotherspoon.

Mr. Wotherspoon: — I think Mr. Weekes got at some of the heart of where I wanted to go with . . . And I'm not sure if the information's available, but it's specifically how we go about our role here and looking specifically about meeting the power needs of Saskatchewan. And certainly price is a factor here that we need to be looking at as well.

And I'm just wondering if you can expand further or if there's any more information. There must be an awful lot of assumptions made at this point in time within your model, whether that be the chemicals that'll be produced and the prices for which those could be sold. Same with the fuels, what you're talking about as being the main driver which — I believe if I'm getting the message properly — then makes power potentially affordable out of this whole production.

And then I'm wondering what you're assumed price of carbon is, which is certainly yet to be determined. So I'm just looking at basically all the by-products you're producing. What are the assumed prices that you can sell these at? And how does that work together, I guess, as far as economies of scale and how those revenues then get transferred to, in the end, what kind of cost are we looking at for power?

You know, there's a lot of really good information here today, but in the end, the heart of what we're looking at is probably that your power production aspect of it being the 300 megawatts and how can we compare that to other sources. And to get to put a price on that, I know there's lots of other assumptions that have to be made. I'm wondering if those have been completed.

Mr. Cruickshank: — A lot of the financial modelling has been done and is ongoing, as there's many changes as time goes on.

Here's a couple of things that I think are what we call bedrock.

First of all, we don't think that you can gasify coal and produce only electricity and have it as economical as you can have with the traditional methods which employ no carbon capture technology. So that's out of the question.

The next thing is that, okay, if you're going to change your product to be able to achieve economies of scale, how do you have to adjust the mix of the products that you do in order to get the economies that allow you to balance off the needs of SaskPower, for instance, or other products that you produce? Right?

If you produced all transportation fuels, you'll produce no power. And then you would maximize profit. But there are other factors, and the other factors are, is that we would be in a position to produce power. Maybe it's on a standby basis or perhaps it's on a negotiated basis. But the point is is that there is a higher cost for producing energy with a full carbon capture package than it is with it's out.

So a lot of those things . . . And I don't think that it is something that is . . . It's certainly not 5x. It's certainly not 3x. What's the number? I don't know. I'd have to do more work.

And then the last part of your question was about carbon, the price of carbon. To be honest, we haven't put any price or we put a zero price for carbon into our models at this particular point because we produce a higher value product. If we adjust that value of the products that we produce, then you're going to have to adjust that by potentially some price for carbon. So essentially when you do your modelling and your balancing of the plant, those are factors that come into consideration. But if we produce only transportation fuels, we wouldn't need to and we don't expect to charge for carbon other than a residual or some form of compensation from what we perceive as an opportunity for enhanced oil production.

The Chair: — I have Mr. Hickie.

Mr. Hickie: — Thank you, Mr. Chair. And I guess Mr. Wotherspoon covered off my question so thank you for that. I think there's one more point you brought up in your presentation and thank you for that, by the way, Mr. Cruickshank. It was well done.

I think the meeting with the Chinese and having that private investment is exciting for our province. The amount of jobs that you can create or have the potential to create is very much what our party believes in — private enterprise driving the economy.

But when you talked to SaskPower, what kind of reception did you receive from them? Yesterday they talked about what appeared to be very high cost for polygen if they were to do it themselves. So they have some partnerships already, when they produce power for our province, and a purchase agreement. What kind of a reception did you receive from them, and have there been talks in your company as to when you could possibly have your system up and running that could be a negotiated base price?

Mr. Cruickshank: — I think that it's fair to say that discussions are ongoing and I sense that SaskPower is actively engaging in discussions in a number of fronts that are looking at solutions. I find SaskPower to be very open for discussion so that's attractive.

In terms of timing, these technologies are in use in China so we're not talking about something that's a science project. This is something that is in use, is operational, that is currently producing. In China they produce mostly chemicals or other attributes from the coal, but coal is a fundamental part of our energy life and you just cannot envision a society that doesn't embrace all forms of energy.

Coal forms 51 per cent of the Americans' energy. It's about 80 per cent of China, 75 per cent of India. It's baseload power. Now let's find a way to be able to take that vast resource and utilize the latest technologies that are in existence — so we're not taking on enormous risks in that regard — put it together in a clean process to be able to produce products that's necessary for our society and for our exports. We think that there is 2 to 300 years worth of energy that can be produced from our deposits right here in Saskatchewan.

Just one last thing. In your packages there's a brochure from the US Department of Energy that talks about coal-to-liquids technology. It outlines their relationship with Shenhua, which is probably the largest coal mining company in the world. The American Department of Energy and Shenhua are very closely linked and you'll see their project in northern China in this document, so this is already mainstream. We just want to be able to bring a project here and we think Saskatchewan is by far the best jurisdiction in North America to do this.

Mr. Hickie: — Thank you.

[10:45]

The Chair: — Mr. Belanger.

Mr. Belanger: — Thank you very much and thanks so much for your presentation. And I certainly want to echo the sentiments in terms of the growing economy and the opportunity for jobs and investment and the opportunity for royalties to make Saskatchewan very, very strong. I think there's no question that absolutely everybody within Saskatchewan wants to see that kind of growth and that kind of excitement, and we share that kind of excitement as well.

When you note on some of your documents that two-thirds of Saskatchewan's electricity generated by coal, how do you contribute to that process? Like how long have you been with your company and have you got contracts with SaskPower now?

Mr. Cruikshank: — We do not have contracts with SaskPower right now, and we are not in production right now. We have access to a large coal deposit in southern Saskatchewan which we want to bring people from China — companies like Sinopec that are in the business of producing energy from coal — to Saskatchewan to combine with us and have a large national or large companies to work with us as operator to be able to produce clean energy from coal.

Mr. Belanger: — So is one of your primary customers being SaskPower?

Mr. Cruickshank: — Not necessarily. Our initial or our primary focus is to produce transportation fuels. We have the ability of being able to turn this coal completely into unleaded gasoline if we so choose, or other products such as diesel or others that are coming as technology evolves.

But because part of the plant is a total of 1.4 gigawatts of power — most of that is used in the production of fuels — we believe that there is an opportunity for us to work with SaskPower and whom we would like for them to operate part of this plant in terms of the production of power; that there is going to be potentially 3 to 400 megawatts of power that would be available to SaskPower for the grid potentially at peak times or at other times that would benefit all parties concerned including the economics of the plant.

Mr. Belanger: — In terms of your deposit, and you mentioned that the northern states also have similar kind of opportunities with coal, how would you characterize your share of the coal deposit that both the States and Canada share in terms of the general area?

Mr. Cruickshank: — Well Saskatchewan is blessed with a huge amount of coal.

Now you have to understand the importance of what's in this document. There's virtually no one that would go out and spend the kind of money to drill 4,600 drill holes to establish a deposit. And that has not been done in the US. It's only been done here, so there was a tremendous amount of effort, knowledge, and opportunity gained from the work that was done in the past. We are the beneficiaries of that work. That is clearly a huge asset that we recognize that we want to be able to monetize, we want to be able to develop.

So we know more about this deposit. To give you a for instance, we need roughly 50, 60 million tonnes of coal per year for our full phase 1 plant, which will be 10 modules producing 150,000 barrels of gasoline a day. So 60 million tonnes into a few billion is a long time.

Mr. Belanger: — Sir, the reason I'm leading up to the question or the position that . . . Obviously one of the considerations for our future energy needs as a province has been the nuclear question. And the reason why I'm asking these questions is that the fact that it was one of the considerations would not have had any ramifications on your particular project when it comes to the actual end product of gasoline as you mentioned. Is that correct?

Mr. Cruickshank: — You know, we would embrace the nuclear option as well because nuclear produces electricity which can produce hydrogen very cheaply. We use an enormous amount of hydrogen in our process. In fact my colleague who would be able to speak about this much more eloquently than I, Mr. John King Burns, as our managing director of the coal-to-liquids division, said that we will take all of the nuclear power's off-peak power to be able to produce hydrogen. Because that hydrogen will increase the yield on our coal from 2.2 barrels of gasoline per tonne to upwards of 5 to 6 barrels of gasoline per tonne, because we use so much hydrogen in the production of gasoline. So in our case that would be very beneficial.

The Chair: — I have Mr. Allchurch.

Mr. Allchurch: — Thank you, Mr. Chair. Mr. Cruickshank, I want to say thank you for your presentation this morning. I also want to say thank you to the answer you've just given Mr. Buckley in regards to nuclear in the province and the spinoff from that for your operation which enhances your operation.

My question basically though is regards to Mr. Hickie and that is, your company is not up and running as it is right now as far as production. If you were to get the go-ahead and could come on board with SaskPower, how long would it take to get your company up into production mode?

Mr. Cruickshank: — The Chinese, the Sinopec has indicated that they could produce these modules, these 15,000-barrel-a-day modules, roughly 36 months, 24 to 36 months after we have a full signed contract. And then they could deliver these modules every few months thereafter. So it's our objective to be able to have them produce one module to get started, to be able to build a 15,000-barrel-a-day plant, and then continue to build this modules. The number is somewhere between 36 and 48 months, 60 months, three to five years.

Mr. Allchurch: — If your project was up and going — and you mention that you need hydrogen in order to enhance your operation — with no nuclear in Saskatchewan as we speak now, where do you plan on getting your hydrogen to facilitate your operation?

Mr. Cruickshank: — Roughly 50 per cent of the coal that we produce to produce the hydrogen. So we're currently consuming part of the coal that we process for the hydrogen. So if I had another source of hydrogen, I wouldn't utilize some of the coal that we currently use for hydrogen. That would go into more production.

Mr. Allchurch: — . . . your operation would enhance your operation immensely in Saskatchewan. Thank you for your answers.

The Chair: — I have Mr. Taylor. We're getting down to about the last three minutes.

Mr. Taylor: — Good. Thank you very much. Really just two questions. It comes back to Mr. Cruikshank's comments earlier about baseload and the amount of baseload power in the US and Saskatchewan currently that comes from coal. What does your crystal ball tell you about the ability to produce baseload power from coal in the future?

Mr. Cruikshank: — To go back to that comment that I made that it's my opinion that the federal government has said no new coal-fired power plants without a carbon management process after 2012, so I think it's that we have to be more creative. I don't think that we will be able to utilize . . . If that is true, then we will not be able to put up just more coal-fired power plants. We're going to have to have a carbon management option on every power plant.

Mr. Taylor: — But the federal government is putting considerable amount of research dollars forward. Saskatchewan

has the experiment under way in this regard. So is it possible with new technologies that baseload power can be obtained at megawatt levels that we're currently seeing today, after 2012?

Mr. Cruickshank: — I'm sorry. I don't quite follow the question.

Mr. Taylor: — With the new technologies, with the R & D [research and development] funding that's currently in place, with the development of the experimental project in that Estevan area, are we in a position to create 3000 megawatts from coal in the future?

Mr. Cruickshank: — Oh, absolutely. I've indicated that our plant would potentially make 3 to 400 megawatts available, but it totally produces 1.4 gigawatts of power. It's 1400 megawatts. So that's on a 10-module plan. So it's definitely possible.

The Chair: — Now I'm afraid I have to stop you there. We're five minutes before our next presenter is due up. So on behalf of the committee I'd like to thank Mr. Cruickshank and Ms. Charlton for joining us today. I think that it's been very knowledgeable for all of us. And thank you again.

Mr. Cruickshank: — Thank you.

The Chair: — We will be recessing for a few moments to change witnesses.

[The committee recessed for a period of time.]

Presenter: Kairos Fort Qu'Appelle

The Chair: — Well, welcome back. I'd like to welcome our next presenter. I will read the same statement again just to put on the record and let you know how we're handling things here.

I would like to advise the witness of the process for presentations. We will be asking all witnesses to introduce themselves and anyone else who may be presenting with them. Please state your name, if applicable your position to the organization you're representing. If you have a written submission, please advise that you would like it to be tabled and table your submission. Once this occurs, your submission will be available to the public. Electronic copies of the tabled submission will be available on the committee's website.

[11:00]

I will ask you to proceed with your presentation. Once the presentation is complete, the committee members may have questions for you. I will direct those questions and recognize each member that is to speak. Members are not permitted to engage the witness in any debate, and witnesses are not permitted to ask questions of committee members. Our agenda allows for 15 minutes for a presentation. I'll give you a little wave with about three minutes to our time limit, just as a courtesy so you know we're getting close, and there'll be 10 minutes for question and answer. Again, as with the last presenter, we have some time following that isn't booked, so if there's questions I would like to have the flexibility that we could pursue those.

I would also like to remind the witness that any written submission presented to the committee will become a public document and will be posted to the committee's website. I'm now going to read the question that we've asked all presenters to present an answer to and that is, how should the government best meet the growing energy needs for the province in a manner that is safe, reliable, and environmentally sustainable while meeting any current or expected federal environmental standards and regulations and maintaining a focus on affordability for Saskatchewan residents. With that I would ask our presenter to introduce him and anyone that's with him, and thank you for coming.

Mr. Harding: — Thank you. And I'm glad it wasn't snowing because Dick Peters came from Grenfell and I came from Fort Qu'Appelle . And we were, two days ago, in FSIN [Federation of Saskatchewan Indian Nations] discussions on this whole question of energy futures, so we're covering a lot of Saskatchewan ourselves.

Thank you for hearing us. I'm presenting for one local and the district of Fort Qu'Appelle which has a large and active Kairos organization. Kairos is an ecumenical organization of 11 large mainstream churches. And you have the pamphlet that shows you who are members.

And Kairos has historically been involved in social justice, human rights, work in the community and is now fully involved in the sustainability questions from its justice and ecumenical perspective, as well as continuing its work on human rights. We've been involved in water campaigns. We're now entering the energy discussions that are occurring globally around sustainability.

My background is I'm an adjunct professor at the University of Regina. I'm a past professor and director of the school of human justice. I directed a research unit in Sask Health in the addictions area for several years. And prior to that, I was teaching environment studies at University of Waterloo.

And if you are interested, I write a weekly column on sustainability that goes into the rural R Town News, which goes to 400 communities, and it is reprinted in such things as *Prairie Messenger*, which is the Catholic national paper. And I'm pointing that out, not because of my work, but because that shows there's a deep, deep grassroots interest in this question — including in many of your ridings, from what I can tell — because I've been active in the province on this since I've retired.

Now I know that the time problem, but we approach this as dialogue, and if you are aware of the Catholic bishops last year issued a statement calling for dialogue and conversation. And the UDP [Uranium Development Partnership] actually turned into that and brought a lot of people from a lot of communities into that. But of course, it wasn't structured for conversation; that was just part of why there was so much frustration. This is, potentially, so I'm grateful that it's moved to this stage. And we may very well end up setting a precedent in Canada in terms of the democratizing and the public involvement of creation in new energy directions if this process continues.

I'm going to do three things. And I will assume you read the

larger piece with the footnotes, and then if there are questions we can come back by your 16th deadline with an addendum.

I want to talk about the broad context for new energy policy, and that's a global question, and Saskatchewan's particular challenges. This leads to the structural barriers that I think we have to grapple with, even though some of those are the direction our economy has gone historically, and a need for somewhat of a shift which I will argue, based on the research, will actually trickle down to even greater benefits to strengthen local communities. And third, I do want to set out in a broad sense the policy, principles, and some of the specific policy directions on energy.

I'll say at the outset, the discussion that I just heard, I was pleased to be in on that. I can remark on some of the same issues if people want to raise them. But in the same sense that they were saying there were spinoffs for electrical generation from our broader energy production, I plan to talk on that scale. Because if we don't talk broadly about energy, we are not going to get a handle on the greenhouse gas climate change issue.

The broad context — and I've followed the UN [United Nations] work since it began — we're now at 4000 tonnes per person globally as an average greenhouse gas footprint. And as a global impact, all the credible science says at least reduce by half and probably more by 2050. I think it's probably more because the scenarios that have been built through the modelling were hitting the indicators faster, whether it's Arctic melting or the destruction of coral reefs or the acidification of the ocean, which is a huge factor. Let me tell you, the marine biologists are very, very nervous about the food chains now.

Now the interesting thing is you've just been talking about China. China's just passed the US as the largest aggregate producer of greenhouse gases. But on a per capita basis, they're actually in the ballpark of the global average. So we've got to get China moving back down, but it's the Western industrial world that is driving this. And I know that if China and India were to model the US or Europeans per capita, we'd be in deep trouble. But I'm actually relatively optimistic that we may already be turning the corner on that.

The biggest region is North America. Europeans are starting to drop their levels quite quickly, and they will meet the Kyoto targets. And I'm sorry to say, as someone proud that medicare came from Saskatchewan, that we're right up there now. We're the top per capita producer. We're past Alberta. And Saskatchewan's now at 72 tonnes, compared to the global average of 4. And there's reasons for that, but we can get a handle on them.

Now, we may think that this isn't going to affect us, but that would be naïve. We are already a semi-arid, drought-prone area. All modelling indicates that the semi-arid and the drought-prone, longer drought-prone areas will spread further north. The mid-range scenario by 2050 is a 2 per cent centigrade degree average rise. That's the mid-range. These are now being questioned based on actual events.

The worst case is 4 to 6 degrees increase in temperature on the prairies by 2050. And you know what that would mean in terms of shifting arability, well-being, water, security. The 2080 mid-range is 4 to 6 degrees increase in mean average temperature for the prairies.

[11:15]

Now I've followed the scenario since I taught environmental studies, and most of the worst-case scenarios in the 1970s have now been surpassed, both in terms of actual temperature rise globally. The last 10 years are pretty much the last hottest years. And you don't judge this by regional climate or extreme weather; you judge this by ocean temperatures and the impacts on weather systems.

We know, as one example, that the studies of water flows on the North and the South Saskatchewan are now indicating that we're already possibly 80 per cent below what we were last century because of the industrialization of those systems upstream, particularly in Alberta. With these scenarios, the climate change is impacting the prairies. There's going to be serious . . . We're one of the areas around the planet that would be targeted as potentially dealing with heat waves and with water scarcity problems.

And I'm not saying that to scare anyone; I'm saying that because that's the science. That's actually the science, both at the University of Regina among the geographers, as well as some of the international work. So of course what this means is we really have to think about what we're doing in this generation in terms of long-term implications for well-being of humans as well as plant and animal habitats.

Now the Saskatchewan situation is unique because every region is. What's the source of the 72 tonnes? Well the oil and gas industry is responsible for a third of them, and if you add other industry in, it totals 39 per cent. So right off the bat, you're almost 40 per cent of the greenhouse gases from the industrial sector. The good news is where energy efficiency has been done seriously, the industrial sector has shifted the fastest. And that's occurring all over the world. And our neighbours to the south actually are leading the way now.

Electrical generation is a corridor, and we've been focusing on that a lot because the nuclear issue has been politicized, I believe by the industry — and that, we can talk about that — and that's not necessarily good because we better keep our eyes on the whole picture. We could phase out all coal in Saskatchewan, and if the other areas that are responsible — transportation, 16 per cent; agricultural, 14 per cent of our greenhouse gases — if they continue to grow and didn't shift in terms of their impacts and their emissions, we would still be on a rising curve.

Think about that. We could phase out coal here, which is about 60 per cent of the 24 per cent, and if the other sectors didn't shift we'd still be increasing. And I say that because I'm concerned that a lot of people in this last year have been drawn into this nuclear panacea agenda, and it's not a panacea. There's no science that suggests it's a panacea for this at all. We can talk about that if you want to talk about the studies.

Most interesting, those of us who live in our homes are only responsible for 3 per cent of these greenhouse gases. I live in an energy-efficient house, believe they should be encouraged.

Passive solar can reduce half of the heating costs, but that isn't going to do it. That's not going to do it unless we move in the direction of the Europeans and we start to use our buildings as a way to generate electricity. Then home and residential reconstruction begins to become part of the larger solution. And I hope you heard me — buildings now are going to become generators of energy, particularly with PV [photovoltaic] which is going to be cost-effective before any new nuclear power plant is built. It is already being put in.

The Chinese, by the way, are building half of the PV. And if you're going to twin with China on gasified coal, you better really think about the future of this market. Because Ontario just lost solar researchers to Germany, and now Germany is vying with China in that world market because Ontario didn't pick up, and German plants built half of the plants at German costs. And now they're competing with the Chinese internationally for the PV market.

So phasing out coal is I believe pragmatic and possible. We can debate whether clean coal is an oxymoron. Biofuels, by the way — just so you know in terms of the past presentation — biofuels are not coming up as energy efficient alternatives. Biomass is, because biomass is directly using the energy of mass to heat or to generate electricity and it's carbon neutral. Biofuels use, as he said, massive amounts of energy to turn biomass into a fuel product. So while there will be some people moving towards the biofuels — and ethanol being one of them — check your subsidies. It's almost the same story as fossil fuels and nuclear — massive hidden subsidies behind the biofuels industry. So you can see it's a challenge across the whole energy sector, not just electrical.

But I'm sorry to say it's even a bigger challenge because if we don't start understanding how our systems affect natural systems and how they in turn affect us, this thing can get out of control. And that's called the biospheric impact. Our emissions are miniscule from human systems compared to the melting of the Arctic and the releases of methane, which is a far more potent greenhouse gas than carbon, or ocean temperature rising and the releasing of carbon, or massive forest fires and the loss of the carbon sink. And I've given you some data.

So you know we now have to think about boreal protection to stabilize the boreal. It's a massive carbon sink. It's actually a more efficient carbon sink than the rainforest. Ontario's taken the lead; I believe Saskatchewan should join them. I believe that approach has incredible implications for new economic, sustainable economic development in the North, partnering with First Nations and Métis. Renewable value-added, sustainable value-added — different mindset, but one that stabilizes the boreal.

So the bigger picture, but you know, here's how I'll say it: while we're focusing on the electrical sector and arguing about nuclear versus renewables — and I'm on the renewable side, because cost effectively, nuclear energy's pretty much out of the market now — while we're arguing about that, we're forgetting that in 2002, 2004, half of Canada's carbon emissions came from forest fires. And that's what's driving the climate change is the complete, total picture including our impacts on natural systems.

Well we've got a lot of barriers because of the way our economy's been built on the non-renewable sector. And I'm not partisan about this at all. And Kairos I think is trying to approach this from an ecumenical perspective. But we're well on our way to 1.7 degrees increases globally, and 2 degrees is considered the threshold for some of these irreversible shifts in terms of releasing carbon stored in the oceans, in terms of methane releasing, etc.

I won't go into the details of how we haven't really addressed this in Canada, but I'll say we're behind everyone now. And the US has 30 states who have renewable energy targets because the federal government didn't initiate it. I suspect Canada, a lot of this change will probably occur at the provincial level, and there's jurisdictional ability to do that.

Be aware the shift to renewables and efficiencies is already occurring in most industrial societies, and Ontario has just made the shift in policy. And I won't have time to go through the specific policy recommendations, but when SaskPower projects a demand increase, they're using old, obsolete models.

And if you go to Vermont or California or Germany or Denmark — or, I believe, even China soon — at the rate they're going, you're going to find that demand-side management is the cheapest way to create new supply. That's good old conservation.

In Vermont, the agency on energy conservation, when an industry that has huge motors breaks down, they phone the energy conservation who will find them the most efficient motors and pay the difference because in fact it saves the taxpayer money because it reduces the demand on the grid with huge capital cost implications and debt implications. And this way of thinking is driving industrial efficiency — in fact the industrial sector is leading this. It's the governmental and the Crown sectors that have actually been slow because they've been wedded to those large utilities.

And I know that's ideologically hard to grapple with in terms of Saskatchewan, the history of politics, but we've somehow got to go to the third way of thinking, is how I put it. But we're already seeing the renewables past nuclear, globally in 2005. In terms of their share of global electrical supply, they're going to double — minimum double — by 2030. Nuclear's dropping; it's down to 14 per cent.

I'm following the economics. There's no hope for this. It's not going to happen. Right wing as well as progressive and liberal think tanks are all saying levelized costs of that industry have pretty much ruled it out. Clean coal is actually more economic, but it's not as economic as demand-side management moving to the renewables.

I'll end by saying this province has more renewable energy potential than any inland area in North America other than the northern States. And they're moving to wind; 186 megawatts is in the works in the United States. And you know how many megawatts of nuclear might happen — 9000. Now think of those figures — 186 000 megawatts is in the works.

SaskPower needs a little encouragement to get on track with this new way of thinking. Wind could provide 800 megawatts

and the baseload argument is now obsolete. They're firming the renewable. You can use import hydro from Manitoba as a complementary source to stabilize; it's called firming. You can locate your wind farms in diverse wind zones and get highly reliable production. The states in the US at Stanford University indicate they can guarantee anywhere from 35 to 40 per cent of capacity reliably feeding into the grid. And they're now doing this in industrial sectors.

SaskPower is simply got to be bumped into this new way of thinking. Just demand-side management to end and moving to wind — we're the highest inland wind potential region in Canada and we only get 3 per cent right now. Just those two address 40 per cent of the question of projected demand increase. And then I've pointed out all the other sources that could in fact be cogeneration from gasified coal, etc., etc.

I'll end by saying it's a perspective question. The concrete policy directions flow from the grasp of the global situation, the Saskatchewan dilemma, and the new potentials that we're starting to see in the green technology economies.

The Chair: — Thank you, Dr. Harding. I was giving you the signal to wrap it up, and I apologize for doing that, but I know that many of the committee members have questions that are probably going to flesh out many of the things you were saying as well. But just a quick note — the information you provided, did you want to table that?

Mr. Harding: — Absolutely.

The Chair: — Okay. Those will be tabled and put to the website. I have Mr. Bradshaw on first.

Mr. Bradshaw: — Thank you very much for your information. And I guess looking at the actual question as it's being put forward is, it says the main . . . part of the question is maintaining the focus on affordability for Saskatchewan residents today and in the future.

I know that you talked extensively on renewables. I take it your renewables are wind and solar. Am I correct on that?

Mr. Harding: — Biomass, run-of-the-river hydro — there's a lot of renewables. I personally think that photovoltaic will . . . I believe wind will be possibly transitional to solar, but that's being debated hardly. You know, there's a hard debate going on about the costs of moving to solar. At this point I think wind's cost-effective and all the studies indicate it.

[11:30]

Mr. Bradshaw: — I noticed just in your paper — and I just had to quickly read through there — that you were talking 20 per cent from wind power. That's a target.

Mr. Harding: — Yes.

Mr. Bradshaw: — And yet when we talked to SaskPower yesterday, they felt that the most they could go would be 8 per cent. And you are saying, well, we could draw from the other places such as Manitoba, tie into their lines with their hydro. But as the economy expands, what do we do? Like, we can only draw so much from them, so how do we keep that baseload in perspective?

Mr. Harding: — No, well I understand, but see SaskPower . . . See Alberta has actually now shifted its position on the amount of wind. And by the way, when I say 800 megawatts, that's what Alberta's going to be producing from wind when the next wind farm's up. Did you know that? They're going to be at 10 per cent of their grid. They get a bad public image around the tar sands, but they're actually ahead of us on the renewable sector. Ontario is too, by the way.

So they're going to actually have 800 megawatts of wind in Alberta when this next wind farm — which is funded by an Irishman, which is interesting — because they did wind zone analysis, and these Alberta clippers are just about as good as the offshore wind farms for capturing energy.

The base load question: here's what you've got to realize, is when we talk about peak loads — and SaskPower always says we need more supply to meet peak loads — they've never really done demand-side management work here in a systematic way. What you do with demand-side management is you reorganize when there's demand on the grid, so you drop your peaks and you coordinate your input. And that's what I'm saying about an integrated, interprovincial grid.

Do you know that most of Manitoba's excess goes to the States? Do you know that they're not going to want it soon, based on the projections? They're going for energy security — finally. It'll make the world a more peaceful place. So where's our long-term planning about energy security and not building an economy on exporting non-renewables? We've got to start thinking about this now. If we don't, the next generation will have an even more difficult time.

There's tremendous excess hydro in Manitoba that can be easily integrated into upgrading our connection there. And we're in a natural grid system with Manitoba — not Alberta, by the way. So you simply coordinate when they do and when they don't release hydro into our grid.

But SaskPower's moved towards gas turbines as peak load backup. And that's a way to reduce greenhouse gases; I'm with them on that. They just spent $400 million of our money on those gas turbines to deal with peak load, but they didn't buy the efficient ones. And I asked the vice-president, why didn't you buy the combined cycle units which increase the efficiency and lower the greenhouse gases? He said we were in a hurry, which suggested to me they're not planning with an efficiency perspective because we know the combined cycle, where you cogenerate with waste heat, increases your bang for your bucks, reduces your carbon load per energy output. It's well known.

If you bring someone like Amory Lovins in as a witness from the Rocky Mountain Institute, he's the world expert. He's right now commissioned with Wal-Mart to reduce their energy load by 30 per cent. So think about that. If they've hired him, you might want to talk to him.

So I don't think this is a problem at all. I just think they're stuck in the old way. They have to change the grid. The grid does have to be changed, but the costs of upgrading grids to export

electricity are massive. And the costs of readjusting the grid to deal with more supply from different sources, it's being done in other countries. And that's the decision — to invest in a grid that can deal with renewables with low environmental impact, or do you keep building grids for centralized, thermal plants? They're highly unreliable, meaning we're vulnerable if they go down, and you need backup for them which is pretty costly. So it's a different perspective.

Mr. Bradshaw: — My understanding is, on the wind turbines, when it gets to minus 30, they shut them down for safety's sake. So, as you know, the biggest draw on our power is when it gets very cold. That also happens to be a time when the wind, you know, doesn't blow. What do you propose then that we pick up this large — if we went to 20 per cent — we pick up that large capacity that we would need when it gets very cold?

Mr. Harding: — Well no. They're using windmills in the Arctic 12 months a year now on research stations, and the Nordic countries are moving to wind in extremely cold climates. I mean, if people are so optimistic about the other technologies being able to solve these problems, I'm totally optimistic about that issue of wind being able to function in our cold weather.

A combination of renewables is what provides security. When you move your grid to one source of energy . . . You know about the brownouts — huge vulnerability of people on the grids — they're usually a result of the grid having too many centralized sources and not enough diverse sources. So you might think there's energy insecurity because of issues like temperature and wind, but actually your vulnerability is greater if you had 50 per cent on . . . If you had Bruce Power building 2200 megawatts on our grid, you'd have to be running backup — probably coal plants — at a massive cost in case those went down.

Nuclear power plants, by the way — in Ontario, full-life analysis — run at about 66 per cent efficiency. So all I'm saying is there's a debate with all of them about this question of reliability. And I think the indications are wind is going to be a good part of the mix. And 20 per cent, you know, 800 megawatts is what Alberta's going to be producing soon. Ontario's going to go past that very soon.

The Chair: — Mr. Belanger.

Mr. Belanger: — Thank you very much, Doctor, for your presentation. And I certainly thank you for your continued effort to try and get the rest of the world to understand the challenges facing not only Saskatchewan, but in the entire globe, in terms of the environmental challenges that we all face. It takes a lot of effort to finally convince people to get it.

You know, I think too the series of discussions that you presented to us, that's one of the things that this committee wants to do. What do we do to meet the future energy demands of Saskatchewan and not have it focus on the uranium debate as has been advocated in the past number of months?

When you talk about the demand-side management and the systematic way that SaskPower is not looking at managing that, then you speak of the sustainable development of wind and hydro and so on and so forth, would you say that the resources and the time and the concentration on those aspects of managing our power needs have not been given a fair amount of time and resources to really, really thoroughly investigate some of the options available to us?

Mr. Harding: — You know, I want to preface this. I'm not partisan on this question, and I'm not even into blaming because I don't think that's how we'll move forward. I think there's historical reasons why SaskPower is way behind the pack. If I was to rate SaskPower on a North American scale of moving forward progressively with the new technology, they'd be way near the bottom. They'd be way past Vermont. They'd be way past California. I'm just saying that.

There's reasons for that. We're a small population. We've got a relatively small grid. Now let's think about this — 3500 megawatt electric grid is a small grid. It's been served well by coal historically, reasonably reliably, but heck of a lot of dirt. And we haven't been too concerned about air pollution because we don't have dense populations like Toronto where kids are going to the hospital with asthma attacks.

So we've had it good here because we're a small population, we've had a small grid, and we've had cheap coal. And that's why we're in this dilemma now because we've got to join the world in reducing our greenhouse impact. We have the highest per capita probably on the planet, and we'll take a little bit . . . See, we have the advantage that the small grid and the reconstruction and conversion to renewables can happen relatively easily, plus we have access to diverse renewables — biomass, run of the river, solar, wind, demand-side management, and conservation.

So we could go from being one of the most backward, in the sense that we're historically now dependent on coal and a high footprint, I believe in 10 years we could go from one of the most backward to one of the most forward, to be quite honest, because we have the resources here to do it. And would it be a driver of local economic development? All the studies indicate five to seven jobs per dollar invested or kilowatt produced with the renewables versus the nons because they're capital intensive. And these are labour-intensive jobs maintaining your wind farms in the local community, jobs putting up the wind farms in your local community. So the economic spinoffs of going in this other direction are also a positive in terms of economic development.

But I think historically we're in a predicament because of it's been relatively easy to provide our needs on a small grid with coal and here we are. We got to think it through again. And I think we will. I think you're going to hear recommendations from people who are top-notch experts on energy efficiency and renewables as your hearings proceed. And I would strongly encourage you to bring in some of the world leaders like Amory Lovins or Ralph Torrie who's an energy conservation consultant in Ontario, who's been working for the corporate sector, by the way.

The irony about this is the industrial sector has driven efficiency. They're the ones, because they had a bottom-line motivation for reducing their energy costs. And the state sector's been the slowest. And I'll add that the only place

nuclear power plants are going to be built, folks, is by the state. Think about that. And I don't think you want to do that, but that's something you'll have to decide.

I don't think you want a state-run nuclear power plant, and private companies aren't going to build them. And by the time they're built, all this other stuff is going to be up and running, so it's a waste of money. Even your coal, nuclear thing you were talking about before around hydrogen, it's not going to happen because they're going to be up and running. And maybe they'll want wind as their electric source of energy for hydrogen, I don't know, but I just don't see it. It's not in sync because your nuclear power plants can't be on stream for a decade or more, and there's not the financial willingness in the private sector. And I don't think the Saskatchewan public would put up with the debt load because they've seen what's happened in Ontario. So this way, I think it's time to make the shift now, and we can do it in Saskatchewan.

Mr. Belanger: — I just want to make a point, and my final point, and we'll let the other side have their opportunity. And certainly I'm not trying to box you in, in terms of the partisanship that often is accompanied in theatres such as this. I think the point that we're trying to make or I'm trying to make is that obviously there's got to be a series of serious efforts to try and resolve this issue, that it's not just a one-stop approach.

Mr. Harding: — No, it isn't. I'm sorry we got tied up on wind, but that's fine. But moving to lower inputs in agriculture, we're learning a lot about companion cropping and rotation and soil enrichment and weed control with lower carbon inputs. We're learning about it. Organic agriculture is not just going to be hobby farm agriculture.

Public transit, I believe this government's actually given leadership on the buses. The buses have had more people on. I take the buses. They've had more people on in the last couple of years. I think you've done a good job in moving to a better use of that because an empty bus is stupid. But all these sectors have to go through shifts. The residential isn't a big carbon footprint, but I'm pointing out the use of buildings and homes to generate electricity is what's coming.

[11:45]

Buildings are going to be net producers of electricity. So your city is going to be producing its own electricity in the future. It's not going to be on a grid from a faraway thermal plant on a river, contaminating water. It's going to be generating its electricity off the buildings. SaskPower doesn't see it because they've never had to. But it's happening in Germany as we speak. It's happening in California. Google has a third of their electricity provided by their PV panels on their head office. Just think about that.

So it's a mindset that we've got to embrace. And we're good at this — the one thing I'll say about Saskatchewan people is we get stuck on tracks because they've worked, but when we have to change track, we're very fast. We're very innovative. I see it in the farm population. And so because we're small and we have populist things happening in our province that other places don't, we can make these . . . We're resilient, is how I would put it.

Mr. Belanger: — And that's exactly the thrust of what I was going to ask. And the first thing I would say is that we really do need a list of the experts because we determine that there's got to be a lot of discussion, a lot of very, very hard decisions made, and we've got to engage the public as you mentioned. So we need a list of those experts that you speak of because it really helps us. You're helping us. And I don't think you have to preach to the converted because if any politician worth their salt doesn't get it, then they aren't going to be a politician very long.

The second point I would make is that when you look at some of the efficiencies you talk about and the renewables — you mentioned forest fires — your perspective on . . . Back home in Ile-a-la-Crosse, northern Saskatchewan, I have a fuel furnace and I've got a wood stove. And I tell my wife, well it's cheaper to burn wood because I can get my own wood from the bush and the mills aren't using them anymore. But am I contributing more carbon through wood burning as opposed to fossil fuels? These are some of the things that people ought to know.

Mr. Harding: — No, you're not. I'm on wood stove as my backup. I'm in Fort Qu'Appelle — passive solar, heat sink. I hold the solar heat through the night with super insulation. My backup's wood; I burn less than a cord. I heat 2,000 square feet and I have a carbon neutral footprint because biomass releases the same gases when it composts as it does when it's burned. If you burn it efficiently, you can actually capture the gases and reduce the footprint. And I'm quoting Natural Resources Canada, who has just done a study and said we should return to more wood heat with the efficient burners we're using because it's better than natural gas. Natural gas is better than oil.

So we have a lot of misconceptions about this. The North should be on wood heat in more places because it's there, and it's a regenerating, it's a renewable fuel.

Mr. Belanger: — But we do need those list of experts. If we really, really want to truly give the process, we need the list of experts because we'll obviously call them in. and the point . . .

Mr. Harding: — I will give you two names. Amory Lovins, Rocky Mountain Institute. You'll find him very interesting because he's actually working for Wal-Mart now. Ralph Torrie, a consultant out of Toronto — their names are in my brief — who's worked with the US corporate sector because the Canadian corporate sector was behind, so he had to go across the border to get work. But he's worked to increase the efficiencies in banks and all kinds of institutions on their use of electricity.

Here's what they mostly do, by the way. If you burn gas for heat in a huge building, what happens to your waste heat? It goes out. Cogeneration, you trap your waste heat; you generate your electricity for your building. There you go — right off the bat you've reduced your cost, your footprint, increased your bottom line. Buildings are moving in this direction. Just think about that. Just that — natural gas, capture waste heat, cogenerate electricity. It's a different way of thinking. It's the scientific way of thinking; it's the new physics.

I'm sorry to say that thermal plants are the old physics. And I'm sorry to say boiling water with a nuclear power plant at 6,000

degrees with all the fission, uncertainties, and the waste product is old science. The new sciences are taking us in this other direction.

Mr. Belanger: — Okay. I just want to make the final question I had proposed. Do you think it's wiser to look at . . . As an example, somebody mentioned to do the battery for solar power costs more power today to build it — it consumes more energy to build it — than the efficiencies it provides. But that battery has a life of, could be re-charged.

Mr. Harding: — That's a good question. I've waited, I'm about to put wind on in our farm to go into SaskPower because finally we have net metering. And I'll tell you, we're 10 years behind other jurisdictions. But one of our recommendations, and you're going to hear it all through your hearings, is we'd better get the feed-in tariff here quick, because if we don't, the market's going to go elsewhere. Ontario's gone to it. Germany's transformed their grid with a feed-in tariff, and they're doing it all over the States.

What that means is a First Nations wind farm, farmer co-op, towns and villages become producers of energy and the efficiencies go up when you produce as close to the end use as you can. You know that transmission reduces the efficiency by about 60 per cent. It's unbelievable. Exporting hydro from Manitoba down to the States is absurd from an efficiency point of view. So you get a feed-in tariff policy here and you watch what happens. You'll have small businesses, cogeneration plants, rural wind farms will redistribute the benefits of the energy economy across the whole province.

And I'm waiting because I didn't want to invest in batteries. Why would I if I'm on the grid? So when I overproduce at our farm, you'll now take it at SaskPower but only as a credit for the amount I produce. That's absurd. If I put $20,000 into a windmill on our farm and I can produce for our whole cul-de-sac and reduce the load at the coal plants and the emissions, we work out a relationship and it's a good relationship.

And that answers partly the question that you raised earlier about wind and reliability: the more points on the grid that are able to do a feed-in tariff, the more sources you have to work stable baseload power from. So I could be producing for people who would be shut down because the grid shut down. I mean, think about that.

The Chair: — I have Mr. Hickie.

Mr. Hickie: — Mr. Chair. Thank you, Mr. Harding, for your presentation. I just have a couple of quick questions, and I think the reliability on the wind part first.

SaskPower yesterday talked about our climate being . . . of course in the middle of winter when it's past 30 below, they have to shut down the turbines. You mentioned the Alberta clippers and Alberta with this new wind farm. Could you elaborate on the whole climate issue when using the turbines? Because I think in the northern states and in this Alberta clipper issue with Alberta wind farm area, they aren't struck with the massive amount of days, I would say, in the middle of a winter cycle that we get 30 below-plus with wind chills. The wind's great, but it causes high wind chill which means you have to shut the turbines down, if I understood SaskPower correctly.

Mr. Harding: — Did they say they were shutting down the 150-megawatt by Gull Lake?

Mr. Hickie: — You know, they didn't speak of one particular wind farm, but they talked about . . .

Mr. Harding: — Because I believe that ran through the winters. And the locating of these . . . First of all, the climate's changing, so think about that, the warming pattern. We're going to get more warming fronts up from El Niño through the Phoenix area. And last winter was a particularly heavy, long Arctic front, but I know how many others we had that weren't like that because I've been keeping track of them. So don't . . . Put that into your scenario.

But I think you better ask some questions about the French turbines that are being built. I'm close to buying a French turbine, but I'd rather buy Saskatchewan. And the Saskatoon people who are starting to produce are moving ahead because they have to produce for this market. And I hope they do because I'd like to see wind technology built in Saskatchewan and not imported. Like for people who believe in technological innovation and engineering moving forward, I consider this a small problem. This is not going to be a big problem.

Mr. Hickie: — Thank you. Just one more final question, I guess. It's just in relation to the cogeneration part of your paper here. Saskatchewan is attracting a lot more big business. We seem to be moving along those lines. We're leading the nation in the recession issue. We're coming out of that better. We have a lot more interest than before with our new growth tax incentive possibilities and attracting those kind of corporations.

Now with the cogen aspect, would you be then saying to us that you're in favour if we have corporations that want cogen at a much more aggressive level and having SaskPower be more receptive to that, to put that onto the power grid system? Is that what you . . . if I heard you right about cogen?

Mr. Harding: — It's being done with Lloydminster and with potash now, under the previous government. And I believe it's 500 megawatts. I've always wondered why SaskPower's not doing it, why they're just relying on purchasing it from the private sector. My view would be both. When they finally made the deal on the pipeline waste heat — because don't forget how much energy's being used on these pipelines and there's waste heat — so when they made the deal on the southern area gets 60 megawatts, I consider that was the beginning of real intelligent energy policy. But remember those pipelines are greenhouse gas intensive energy sources, so it's only transitional.

But while you're doing that, while you're using the fossil fuels, your first thing is an efficient, lower impact policy. That's how you lower your greenhouses. Until you shift your technologies to the renewables, you're responsible to lower your impact and increase your efficiencies, which is why we say efficiency and conservation first always. That's always what the policy should be. And SaskPower has not done that.

So the answer is yes, every source of waste heat and potential

cogeneration should be built into SaskPower's projected energy supply. And that would rule out a large mega plant, I guarantee you, because especially if there's a clean coal option here . . . And look, you just talk to someone. China is ahead on gasification. I know that and China says they're going to lower their greenhouse gas through combination, just like I'm talking. They went to the UN summit last month and said they might actually be able to reach the European reductions, which means we're now the bad guys — North America.

Now India's going to be a problem. India's, I don't think, going to be able to do this. But if you were in China, you'd want to do this because the extreme weather, the water crisis, the ecological carrying capacity, the deforestation, the lack of food security — they're in a serious ecological crisis in China. That's all I would say. They have to shift. They can't keep burning that dirty coal.

They'll never build the amount of nuclear to replace it. I want you to know what would be involved: you'd need 3,000 nuclear power plants — you now have 400 — to replace existing coal electricity. And that's only half of the electrical generation part of the greenhouse footprint, back to my first point.

It wouldn't make a difference. It's been modelled. You could replace every coal plant with a nuclear power plant, and you would not reduce the increased upward trend towards more carbon in the atmosphere, which is why we have to be intelligent.

Every sector, you start to move it. You enhance the local economic impacts. You reduce it as an overall impact. You have to hit every sector. You have to hit transportation, agriculture, electrical. And the oil and gas industry definitely as the largest producer of greenhouse gases has to be made more energy efficient.

I believe there is incentives in industry to go to efficiency if the policies are there, just like there's an incentive for me if SaskPower has a feed-in tariff. Because I shouldn't have to front the capital costs if I'm doing a service by overproducing electricity which reduces the burden on the taxpayer. Follow my logic?

Mr. Hickie: — Thank you very much.

The Chair: — Well, I think we're pretty much at the end of our morning session, but on behalf of the committee I'd like to thank you very much for coming and making your presentation and answering the questions, I think, quite directly and very thoroughly. So thank you very much. We will now recess until 2 o'clock.

[The committee recessed for a period of time.]

Presenter: Council of Canadians

The Chair: — Well, welcome back. I'd like to bring the committee back to order. We've got a presenter, Mr. Don Mitchell, here. I'm going to start off by reading a brief statement stating how the committee will be run, and then I'll turn it over to Mr. Mitchell.

I would like to advise the witness of the process for presentations. We'll be asking all witnesses to introduce themselves. Please state your name and if applicable your position with the organization you represent. If you have any written submissions, please advise that you would like them to be tabled submissions. Once this occurs, your submission will be available to the public electronically. Electronic copies of tabled submissions will be available on the committee's website.

I will then ask you to proceed with your presentation. Once your presentation is complete, the committee members may have questions for you. I will direct questions and recognize each member that is to speak. Members are not permitted to engage witnesses in any debate, and witnesses are not permitted to ask questions of committee members.

Our agenda allows presentation times of 15 minutes with 10 minutes of question and answer. But as I had mentioned earlier, likely we have some flexibility at the end. And if there's questions, hopefully you'd be willing to stay a little beyond that to answer questions. With about three minutes left in your presentation time, I might give you a little signal, just so you don't get caught at the end.

I will also read a question that the committee had worked together on to come up with that all presenters are to present in response to this question: how should the government best meet the growing energy needs of the province in a manner that is safe, reliable, and environmentally sustainable while meeting any current and expected federal environmental standards and regulations and maintaining a focus on affordability for Saskatchewan residents?

And with that, I would like to turn it over to this afternoon's presenter.

Mr. Mitchell: — Thank you. Well I hope I can address the question in the context of my presentation because I think it's on topic there.

My name is Don Mitchell. I'm a resident of Moose Jaw, and I'm representing the local chapter — Moose Jaw chapter — of the Council of Canadians which is a social policy advocacy group that extends across the country. There are three or four chapters in Saskatchewan, and energy policy and options is just one of the framing policies of that organization.

So this representation is consistent with the Council of Canadians position, but was developed in a Saskatchewan context and is representing the Moose Jaw local of which I'm an executive member. And I would like to table this as a written submission.

I'm not going to read through the document. I know you haven't had it long, but you'll have a chance to reference it. I will be dealing with a number of points, but I'll try and emphasize what I think are the priority points. And the brief deals with the question of process on this issue and where we go from here in sorting out the important question of energy options. It emphasizes the range of alternatives that need to be explored further around renewable energy and efficiency and conservation. And I think, yes, I want to underline a couple of

points that are made here within the brief at the outset.

One is that on the question of renewable energy I think there is a broad consensus. The Council of Canadians actually commissioned a poll that was done by Environics in January 2009. And I reference that in here on the question "Do you strongly support, somewhat support, somewhat oppose or strongly oppose the Canadian government developing a comprehensive strategy to create more 'green jobs' through improved energy efficiency and the expansion of renewable energy sources?"

So like most polls the question slants, but the result is not really surprising, that there were 93 per cent of Canadians surveyed support that initiative, 5 per cent opposed it, and 2 per cent didn't know or didn't answer. And as I say, that's not surprising. I think renewable energy is logical, as is conservation logical. It's like motherhood. But just because it's logical and there's a broad consensus on it, as with motherhood, it doesn't mean that we're necessarily doing a lot to support moving that issue forward and deepening our understanding and our strategy around it. As with motherhood and child care, motherhood is an easy concept. Effective and comprehensive support for child care sometimes doesn't happen.

So in terms of the process, a major appeal within this is that the work that you're doing — and I think I understand the mandate, but I could be corrected — you're sort of looking at this issue in terms of recognizing some gap in terms of information and strategy and trying to advise government in terms of next steps of how we move this discussion a little deeper. And so that's kind of where the conclusion of this brief focus is. And in order to ensure that I don't miss that, I think I want to start with that.

Four recommendations, and I should say too — although it's in the brief — that the kind of scope and direction of this is very much borrowed from a document and report that is much more comprehensive, longer, and deeper in detail than this that was done was the Pembina Institute in the province of Alberta directed towards the options for the Alberta government looking at these same issues.

So the four recommendations around process would be first of all to establish a renewable electricity task force. And I would see this as being of the same weight and priority and a parallel to the panel that explored, in these recent round of hearings, the potential role of nuclear power. We'd like to see a panel examine renewable energy, look at what's happening in other jurisdictions — because there's a lot happening globally and especially in Europe around renewable energy — and invite expert testimony within that process. I don't consider myself an expert. I've had experience in some of this that I'll refer to because of municipal involvement in the city of Moose Jaw in the 1990s, but there are certainly lots of experts in the technology and the experience of renewable energy that we could draw on to give us directions.

Number two: develop a comprehensive energy efficiency and conservation strategy because that's the parallel of renewable and dealing with what's expected to be a rising demand. I don't accept the assumption that energy demand is going to double in the next 10 years. I think it's irresponsible to assume that. It depends what we do as a matter of public policy, and conservation and efficiency are an important subtheme of that. We need to seize the opportunity now to show bold leadership in making energy use more cost-effective.

Saskatchewan could promote a culture of smart energy users through training and outreach, loans, updated efficiency regulations, and the retrofitting of energy-efficient public buildings. There's a whole range at the individual, consumer, community, and public and corporate level of strategies that can and have been adopted elsewhere that could reduce the projected demand that SaskPower is now forecasting considerably. So developing a strategy around that would be a wise move by government.

Thirdly, to conduct an assessment of renewable energy for Saskatchewan to understand how to best plan for and strategically develop our renewable resources. We need to look at the full potential for the various technologies. And we have greater potential than most jurisdictions just because of our geography, our climate, our mass land base. We are better situated for renewable energy than many parts of the world, including Europe that has done much more than us on this.

A renewable energy assessment for Saskatchewan would provide detailed information for public and private decision makers about the quantity, quality, and location of the province's existing and potential renewable resources. And finally, and I guess most importantly too in these difficult times when leadership and choices are tough because of the state of the economy, we need to earmark funds for renewable energy.

Alaska for example is using its fossil fuel revenues to create a quarter billion dollar renewable energy fund. We have more population than Alaska and we could do much with less money than has been allocated to uranium studies and carbon capture and storage if resources were targeted to renewable. And within renewable research, investment is needed to drive wind and solar applications and lesser known renewable technologies that I describe here, such as cogeneration and biomass. This investment would not only help the Saskatchewan grid be more green at home, but potentially enable us to export products and skills to what is a booming global renewable energy industry.

And again at the municipal level in the city of Moose Jaw, which is looking for employment creation to replace shut down plants and food processing and other sectors, we're looking at green technology to be a job growth feature of developing our local economy. And small-scale industry fits within green jobs, whether it's in wind and solar small-scale technology or some of the other examples.

So I want to move, I think, directly to the next priority point, one that I just touched on, and that is the impact of this on the economy and especially in terms of jobs. And that's the second-last section in the brief.

A shift to cleaner technology would result in a major new economic sector. And again the examples of Europe: green jobs have grown rapidly in the last four years in Germany, from 160,000 in 2004 to 214,000 today. Some of the companies that are featured in German manufacturing technology are actually Canadian companies that relocated there because the demand and the support was there from government and consumers that

they were able to set up. They moved from Ontario.

Green technology is expected to be the single largest employment sector in Germany by 2010, ahead of car manufacturing and electrical engineering. In Spain an estimated 190,000 are employed in the renewable energy sector. A recent UN study concluded that 2.3 million people have in recent years found new jobs in the renewable energy sector alone. And the potential for job growth in this sector is huge.

And an example of government policies helping to maximize employment benefits comes from Quebec, where the provincial government passed a law requiring power plant developers to spend 60 per cent of project costs within the province, which has spurred local wind turbine manufacturing and created a sustainable industry.

The Worldwatch Institute states as an estimate that to produce 1000 gigawatt hours of electricity per year creates 542 jobs with wind, 248 jobs with solar thermal, 116 jobs with coal, and only 100 jobs with nuclear fission.

[14:15]

So I made reference to setting up a efficiency and conservation strategy within the province. That's the first point in the menu-of-choice options that I deal with in more detail in the brief. And I don't think that needs a lot of explanation, but it applies at different levels — buildings and homes, farms, industrial and institutional buildings — applying a whole range of strategies in terms of electrical use and conserving on heat that would make an impact in terms of energy conservation.

The second point is on wind technology, again familiar to us. Saskatchewan is one of Canada's best wind resources. And I don't know the latest figure, I know that we've made some initiatives on wind energy, but I think it's still around 1 per cent or less or maybe one and a half. Denmark by comparison has generated close to 20 per cent of its supply from wind since 2004. And wind technology is both large-scale, with wind farms that have been developed here and elsewhere — but quite minimally here — and small-scale wind technology, which I've included under micro power as a sort of separate category where small solar and wind technology can apply to households and decentralized units like farms or small business.

Saskatchewan's scale of wind resource is one of the best and most accessible because of our land base in Canada. The winds are strongest in the south of the province, although there are pockets of windy regions in the West and Northwest. Germany, with a land mass approximately half that of Saskatchewan and a considerably weaker wind resource, has already established 22 250 megawatts of wind generation at the end of 2007. And in 2007, more than a third of all new capacity additions in the United States and 40 per cent of energy capacity additions in Europe were from wind. Wind capacity in China more than doubled between 2005 and 2006 and again doubled between 2006, 2007.

This technology is being broadly applied across certainly the industrial world and the newly industrial world such as in China and India. And of course it's environmentally friendly; wind turbines can be deployed quickly.

I'll shift to hydro. We know our hydro potential is very limited, as compared especially to Manitoba, but it does exist. And again, in terms of smaller scale technology, it needs to be explored particularly using run-of-river technology. The advantage of hydro is that it's very dense material, and as a result relatively small projects can produce quite significant amounts of electricity. Hydro electricity lends itself well to storage because water can be kept in reservoirs from wet season to dry, and run-of-river hydro systems can be designed to minimize ecological impacts on the rivers where they're deployed. We're not talking about huge dams on rivers that we don't largely have here; we're talking about small-scale technology that can be applied to local consumer needs and tie in with the grid.

One other point I guess on hydro is that Manitoba, we know, does have a big surplus. And when we talk about wind technology on a large scale, the point is always made about there are shifts, obviously, in the capacity to produce with wind technology. So tying into the grid with Manitoba, which has surplus hydro, and trading off that capacity from wind would be the same kind of relationship that Denmark and Germany have established with their partners in northern Europe because the winds don't always blow. But if you're part of a larger grid, then that's a much more secure partnership I think than a nuclear partnership with Alberta.

Biomass: again there's a wide range of applied technologies that fit under the category of biomass, but it's a category that includes all organic matter and can be used as a sustainable fuel for generating electricity. And there are large- and small-scale applications of this. But certainly we have the raw materials to proceed with that, both in terms of forest and agricultural wastes. We're not talking about field crops at this point. We're talking about genuine waste that can be turned into . . . and including urban landfills and tapping methane gas. Micro power is the combination of solar, wind, and other small-scale technologies which people can engage in the grid from their own homes or farms.

I want to just touch, and I know my time is wrapping up, but on the cogeneration question, there are a lot of potentials for cogeneration from industrial sources. And I was involved, as the mayor in the city of Moose Jaw, with a joint project with the asphalt plant that we developed to use heat from their refining process for both electrical generation and hot water heat for a district heating proposal in downtown Moose Jaw.
We were pretty excited about it; it had a lot of potential. And I think I got the wrong year — I said '91, I think it was probably '93 that that was brought forward to SaskPower. We had what we thought was really a good, solid project. And it was turned down because they were not interested at that point in encouraging cogeneration projects to feed into the provincial grid. They were keeping it centralized.

That project probably still has potential because the plant is still there, the proposal's in the files. And there are others like that around the province where we could tie in with the grid. More of that is being done in the province of Alberta. It means some re-regulation to allow for partnerships between public-, private-, and community-level sources to expand the grid and diversify it.

So I think I'll stop there and leave time for questions. I want to express appreciation that I was allowed to come here on short notice, and I appreciate the work that you're starting into. I think, as I said earlier, this has a lot of consensus potential. I think this could be an all-party exercise that the people of Saskatchewan are going to be interested in, and it could be a bit of a healing around the sometimes harsh debates we've had about nuclear energy. I think we've got room to move forward on this. And I hope you'll share some of these thoughts and consider the recommendations. Thank you very much.

The Chair: — Well thank you very much for your presentation. I think first question, I have Mr. Weekes.

Mr. Weekes: — Thank you, Mr. Chair. Thank you, Mr. Mitchell, for your presentation. It's very interesting. As you stated, it's basically about renewables, and I think we would all agree that that's going to be a part of the energy in the future. Energy production of the future needs to be looked at.

From the presentation of SaskPower yesterday, they referred to the growing economy and the demand for electricity for that. But also I think as big or a bigger issue is the aging infrastructure, and really the lack of infrastructure in energy production in the last 18 years. And that's an issue now that we have to catch up on and the whole issues around demand load. And you know, when you talk about renewables as issues around demand load where renewables may not, you know . . . Wind is an issue. It doesn't blow all the time. And there's some discussion around whether you can run wind turbines, you know, when it's colder than minus 30.

What I would ask you to comment on . . . You talked about renewable, and you know how much progress has been made in the India and China in renewable, and I agree with you. They're looking at a broad range of energy production, but the other thing that they are also doing, which North America hasn't done for decades, is nuclear power. And many of the new nuclear power plants that are either proposed or being built in India and China.

And I guess my comment, my question to you is, is there a place for nuclear power in the mix? There's problems or challenges with any source of energy production, but do you feel there's any place for nuclear in the mix in various countries around the world?

Mr. Mitchell: — Well I guess it's pretty hard to be absolute on a question like that, but given the options we have I would say, in terms of cost-effective and time and resources available here, I would say from our perspective, no.

If we didn't have these alternatives that are more environmentally friendly, sustainable, and creating more employment and decentralizing our economy, then you might have to look at nuclear because there may not be other choices. But I say given the choices, I don't think so. And in fact in Germany, they're phasing nuclear out. And they're the country that has the largest and most rapid growth and most developed technologies in the green sector in wind and solar.

And I think the question of infrastructure is important. And I did make the point that wind technology and wind turbines are probably the most quickly deployed of the renewable options in terms of a larger scale, a larger source with high-tech wind farms, and in a smaller scale at the community level that wind technology also applies going back to generation and storage that was common in farms back in the '40s and '50s when a lot of people had power sources from wind at the community level.

So I don't want to re-engage. I mean, the nuclear discussion has been had, and a lot of evidence has been put together on both sides of that. But certainly from our perspective, that's not an alternative that we should be looking at for Saskatchewan, given the options we have.

Mr. Weekes: — I'll just pick up on your comments about Germany. I think you were accurate before their recent federal election, but I understand now that the German government is delaying the phasing out of nuclear. I don't know what that means. They didn't say . . .

Mr. Mitchell: — Yes.

Mr. Weekes: — But it was also interesting to know that they had the policy of phasing out nuclear, but they were going to replace it with nuclear electrical generation from France. So it's kind of ironic that, you know, two countries that live close together that one was phasing it out, but they were going to rely on purchasing it from another country that's mainly nuclear.

I'd just like to quote from *The StarPhoenix*, June 4, 2008, the Leader of the Opposition, the Leader of the NDP [New Democratic Party] Mr. Lingenfelter stated in regards to nuclear energy that "It's not perfect energy, but compared to any other form, it will have a big role in the future of our society and economy."

Now I questioned do you agree with that statement? I guess you may have answered partially, but there certainly has been from various parts of society and the political spectrum that, you know, look at nuclear as a reasonable option at least to look at.

Mr. Mitchell: — Well I respect that this issue crosses party lines, and I respect that we may have a difference on it, but I wouldn't agree with that statement, that interpretation. From my research on the evidence and the experience elsewhere, you know, it may be in the category of last resort. But it certainly wouldn't be a priority for securing our energy needs given the costs, the risks, and the environmental impact.

Mr. Weekes: — And the nuclear debate is an interesting one because, you know, people think about nuclear, right away they think about the mega plants. And I think some people have been talking about building a mega nuclear reactor, but it would have to be . . . Well the business plan would have to obviously include selling power to the oil sands projects in Alberta and possibly a new one in Saskatchewan and possible export to the United States.

But the more we get into this topic about energy and nuclear, which is part of the discussion and the possible mix, there's new technologies coming along which are much smaller: nuclear generation plants that — well it's my term — would be more of a regional plant that wouldn't have the same impact on the need for investment in infrastructure that a huge plant would

offer.

[14:30]

I guess we would lead into this next quote from the Leader of the Opposition, Mr. Lingenfelter, in regards to the topic of nuclear energy. He remarked in regards to that issue, "It's got to do with what's best for the economy and the environment at this moment." And that's a quote, November 9, 2008.

Could you just give the committee your opinion on, and just in a general way, an explanation as to the environmental effects of nuclear energy as opposed to other power sources, renewable or others? And is there any environmental benefit to nuclear, given that there's no carbon production?

Mr. Mitchell: — Well the environmental impact on all of the stages leading up to the actual activity of the reactor, of a power generating reactor, do have major environmental impact around mining, transportation, etc.

The reason that I was really interested in coming here — and I really congratulate you for taking this step — is that within this whole discussion of energy we have been so fixed on the nuclear option. And there's been evidence and debate — considerable — and a fair allocation of costs to a process that has really polarized the province. I'm not saying that discussion can't go on, but we need some room in this debate to look at the fastest growing alternative source of energy growth in Europe and elsewhere that we have very rich support for in the province of Saskatchewan.

I mean we may have different views, and mostly we agree on renewable, but we don't . . . I'm pulling from a report that was done in Alberta from people that have some expertise, but I need to know a lot more about these energy options to fully engage and support.

I mean there's lots to be borrowed from other jurisdictions, but we have to study it here. We have to look at our own resource mix and see what the potential is. Because whatever happens on the nuclear question, that's not going to solve the energy needs even if it goes ahead, you know. It's not sustainable to deal with the range of mix that we're going to require when fossil fuels begin to disappear or become too expensive to be used practically for much of our economic activity. We need to develop these alternatives separate and beyond the nuclear question, and unfortunately we haven't given it enough attention and resources to really have the answers on this side. We might disagree on nuclear, but there's been a lot more evidence on all sides produced there. I want to see us move forward on this and that's what I hope your commitment would be out of these discussions is to strike more of a balance, make some room, and understand more completely the choices we have.

Mr. Weekes: — Thank you. I didn't think I had an opinion on nuclear. I'm just talking about all the alternatives in energy, and you raised renewable, and obviously the discussion around nuclear is part of the potential mix in our economy. You're very right that the issue about energy production in Saskatchewan is mainly based on coal, you know, and it's going to be that way for the foreseeable future and I guess this is part of the process in this legislative committee is to flesh out what we need to do to either go to clean coal if that's possible. As a presentation we had this morning was gasification, and what we do to replace our existing power production, and which way to go, and what kind of a mix between renewables and carbon-based and nuclear if that's feasible. So thank you very much for your presentation.

The Chair: — Mr. Belanger.

Mr. Belanger: — Thank you very much again for the information you presented. And I think what's really important is to retain focus on this particular exercise, as you mentioned, that's so key to us on this side of the committee hearings.

My father used to always — it's the second day I'm using this quote — but he'd say to me all the time, half of being intelligent is knowing what you're dumb at. So a lot of times I ask for advice from people in the know. So I think one of the things that's really important is that I won't try and politicize the process nor try and explain what Germany's doing because I don't know. I'm trying to focus on Saskatchewan's needs, and certainly I think the whole avenue of meeting our future needs are beyond the theatrics sometimes that we are drawn into in assemblies like this.

But I would say the points that you raise — the conservation efforts, the load demand decreases that are necessary, alternative energies that you bring forward, and all the exciting recommendations that you brought forward — it's time that the Saskatchewan people learn of these options, and we learn fast. Because I absolutely agree with you that the mood and the general receptiveness of the people of Saskatchewan is there. They have said yes, the UDP process was there, done its part, and we've heard all the pros and cons of that argument. But let's get on to the alternative energies. Let's talk about how we can build SaskPower in meeting our demands better. Like they're willing and waiting for that challenge. So I thank you for your participation.

But one of the things, the first question I have — I have two for you — the first question I have is your assertion from your document . . . And I'm just being a devil's advocate. Don't think of me being defensive of anything, because a well-informed politician seeking advice from elsewhere is also very helpful to the process. But in your document, in your brief, you mentioned that, and I quote, "we consider the declaration of Sask Power management that energy demand will double over 10 years is irresponsible."

Yesterday we had their presentation. A very fine group of people. They've got expertise in the various sectors of SaskPower, years and years of managerial experience. And so they're pretty impressive people. So based on that assumption, how could we take your word that their load growth that they need is irresponsible?

Mr. Mitchell: — By saying it's irresponsible I'm not saying it's necessarily wrong. And I also heard in the discussion yesterday in the media, I think I heard something about status quo or given the status quo, was part of that. The reason I say it's irresponsible collectively is that, you know, if every jurisdiction is projecting double the demand load for energy

over the next 10 years, the whole global issue of climate change and gutting of fossil fuels, including coal, is going to accelerate.

And I don't think it's the role of SaskPower management to make all the assumptions about what will create — you know, to just accept the status quo and say, well it's going to double given current trends. Because we have choices — I mean that's where conservation and efficiencies comes in as part of that. You know, we can maintain the standard of living we have and do things differently in terms of energy use and efficiency and I think people want to do that. People are trying to do it through their individual choices.

So it's not that he couldn't be right about it doubling, but it's up to the community at large, including the role of the provincial government, to be engaged in planning and set targets for a whole range of issues within the energy sphere to prevent that from happening. So I'm not questioning the wisdom and knowledge of SaskPower management if they'd take a snapshot and say, well if we don't do anything else and things keep going like this, it'll double. But I don't think that's a responsible position for either the Crown agency, and more importantly, the elected officials of the province, at any level, to embrace. We've got to make a difference; otherwise we're creating more problems for ourselves and our community and for the planet.

Mr. Belanger: — The second question I have is that I don't think you're in too bad a company because the Conference Board of Canada actually indicated that they foresee and forecast that the Saskatchewan economy will actually shrink by over 2 per cent.

And so, you know, we look at what SaskPower's telling us whereas, first of all, the Conference Board of Canada is saying about Saskatchewan's growth that you begin to understand, well, where are things moving and what direction are they heading? But the curious point in all this discussion is that we have to keep focus on what we're here for — the alternative energies discussion. That's really, really key to me.

I looked at some of your recommendations. And based on some of your experience — and you've got a lot of experience and a lot of information, a lot of knowledge — I think people ought to have access to folks like you and many others, experts and people that have experience, to how we craft a Saskatchewan, made-in-Saskatchewan process to really begin to develop the renewable resource industries or the power needs for our province.

So based on all this that you've seen and asking the question . . . We see the UDP process with $3 million and an expert panel of 12 people and taken all throughout Saskatchewan. We don't see the correlating support mechanisms for the non-renewable resource sector, and your recommendation is quite clear. What do you foresee as adequate resources — given your geothermal, your wind, your solar argument — do you see adequate or the same, equal treatment for all those sectors as you would for the UDP process?

Mr. Mitchell: — Well certainly up to . . . I mean I can't quote you a figure. I made recommendations about the process, and I agree that should happen. It will take some resources but I don't know what the number is. Certainly we need to balance in terms of the information and understanding that we have on the range of choices. And that's going to take some investment, and it'll take a bit of time. So you know, a task force that has a clear mandate beyond the mandate of this committee needs to be established and given direction and some supporting resources.

Mr. Belanger: — Thank you.

The Chair: — I have Mr. Allchurch.

Mr. Allchurch: — Thank you, Mr. Chair. Thank you for the presentation. It was very enlightening. One of the comments that you made mention of, and I just want to just relate to that, because I'm from the North, around Prince Albert. And your comment regarding in 1993, I believe you corrected from '91, that the city of Moose Jaw was looking at a cogen operation and it was turned down.

Well Weyerhaeuser at that time from Prince Albert also was looking at a cogen operation. They put together a very, very good plan, and again it was turned down by the government of the day. So I feel we've missed out on an opportunity from at least two cities that I know of that could've utilized cogen and we'd be further ahead today with that operation had it gone forward, had not the government stepped in and said no. But needless to say, that's water under the bridge. We have to look at forward thinking and that's what this process is all about.

In regards to wind, because I know you've mentioned a lot about wind, and I know you're from Moose Jaw, and I don't want to use the words that Moose Jaw is very windy, but at least around that . . . [inaudible interjection] . . . Swift Current. At least around that area there seems to be a lot of wind and that's where the turbines are set up, so it's a natural fit. Because you're a resident of Moose Jaw, have you heard of any problems from area people around the turbines that have come up or you've heard in respect to problems with the wind turbines?

Mr. Mitchell: — No, I haven't, but they're not close by us so it's not exactly a local issue, although there's discussion in municipalities about sort of backyard turbines. But again I'm not sure that's been raised as an issue in Moose Jaw.

I think these questions — and Mr. Weekes referred earlier to operating turbines in cold weather — I mean, those issues which I've heard around wind turbines are certainly things that we could research from the experience of other jurisdictions. But I don't think there is . . . I guess in Ontario they're looking at floating turbines on the lake, so there's been some questions around migrating birds, etc. But those are obviously issues to explore and see what's happened in other jurisdictions. But it hasn't been a major issue that I'm aware of, of concern.

Mr. Allchurch: — I'm glad you mentioned about the migrating birds because that seemed to be one of the major problems as far as a wildlife problem, is the migration of birds and other animals or other birds that go through there that could affect it. Maybe it's not a big issue as far as a problem with wind turbines but it is still an issue.

One of the main disadvantages of a wind system according to SaskPower's briefing was that the wind is not dispatchable.

[14:45]

Mr. Mitchell: — Is not which?

Mr. Allchurch: — Not dispatchable.

Mr. Mitchell: — I've not seen that word. It's not . . .

Mr. Allchurch: — Dispatchable.

Mr. Mitchell: — Okay.

Mr. Allchurch: — It's right here from the SaskPower briefing.

Mr. Mitchell: — I haven't seen the SaskPower briefing. My understanding was that they were being supportive of expanding wind technology but . . . I mean it is part of the grid now but I don't know what their official position is.

Mr. Allchurch: — It's just the damages of wind power that they have written down. I just wanted if you'd make comment on it.

Another thing I want to comment is the reason I think SaskPower is looking at a huge increase in the province for extra power is because of the growth of the province. I think the previous administration used a word that was going to be declined. They just used it again according to the conference board that Saskatchewan is going to decline. I think they're wrong. I think that this province is going forward and it's going to be there for a long term and that's why SaskPower needs extra power. And I know part of the process that we have here today is to look at all alternatives of power or energy that could be utilized, and it's not to rule out nuclear also, that there may be a place for it. But the whole reason for this process is because of the growth of the province.

Mr. Mitchell: — There'd undoubtedly be some growth in the province. The population isn't going to double. Or even if it did, it wouldn't necessarily mean that the energy choices and planning around energy would necessarily require double the demand. I don't think this is tied so much to population size. It's tied to industrial development strategies and approaches to energy sourcing and also to efficiencies in conservation. I mean I'm not taking sides in the projections about short-term growth or declining population because I don't think that's the major driving factor here. It's a question of the technology applied to energy and industrial processes. And we need to find alternatives to ensure that it doesn't double. That's my point.

Mr. Allchurch: — What doesn't double?

Mr. Mitchell: — The demand and consumption of energy. Well the projection is the demand would double in 10 years — from SaskPower. But there are other policies and planning that can make that a different result regardless of what happens with the population numbers.

Mr. Allchurch: — Thank you very much.

The Chair: — I have Mr. Wotherspoon, but just a little clarification. I think what you're talking about if — and I could be proven wrong — is SaskPower's number for 10 years or the medium term, I don't think they're talking about doubling the amount of electricity. They're talking about a substantial amount of their current electricity will need refurbished or replaced, and that number is somewhat equal to what we currently have. And again feel free to set me straight, but I think that the number you're speaking of isn't doubling current capacity. It's replacing a lot of the current infrastructure that's due for refurbishment as well as the growth of the population. But I have Mr. Wotherspoon.

Mr. Wotherspoon: — Thank you, Mr. Chair. As said by the committee Chair earlier today — I believe you used the word partisan shots — we're here to focus on the issue at hand and the presenter that's here. If members at the other side of the table want to make shots about previous lack of action that they perceive about cogeneration or wind power, I guess they should look to the 500 megawatts of cogen or the 200 megawatts of wind. Nothing under their government in two years. So let's get on with looking at these things.

Secondly, if you want to talk about growth, I don't think a growing economy — in fact I'm certain of this — in a robust economy, that doesn't preclude looking at demand-side management or reducing your energy footprint. And I think if we look to some of the stuff that's come out of this presentation here today, specifically . . .

An Hon. Member: — Do you have a question?

Mr. Wotherspoon: — I sure do have a question. The question's for you guys too, and I'd wish you'd clue into some of the presentation. In fact when we're looking at industrial demand growing the way it is, the opportunities that are presented today in this report around demand-side management, reduction of use both in households and in industry, we have lots of opportunities in Saskatchewan. We can isolate very specifically where that demand growth is coming from.

Interesting point here that I think is something that's practical is an inventorying and placing some resources into understanding what our renewable resource opportunities are in this province from a geographic perspective, whether that's wind or biomass or PV or run-of-the-river hydro, and then specifically from the industrial side, the cogeneration and being able to isolate the different spots that this might be possible.

What we heard here this morning was interesting. We had a coal presentation and the individual produced what he called the coal bible that was put together by Energy and Resources here in Saskatchewan back 25 years ago, and this has been very important to the coal industry.

Well just the same, if we're looking to the economy ahead of us and the emergent challenges as it relates to energy, we have a real opportunity to put the same kind of resources that we've put into, say, the core sample warehousing that we have that works well for mining and for oil and gas, and also some of the inventory that we have around coal. So I think that's a very practical solution for us to look at — identifying industrial efficiencies that could be made — and then what role there is for government as well to induce those kind of efficiencies to be achieved.

Get to my question. Good points on those. I think that you cite different work around the world as it relates to experts. I'd invite you to either share some of those experts here today that you think this committee should be engaging at this point in time. And I'd also invite you to table those or write back to the committee if there's other, because we really do want to get this right. And we don't want you driving home to Moose Jaw and identifying a couple more that we should have at this table.

And particularly on the sides of demand-side management and, as well, those that might be able to put forward solutions — for example SaskPower, who says that the highest we can go at wind at this point in time is 8 per cent in our grid. We know other jurisdictions around the world have moved this line significantly. We know that the United States, in many states, have strong leadership on some of these fronts. And so I guess if you could cite some of those experts. And certainly we invite that correspondence, ongoing.

Mr. Mitchell: — Well first of all, I wanted to make reference back to this report: *Greening the Grid* by the Pembina Institute in Alberta. It's on the website. And what I presented here was just sort of drawing some of what they present because I mean Alberta has really all of the same issues, including pollution. They're the only province that has a higher density of greenhouse gas emissions than us.

So it's a good report, and part of what I wanted to get back to it is to say that anything that I've referred to in terms of jurisdictions in Europe and so on, they have footnoted, and have the detailed references to that which I didn't have time to do, to extract all of that. So I don't have those footnoted, but those references are there, and the source documents and expertise you could find on that site. And there are other technologies and choices even beyond the ones I've listed here that they include, having to do with industry and sort of power regeneration options.

But, you know, geothermal is one of those things that we have. We have a geothermal hot water source in Moose Jaw, as a matter of fact. I don't think we know what the resource potential, especially for deep digging. Because geothermal, you know, it can be brought up . . . In France they've gone down 4 kilometres to bring up hot water or heat-generating sources for electricity. I don't know a lot about that. There's been some study at the University of Regina on that question. There's been research done, but I don't think it's been very much shared publicly.

That's just one resource that we really can't speak to as a province because none of the assessment . . . And that's another part is the assessing the sort of natural base of resources that may be there, and also the hydro one in terms of different technologies than traditional hydro-powered amps. So, you know, we continue to explore this and would be happy to share information, but I think the Pembina study is a good reference point to start with.

And I don't know what your timetable is, but if there's hearings in January, I think you know there's . . . One of the things about the nuclear debate is it's engaged the public; they want answers. They want answers across the board regardless. They weren't very satisfied with that process regardless of where they stood on nuclear.

So we've got some time in the short term. And if you're having hearings in January, I think there's a chance for some of those local experts or people that have good source material to come forward and share with you some of the alternatives. But it's still going to require an assessment that's beyond the resources of any of us as individuals to really kind of go through the province and more systematically assess what potential is there.

The Chair: — With that, Mr. Mitchell, I'm going to thank you very much for joining us today and presenting this document which has now been tabled, and answering the questions you did. It was very generous of your time. Thank you very much.

Mr. Mitchell: — Thank you very much. I appreciate being here.

The Chair: — We will now be recessed for just a few moments while our next presenter gets organized.

[The committee recessed for a period of time.]

Presenter: Helix Geological Consulting

The Chair: — Well I'd like to welcome everybody back. We've got a new presenter here from Helix Geological Consulting.

I will start off again by reading a brief statement. I would like to advise our witnesses that, for the process of presenting, it will be asked that all witnesses introduce themselves and state the name of any organization which they may be representing. I'd like to also make it known that any written documents that you would like to be tabled, you can make available to the committee at your pleasure. The process is you have 15 minutes for your presentation, and there will be question-and-answer following. I understand your presentation might go just slightly longer than 15, and I don't think anyone would have a problem with that if it's already prepared.

So I think we can move on to the last thing I've been doing before presenting is the committee has a single question which each presenter is asked to respond, have their presentation respond to. And that is, how should the government best meet the growing energy needs of the province in a manner that is safe, reliable, and environmentally sustainable while meeting any current and expected federal environmental standards and regulations and maintaining a focus on affordability for Saskatchewan residents? With that I will turn it over to our presenter.

Mr. Brunskill: — Thanks, everyone. I'm Brian Brunskill. I've been working as a consulting geologist, a petroleum geologist in Saskatchewan since 1985. I am the owner/operator of Helix Geological Consultants. And since about 2004, I expanded that interest to include looking for places in the deep subsurface where we could potentially store carbon dioxide in carbon capture storage initiatives that are in process.

And more recently in the last couple of years, I've been very interested in the development of deep geothermal energy. To make the distinction with the word deep, we're not talking

about ground source heat pumps, but actually where we go deep into the earth where we can find hot water and bring it to surface and use it in heating applications and, in some cases, for electrical generation.

I also want to recognize the Ministry of Environment's Go Green Fund. They've supported me in some research in this project that is just, just being completed now. In the last couple of weeks, the final bits have come together for the actual work that I've been doing. So I very much want to recognize their participation in this process and their support in the whole concept of developing deep geothermal energy.

I have a slide show presentation for you to have a look at, so I guess you're looking at it that way. My topic today is to talk about utilizing deep geothermal energy for the generation of electricity, but probably more importantly in its utilization for direct heating in Saskatchewan.

This is a picture at the University of Regina campus in 1979 of a drilling rig that drilled a geothermal test well to our deepest aquifer. This well went about 2.2 kilometres down and was able to assess the aquifer properties of an aquifer at that depth. And they really were able to establish the proven reserves, the proven reserve equivalent, of a geothermal source at Regina. This was prior to the development of Innovation Place. There's the power heating plant there to the right.

This is a three-dimensional block diagram of Saskatchewan. My interest starts with significant depth. The little black dots represent some of the major cities. You can see Estevan and Regina there and some of the surface features like the Missouri Coteau and Duck Mountains and Moose Mountain.

The black squiggly line up towards the top up there represents where the Precambrian Shield is exposed at surface. That's important because if you look at the side of the diagram now, as we come south from that contact point on the southern two-thirds of Saskatchewan, as you come further south, there's an ever-thickening wedge of sedimentary rock that lays on top of the Precambrian surface. And in this diagram, the little layer, the beige-coloured layer right at the base, is a formation of rocks called the Deadwood formation. And depending on location, within that Deadwood formation of rocks, there's a large prolific aquifer. And of course with depth, there's a direct relationship between depth and temperature of the rocks, therefore the temperature of the water in that aquifer.

So if we drilled straight down at Regina like we did at the university in the late '70s, we would intersect that Precambrian surface at about 2200 metres, and the water in that aquifer would be about 60 degrees C [Celsius]. At Estevan, or just south of Estevan right on the international boundary, that aquifer is about 3500 metres deep. So significantly deeper, and the temperature there would be about 105 degrees Celsius.

This is a model of what we would do at Regina as to how we'd actually access and recover that heat. We have ground level there on the left, the scale to the left down to 2200 metres, and in yellow, that section represents that Deadwood aquifer. Over on the far right, we've drilled a source well from surface. It's drilled down into the aquifer where water is pumped up from the aquifer there. The hot water goes up the well, and it's piped to a heat exchanger plant where the heat in that water is extracted through the heat exchanger and then transferred to the load — whether it happens to be a building or whatever the application is. The water, which is now cool, is re-injected back into the earth in this disposal well, so it creates a loop.

So really this water just travels around and around. But as the cool water travels back towards the source well, it picks up the heat from the massive rock reservoir that's there. So it's reheated. And some of the modelling that is done at Regina, that if we operate this at capacity and there's about a kilometre separation at the bottom, we can have a heat supply here for 35 years. The water in the aquifer itself is fairly stagnant. It's not really moving, so we're creating a flow by pumping it.

This is a picture of a power unit that's been developed by United Technologies and there are others. If the geothermal water is hot enough, this water can be used to vaporize a gas. This is an internal system: this gas, it boils at a lower temperature than the water, and as vapour of course it can be passed through a turbine and generate electricity. The system also requires a cold water supply to condense the working fluid back into a useable liquid where it's reheated. So there's a loop, an internal cycle, a circuit within the power unit to generate electricity.

[15:15]

To get electricity generation from geothermal, we need a minimum of about 91 degrees C water as a source water. We require about 500 gallons a minute. I'm going to bounce back and forth, oddly enough, between imperial and the metric units because the drilling industry, which is my background, we use metric, but the heating industry still uses imperial. So I have to kind of combine both all the time. Five hundred gallons a minute is about two and a half cubic metres of water a minute.

On the other side, on the condensation side, we have to provide about 1,160 gallons a minute of cool water to recondense that working fluid inside the power unit. We have the easy ability to pump the 500 gallons a minute and the 1,160 gallons a minute, but we need the source of the 91 degree C water.

This is a contour map — the number's a little small — a contour map of what we assume the temperature will be of the water in that deadwood aquifer. And right about there is the 90 degree C aquifer. So we're looking at a fairly small area of southeast Saskatchewan where the rocks are deep enough — therefore hot enough — where geothermal energy could actually support the generation of electricity using one of these mechanical systems.

So that kind of focuses into the Estevan area where we have about 106 degrees C water. We have potential cooling at Boundary dam and other areas. And the power unit could actually generate about 250 kilowatts of electricity in this one application. Now that's not a lot of electricity when you consider the large capital cost for developing a geothermal system, but it would help provide electrical generation for the actual operation. It would subsidize the operation of the actual geothermal system. So the primary value of a geothermal system is in its heating potential. And depending upon the location, electricity generation could be applicable — most

likely just in the Estevan area.

So I'm going to speak much more directly to the actual heating potential. This is a little cartoon of what a district heating system might look like. In this case, we have two source wells where the geothermal source is coming up. The heat is being extracted in the exchanger plant, and then it's being put back down to the earth. This water is generally very saline. It's corrosive. It's not very friendly water to have around, so you want to put it back in the aquifer as quickly as possible and not introduce any oxygen. And again we have abundant experience in petroleum production to handle these things. On the load side, we now have a hot water source that provides heating for domestic and commercial and industrial applications — whoever needs the actual heat source.

So we have two independent loops. We have the energy production side, the geothermal side, which is a closed loop, and the load side which is another closed loop. And it's a simple matter of pumping water around and transferring heat from one system to the other.

Well how much energy is actually available? I've identified the four major cities of Estevan, Weyburn, Moose Jaw, and Regina in southeast Saskatchewan where this would mostly be . . . where the nature of the aquifer itself is very suitable for development. And of course these are just pinpoints. The areas, large areas around these communities will also be applicable. You can see, as I mentioned earlier, the aquifer itself is much deeper at Estevan and Weyburn, so there's a direct relationship between temperature of the water — at Estevan it's about 105 C and 61 at Regina.

Again using standard oil field practice, we can produce that water at a high volume and extract heat from that water supply to the tune of, in Estevan, about 50 million BTU [British thermal unit] per hour. Again it's cooler near Regina, so we're extracting about 23.7 million BTU per hour.

Well those are big numbers, but what can we do with that? We try to translate that into how much space we can actually heat from that. The production stream at Estevan can provide baseload heating for about 3.1 million square feet of light commercial or industrial application. To put that in reference, that's equivalent to the area of about 35 CFL [Canadian Football League] football fields — or another way of looking at it, about 1,160 houses, we'd provide baseload heating. At Regina, which it seems like a much smaller number, but 1.4 million square feet of commercial space is still equivalent to about 17 CFL football fields or about 510 houses. And 510 houses is a lot of houses.

Part of the assessment, of course, was to find out what this energy source is worth. Again the four cities are identified, and the cost of 8.1 million at Estevan and 5.5 at Regina, most of this cost is drilling — it's just getting there, down to that aquifer. But these total costs include all the subsurface infrastructure, drilling, pumping, and the distribution hub or the heat exchanger plant that would be required on surface. So there would be additional capital cost, depending upon the application, to complete the actual loop on the load side.

The value first year of Estevan at $1.9 million is based on the amount of natural gas that would not be purchased. What we're really doing here is displacing the use of natural gas to provide an equivalent amount of heat, so 1.9 million at Estevan in the first year. If we forecast that out 20 years using a 6 per cent discount rate, then that present value is about $13.7 million, which represents a rate of return of about 22 per cent. And this project would pay out itself between four and five years.

At Regina, $5.8 million. Moose Jaw is about the same because the depths are similar, but the water is a little warmer at Moose Jaw so we can extract more BTUs from it. So the value is a little bit more at Moose Jaw. But again at Regina as the coolest of the locations, a little over $900,000 in revenue saved in the first year — net present value at three and a half million dollars representing a nearly 13 per cent rate of return.

This is the part that costs nothing — the environmental value. Because we're not using a combustion-based fuel — this water is already hot — we can determine how much natural gas we're not going to purchase and combust, so we can also calculate how much CO_2 will not be produced by that process.

Out of Estevan again, we'll use the amount of CO_2 avoided is about 13 200 tonnes per year. Of course we have to pump quite a bit of water, so we're using electricity generated by SaskPower, and we have to reduce that gross amount by the SaskPower emissions, which would be equivalent to about 1600 tonnes. So our net tonnes avoided are 11 600 tonnes at Estevan. And Regina, with the same process, we're a little over 5000 tonnes per year from one system that has been avoided.

Now there's no market value for this CO_2 but these are certainly in discussion. In Saskatchewan there's no vehicle at all but in Alberta, the Alberta Climate Change and Emissions Management Fund allows participants to pay $15 per tonne into the fund, up and above their pre-described limits. So if we just for fun say these CO_2 emission avoided are worth $15 a tonne, that represents about $174,000 from one system at Estevan. These values of course have been not included in any economic assessment.

Geothermal energy is available for a very long time. The model that I presented to you was based on operating one of these systems for half the year. The water is only useful for heating, so the net production would be equivalent to 50 per cent production at capacity throughout the year. So if we were to use this for an industrial application for example, we would be using it all year, so those values would more than double. But for direct heating the systems are available for the 35 years at capacity, but for direct heating you could essentially double that to 70 years' capacity from one loop, one geothermal loop. It's environmentally friendly because there's relatively . . . there's no direct emissions of greenhouse gases or SO_x or NO_x.

The resource is sustainable. We're talking about pumping water, nothing more complicated than that. We can operate regardless of what the weather conditions are, operate 24-7, every day of the year. The pumps are variable as well, so we can respond to daily and seasonal variations. It's very reliable because of this enormous geological heat sink, so to speak. The mass of the rock and the water in this giant aquifer is very large, and the time it takes for this massive reservoir to actually cool is very long, so the heat, the temperature, and flow rate are very

reliable. And of course the fuel itself is not subject to price volatility, unlike hydrocarbons — coal, gas, or oil, whatever the heating source may be.

There are limitations of course. This energy is non-transportable. In fact we have thousands of geothermal wells operating in Saskatchewan now. Some of them have little bits of oil with it. They are just generally in the wrong place, and in many cases, they're maybe not hot enough because they haven't been drilled deeply enough. But I really want to emphasize that we're doing nothing more than pumping water here, and we have lots of experience in the subsurface for doing that.

And of course project development requires significant upfront costs. We're spending all our capital cost upfront. Operating costs are fairly, are reasonably low.

And where can we use this? There's lots of applications — new industrial park developments for example, heating homes in new residential subdivisions. There's lots of industrial applications for boiler or process water preheating, preheating large volumes of ventilation air. It could be used for drying ethanol plant distillers' grain, and of course we even have some experience in geothermal in Saskatchewan now with the Temple Gardens Spa. We've just kind of stuck our toe in the water though.

The state of this technology is really boring. It's not new at all. A geothermal system can be completed by simply integrating the information and knowledge from two industries — the oil field drilling industry and district heating infrastructure industry. Both industries are well experienced at pumping water. There's no restrictions of intellectual property, and most materials and really expertise are available here in Saskatchewan, and most material's available off the shelf.

As an example, this has been used more commonly in Europe, and largely because they're more familiar with district heating systems, but since 1969 France has developed 61 of these systems in conditions that aren't that dissimilar from the subsurface conditions in southern Saskatchewan. They provided heating for over 200,000 residential units and replaced the use of 1.2 million barrels of oil equivalent per year. And they're saving over 603 000 tonnes of CO_2 emissions annually.

We're all looking for ways to develop new energy sources — and this is a brand-new energy source for Saskatchewan — and reduce our environmental footprint, so I like to think this maybe speaks to the question, Mr. Chair. So using deep geothermal energy would contribute significantly to both these goals. Each system can potentially provide a stable, very long energy supply and reliable cash flow stream, an annuity for several generations.

A commercial scale geothermal project developed in Saskatchewan would be the first of its kind in Canada. It would provide direct experience and advance the use of this enormously and currently untapped energy source throughout much of Western Canada.

These systems can be developed by utility providers, joint venturers, and industry partners, communities. Municipalities and communities could finance, build, and manage their own systems. This doesn't need to be a project by a large utility. A community could develop their own system.

I envision that over the next generation, that as we replace and upgrade infrastructure in all our communities, that geothermal can become a part of this network. One geothermal system could provide all the heating needs for an entire community and many communities in southern Saskatchewan. The potential for development is very widespread and it's very simple. The potential for generation of electricity is very limited to the very southeast part of the province, but the heating potential is enormous.

But of course, to get to this point, we have an uncompleted project at the University of Regina — the first well is drilled, but the second was never drilled. We have a partial system in place at Moose Jaw, but we have no real large-scale commercial direct experience. And we know what we need to do to move directly to an actual project. So my interest is in actually I guess leading the charge towards an actual commercial-size demonstration project in Saskatchewan.

So in a nutshell, that's the geothermal, deep geothermal, story. I appreciate you listening. So I'd be happy to take any questions you may have.

The Chair: — Well thank you very much for your presentation. Mr. Wotherspoon has the first set of questions.

Mr. Wotherspoon: — Yes. Thank you very much, Mr. Brunskill. It's a great presentation and something that gets talked about for quite a few years, this project at the University of Regina. So nice that this is part of these presentations here today.

I guess I'd go directly to tie in to the last part of your presentation as it relates to basically setting up a commercial-size test project to see this in practice. What sort of cost are we talking about to get this second well drilled? And what kind of time would it take to conduct or to develop that test site?

[15:30]

Mr. Brunskill: — At the university, you mean?

Mr. Wotherspoon: — Yes.

Mr. Brunskill: — The university has no plan to develop that resource at this time. We have done a kind of preliminary assessment of the university project and part of the . . . They use a steam heating system right now, and this would require the integration of a hot water system. So there's surface mechanical issues that have to be dealt with there, and they will be expensive. So I think it would add undue capital costs to the surface modification without actually . . .

A new well could be drilled and the existing well could probably be revitalized, and the geothermal side of things could be reinvigorated and developed. When you consider, the additional capital costs on the surface side to integrate this system would be very high.

It's not something I think the university would want to take on strictly as a commercial project when they look at it strictly as a payback scenario. So it would have to fall into more of a research perspective where, for example, the Crown was to support them. While we would like to help you do this, do you have a place we can actually use this energy?

So, without speaking for the university, they would have no project in mind, but they would need a champion to push this forward with them.

Mr. Wotherspoon: — So then just . . . And that's good information, but if we were looking at those funds, would be potentially made available, or if we're looking at a specific site that might be new construction or new residential or new industrial, as you've spoken about, to do a operational test site, what kind of money would it take to get this up and running? Not necessarily looking at changing all the infrastructure needed for the university project that might be a worthy project, or looking at a different site.

Mr. Brunskill: — Well, like anything, I think the greenfield idea is favourable because it's simple, and you're starting from the ground up and you're integrating this with the existing infrastructure. For example, when you have the dirt open already to lay your sewer and water, you put your geothermal system in it as well. To reopen the earth, especially after pavement's on, it's really expensive. So the greenfield side of it is really attractive from a capital expenditure perspective.

The geothermal side, as I've said, at Regina for example, would be say $8 million. It really depends on the load, like how large the distribution system has to be, how many buildings would actually be utilized. So it's a little bit of an unknown because you have to know what the load side is going to look like.

Mr. Wotherspoon: — And theoretically, based on your information, for Regina for example the geography would allow for about 500 houses off of one, I guess, one system. But would there be limitations within proximity to that, to how many systems you could have up and running if you're looking to, I guess, expand usage of geothermal into the future?

Mr. Brunskill: — I haven't tried to calculate the footprint of 500 houses, but I suspect there would be an appropriate rollout, so there wouldn't be interference. Just imagine if you were looking down at this system and you had two wells that went out sideways this way. Perhaps an eighth of a mile away you could drill out that way. We have the ability to drill laterally quite a ways to actually try and distribute the load. Like we'll pick the water from various sources. We may have it all consolidated at surface, but we can directionally drill laterally three-quarters of a kilometre quite easily. So I think you could. I guess the question is kind of, yes. You could satisfy a very large area from a single-service footprint through drilling technology.

The Chair: — Mr. Allchurch.

Mr. Allchurch: — Thank you, Mr. Chair. Well thank you for that presentation. I have a few questions regarding utilizing this system in the North. I live two hours north of Saskatoon and we're looking at a new system for our house. All the towns that you've utilized as far as giving some data on are from the South, like Regina, Moose Jaw, Weyburn, and Estevan. Can this system be utilized in the North?

Mr. Brunskill: — I think the utility cut-off is about 50 degrees C. Like there's kind of three geothermal areas. There's the ground source heat pumps which will utilize any kind of temperature available at surface with heat pump technology. And then on the other extreme you have, like from maybe 180 degrees C you have for steam generation for electrical generation. And then everything in between is considered kind of like a warm water resource and it's really based on, the lower limit is based on the utility or whatever you're going to use it for. So 50 degrees C is about the lower cut-off of it being useful. And that's about Craik and south. So north of Craik, like Saskatoon for example, that water in this very same aquifer is about 35 C. It's just too cool. Unless it had some other industrial application or could be used with heat pumps, then perhaps that would have greater application.

Mr. Allchurch: — I know in the geothermal that has been utilized in houses around the area, they have to use, especially in the wintertime, they have to use something else to heat the water to bring it up to the spec. In this application here, the initial cost is great when you're putting it in. Is there added cost afterwards in regards to the electricity utilized to keep this operation going?

Mr. Brunskill: — Yes. That's probably the biggest operating expense, is purchasing electricity to run the pumps. You know, in general we're looking probably at about 500 horsepower in pumping. So we're going to consume quite a bit of electricity. But all that has been considered in the forecasts — operators, maintenance. Another large issue is pump replacement. We have one single downhole pump that provides all this water.

One of the reasons why I emphasize the idea of baseload is because this wouldn't, using a geothermal source wouldn't displace the use of a gas boiler or a furnace, of course. We want to distribute the energy most efficiently over as large a footprint as possible, which would provide baseload heating, let's say, to minus 15. And then every warehouse or house would also have a furnace that would then kick in and top up for anything beyond that. Because when it's only minus 5, and we have the ability to put the geothermal system to heat a large area, and we're not utilizing it, so we want . . . It would be sized to provide that baseload.

So in the event of pump failure as well, all this is reliant on the operation of one pump, which will fail, and so there's backup systems in place for heat generation. And that could be at the heat exchanger plant or it could be a furnace within the actual building, whatever is suitable at the time of construction.

Mr. Allchurch: — I know when businesses utilize the geothermal system, they always talk about how much money you can save and you base it out over X amount of years and it pays for itself. But they don't take into account that electricity used at the cost of what electricity is, is very high, never mind the addition of breakdowns as far as pumps or whatever. So it is a great system, but you have to base it over a large number of years in order to get your money out of the system. But it is a very good system.

Mr. Brunskill: — Forecasting we've done includes maintenance breakdowns, replacement of materials, electricity consumption, all those things.

Mr. Allchurch: — Thank you very much.

The Chair: — Mr. Taylor.

Mr. Taylor: — Thank you very much, Tim. And, Mr. Brunskill, thank you very much for this very informative presentation. Before I ask a couple of my significant questions, I just want some clarification from you. A lot of people who have commercialized heat pumps in Saskatchewan refer to them as geothermal heating. I think that's a misnomer and what I'd like you to do is to clarify the difference between what a lot of people in Saskatchewan are using on their individual homes and small businesses, which really are heat pumps, compared to geothermal heating and electricity generation, which is the project for all intents and purposes. You're talking about deep sourced as opposed to . . . Is it deep sourced?

Mr. Brunskill: — Sure, deep geothermal.

Mr. Taylor: — Deep geothermal as compared to ground source heat pumps. Can you just clarify sort of for the lay people the difference between these two ideas that people may find confusing because it's considered geothermal.

Mr. Brunskill: — Sure. It's probably a term of convenience. We didn't — other than the project at the university in the past — we really didn't have a conversation about geothermal in Saskatchewan since then, so when ground source heat pumps became popular, you have piping in the ground, so it was easy to connect that with geothermal. I think if you look at it more globally, geothermal refers more to heat extraction from depth in the earth which is really . . . And that's how I've always viewed it as a geoscientist, but of course I intentionally added the word deep here just to try and help with that confusion.

So it's a working term. Geothermal can be used for either. Some would argue that the ground source heat pumps actually are collecting solar radiation that's penetrated the earth, so it's up for whatever's convenient really. But really I'm referring to the deep geothermal as to try to make that distinction.

Mr. Taylor: — Some of us are old enough to have lived in buildings with hot water heating. Is there really any difference between what you're talking about and some of these apartment buildings that have been heated with hot water heating and radiators, the boiler in the basement and the radiators throughout the rooms?

Mr. Brunskill: — Well really the geothermal source, if you consider an apartment-type building where you have a boiler in the basement and it distributes hot water to all the rooms, you'd still have that. But in this instance, you would have two pipes coming into the heating room as well, and they would essentially be, you know, through controls they would be piped around the boiler and into the heat exchanger in the boiler, and they would provide the heat. You turn the boiler off, and the heat would be coming from the geothermal source — the hot water coming into the building.

Mr. Taylor: — When we're talking about the temperatures, are the temperatures that you've given at the rock formation or at the surface? Is there any heat loss from the sandstone location and the surface after pumping? And is there any heat lost once the exchange has taken place and it's been moved out into a district?

Mr. Brunskill: — On the geothermal side, there is heat loss into the rocks. Of course as you come up, the rocks are getting cooler, so that heat would be robbed by those rocks. Eventually that would stabilize. We'd be pumping, like, about 660 gallons a minute of water would be travelling through this geothermal system That's a very large volume. So those rocks around the drill pipe would eventually stabilize. So it does cool as it comes up. But the other bit of this is, because it's being operated by a very large pump in the hole, it actually cools the pump which effectively heats the water up a degree or two as well.

So we've considered all those things. And the temperatures I've given you are what we assume it will be at surface, what we've kind of calculated it should be at surface. On the load side, it's relative to whatever existing systems are, whatever those heat losses, I'm not sure. But certainly in modern buildings, LEED [leadership in energy and environmental design] buildings, for example, those heat losses are very low because of appropriate insulation and such.

Mr. Taylor: — Okay. I thank you. And for the purposes of the committee, which is looking at future energy needs for Saskatchewan, you're presenting us with an idea of a workable system, a workable system that you're telling us — and correct me if I'm wrong — is beneficial only to a certain part of Saskatchewan. Therefore a geothermal system that you are describing is designed to be simply one of a diverse set of options available for generating or for future energy needs. Is that correct?

Mr. Brunskill: — Yes. Of course it's very site specific. It's very site specific. But of course, I mean, our habit has been . . . We've grown up with natural gas and it's been such a wonderful fuel. And our experience is, when we run short we just go drill more. It's been that easy for us.

There's evidence to suggest that's changing. Canada as a domestic producer of gas, our gas production may peak in 2011, 2012, when we consider gas production from all sources. And we are building now a liquefied natural gas terminal into Canada, so there's lots of gas in the world, but how this will impact the price of gas domestically will be influenced by world markets as we begin to buy natural gas in the world market more.

[15:45]

Mr. Taylor: — And I think we're all well aware the population centres in Saskatchewan, primarily southern part of the province — no offence to my friends in Saskatoon — but we've got a larger population base here. So the more that you can heat a home without electricity or natural gas, the less cost there is for the rest of the province too to produce electricity to heat a home in Estevan or Weyburn or even Regina. Is that correct?

Mr. Brunskill: — Well we don't have security-of-supply issues

now, but we may. So by reducing our reliance on natural gas allows it to be used other places, for electrical generation, for example. So it's a backdoor way of allowing for more electrical generation using gas. It diversifies our energy mix which kind of stands on its own as one very beneficial reason for looking at geothermal. It's a brand new energy source we're not using and it's literally beneath our feet.

Mr. Taylor: — And a last question, a bit of a comment first. I think geothermal is an area that Saskatchewan and other jurisdictions should be spending some dollars on with regards to research and development, continued research and development, and ultimately taking a look at the very long-term needs in the province.

My question to you: you talk about, you know, there's nothing new here. We've been doing this sort of thing forever. But do you see funds being applied around the world to continue to refine and evolve this technology, and ultimately can you see it being of even greater benefit with new technological applications down the road?

Mr. Brunskill: — I'm not sure about that. I mean there will always be efficiencies and there'll be local experience. So certainly we can benefit from our experience here. But these systems have been operating in other places for quite some time. They've got it down pretty well. And of course the oil field industry, we're well experienced at pumping. And the heating industry is well experienced at heating. And we're really just kind of connecting the pumps together. So in terms of the technology side of it, I don't know, but I don't see great advancements. But I see advancements here in Saskatchewan with experience, like what we can use this resource for. I think that's where the real developments can be.

I mean we're just imagining now what we can use this for. But our experience of course has been that once we have something and we start working with it, it's like, oh well why don't we try it with this?

As n example, this has been one of the most interesting parts of the conversation. Well first of all, geothermal is just now getting into the conversation about alternative energy sources. But the mechanical engineer I'm working with on developing systems is saying, well let's heat the seats in Taylor Field, for example. You know, I'd never even thought of that. You know, it's an alternative to a domed stadium if we just have nice warm seats for everybody to sit on. Maybe that's an alternative, and here's a way of doing that. Or in the dome stadium application, there's so much air to heat there — you can imagine the heat load on a structure that large — that here's a simple way of integrating an environmentally friendly way to heat the new dome, so to speak. So there's where we can use it. Those are the new parts of the conversation that we have yet to discover in Saskatchewan.

But I think we have to be able to have a pipe that you can put your hand on and say, you know, that's really hot. And there's 600 gallons of water moving through that. There's millions of BTUs running through that pipe that's available to us.

So how creative can we be in terms of this application? Preheating brine for potash mining operations, for solution mining operations, preheating the air that can be then used to dry distillers grain, for example. I mean, I haven't even spoken to these people but those are certainly ideas. More and more ideas just come forward when you think heating, ventilation, air in hospitals. Like the energy draw of just heating up the air is enormous for commercial buildings, for example, shopping malls.

I don't see Don here, but I was thinking of the multiplex in Moose Jaw, if the timing had been more appropriate. That's an example where the community itself could build this. They don't need an outside developer to do this. They have some professionals and consultants that could come in. The city of Regina can do it. It's no more complicated, once we have experience, than putting in your own sewer system — just moving water around. There's lots of new ideas to come.

Mr. Taylor: — Thank you very much.

The Chair: — I'm sorry. Mr. Bradshaw.

Mr. Bradshaw: — Yes. Just a couple of quick questions, and I thank you for your presentation. Have you looked at what the costing of the BTU would be, say compared to gas or electrical heating? You've got, I realize you have, you know, your upfront costs are your main cost, but when you take your overall costing and you set about a 35-year run on it, have you come up with a BTU cost on it?

Mr. Brunskill: — No, but we could do the math on that. I haven't done that specifically because you run into lots of variables and you want to be . . . Comparing BTUs from energy sources, you have to work on the net so I haven't done that, no, but there's always ways of trying to compare things that way.

Mr. Bradshaw: — Okay. That was one of the questions and I didn't know if that was done. If you did that, could you supply that to the committee?

Mr. Brunskill: — Yes.

Mr. Bradshaw: — The other thing I was wondering about was you gave an estimated lifespan of 35 years. Why the 35 years?

Mr. Brunskill: — Well the modelling that was done at the University of Regina project initially was to try and assess how long is this energy, how long would it last. And so they assumed a pumping rate, a volume, and how long it would take for that water to circulate around, and how long it would take to strip the heat out of those rocks. As the cool water re-enters the aquifer, it's going to immediately travel towards the production well again because there's a pressure drop. And as it travels, it's reheated. But what it creates is it also cools the rocks behind it. So what it creates is what's called a thermal front that actually travels much more slowly towards the source well. And the modelling that was done at Regina would say that pumping at capacity would take 35 years for that thermal front to actually reach the source well. And at that time, the temperature of the water would just start to go down.

And at some point, based on future energy costs, whether it would still be feasible or not, they would either just stop pumping and close down one of the wells. I guess economics at

that time would determine what they do with it. Of course at that point in time another well could be drilled. You could utilize still the source well but drill a new disposal well, again from the same surface location. But you could drill into a different direction. Then you'd have a brand new loop. And again some of the modelling would suggest you might be able to get actual three source wells from a single surface location. So you're looking at 100 years of energy supply from a single source well. And when you compare that to energy sources in the province, that's really a long time.

Mr. Bradshaw: — Yes, I agree. Just one other, and this is just since I used to work on oil rigs at one time many moons ago. You said the water is very acidic, and we know that. How long do you think your well casing would last or do you use a special casing on something like that or have you taken into account the possibility of replacing casings somewhere along the line?

Mr. Brunskill: — Well the water's corrosive, but if you keep oxygen out of it you really reduce the corrosive effect. It's the combination of oxygen that provides the problem mostly.

And again I don't have a specific answer, but again this is standard oil field practice. We have lots of wells that produce lots of corrosive waters, and we've had oil wells running for 50 years in the Weyburn field, for example. So there's quite a bit of experience around that. I don't have that specifically, but I'm sure there's ways to address that.

Mr. Bradshaw: — Okay, that's all.

The Chair: — Mr. Belanger.

Mr. Belanger: — Yes, just very quickly. Our time's wrapping up here. Two quick questions. First of all, you made the statement . . . And thanks for the information, by the way, because we speak a lot about geothermal, and you've certainly increased our somewhat limited knowledge of that particular field by your presentation today.

I wanted to point out, you mentioned 2012 as a time frame in which all future drilling for all wells, drilling would be completed. Could you elaborate on that a bit because that's pretty good information. Where did you get it from by the way? Sorry.

Mr. Brunskill: — Can we put the screen back up? I have a slide that will help address that quite a bit.

There was a report conducted by Natural Resources Canada in 2006 called *Canada's Energy Outlook*. And what they plotted on this chart we're about to see is the production of natural gas from all sources in Canada, from 1990 and forecasted out to 2020. And at that time . . . Maybe I'll just wait for a sec.

You can see on the chart there the volumes in BCF, billions of cubic feet. The very large, purple bottom part of the graph there is from the Western Canada sedimentary basin. That's our large body in Western Canada that provides almost all gas. On the bottom there we've got some offshore East Coast gas. The black stuff refers to coal bed methane production, and the Mackenzie valley source if and when it comes online. This was a 2005 assessment, of course.

So what they're forecasting is that natural gas production from all sources will actually peak in 2011, and they will decline thereafter. If Mackenzie doesn't come on, you can see how that slope will change.

They didn't consider shale gas, which is another new source of gas that will impact this in some way. This black line on the bottom represents our domestic consumption in 2005 and forecasted out to 2020. Everything on the top side of that line is exported to largely to United States. So forecasted out, you can see the Western Canada sedimentary basin for example, our largest body — and my own experience from colleagues in that industry, that essentially every new well, every new gas well is not as good as the previous one. So our ability to sustain production for natural gas domestically is going to peak in 2011 from all sources.

Through NAFTA [North American Free Trade Agreement], we are not allowed to hold back gas production, so we are obliged to sell everything in excess. So you know, we have to have whatever the capacity output is. And I guess what I'm saying is at some point when these lines cross, we will no longer be exporting, but we'll be in a position of net importers. Canada — I'm not sure of the exact status — but I know we had application for the creation of four liquefied natural gas terminals to be constructed. I think one is being constructed now on the east coast. So we will become, eventually at some point, we will become an importer of natural gas.

Now as I said before, there's lots of natural gas around the world — Russia, Qatar for example, many other places — but it will be subject to international prices.

Mr. Belanger: — My final question — and I appreciate the time factor — is that you mentioned that the site-specific location in southwestern Saskatchewan is probably the best place to put this. I know that in Quebec they have a northern Quebec community — I'm not sure how far north, where it is — it has a central heating system. I'm not sure if it's geothermal. But is that to say that in the other locations — the Saskatoons, the Meadow Lakes, the La Ronges in the Precambrian Shield — would you need deeper wells to achieve the same kind of temperatures as opposed to southern Saskatchewan, but it's still possible all throughout Saskatchewan?

Mr. Brunskill: — No. We can only drill to the Precambrian Shield because the shield itself is a crystalline rock. There's no porosity or water in it.

We need two things. We need the hot rocks, but we need a carrier as well. So it's the water in those rocks that we circulate to get the energy out. So in the Precambrian, that water doesn't exist. So we're limited to that Deadwood aquifer and it rests right on top of the Precambrian. And as you come further south, it gets deeper. So the Precambrian exists at Saskatoon for example, but it's just too shallow. The water's not warm enough to use it for anything. I shouldn't say that — not for anything. Perhaps it could be used in conjunction with heat pumps to be a valuable heat source.

[16:00]

Mr. Belanger: — And the community? Is there a community in Quebec that . . .

Mr. Brunskill: — Quebec is mostly Precambrian Shield, so I suspect it could be a district heating system. And they may use ground-source heat pumps. There isn't one of these in Canada.

Mr. Belanger: — Okay.

The Chair: — Well on behalf of the committee, I'd like to thank you for taking the time to come here today and introduce us to this technology. It was well appreciated by everyone. Thank you very much.

Mr. Brunskill: — Thank you for your attention.

The Chair: — Would somebody like to move an adjournment?

It has been moved by Mr. Weekes that we adjourn the committee until 10 tomorrow morning. All in favour?

Some Hon. Members: — Agreed.

The Chair: — Carried. The committee now stands adjourned.

[The committee adjourned at 16:01.]