Nuclear’s New Frontiers and Canada’s Oil Sands

By Wayne Henuset, President, Energy Alberta Corporation

Canadian Nuclear Association
Annual Seminar 2007
Ottawa, Ontario

Ladies and gentlemen, thank you for that kind welcoming. This is a great opportunity for me today and it's quite an honour as well.

The Canadian Nuclear Association and its members do excellent work in Canada, in the Canadian energy sector, and they do it quietly without seeking the limelight like us oil guys do. And, I can say that because I am an oil and gas guy. But I think it's time for the industry to see some of that spotlight because there are exciting days ahead for the nuclear energy in Canada.

Today, I'd like to share our company's vision of the new frontiers for nuclear energy in Canada. I'll begin with some background on our company. I co-founded Energy of Alberta Corporation in 2005 which makes us a relatively brand new company. Before that, I would never have imagined that I would be speaking, on a Thursday afternoon, at a nuclear association conference event.

You see, I'm not a nuclear guy, or at least I didn't used to be. I'm an old school entrepreneur at heart. And by old school, I mean I invest my own money. And because it's my own money, I invest it in things that make sense. I've been in the oil and gas business, the pipeline construction business, drilling rig business, well servicing business, auto dealerships, retailing of wine, beer and spirit business, so my background is an entrepreneur. Well the question is, how did I get here?

Well I'll tell you how I got here. It's a story& and it happened a couple of years ago when I just finished building my dream home in Florida and when hurricane Charley rolled through. I couldn't sleep for days worried about my house. And you see that part of Florida only sees hurricanes about every decade. You can imagine how surprised I was when another hurricane rolled through only a month later, hurricane Ivan. Happily, both hurricanes passed without damaging my property but my emotions were certainly running high for a couple of months.

That experience taught me that global warming is real. We need to do something now about it. Around that time, I happened to meet a nuclear physicist and we got talking about nuclear energy. It didn't take long for this oil guy to begin to see a lot of sense in nuclear energy, even in energy-rich Alberta; and, in fact, especially in energy-rich Alberta. You see, Alberta is home to the oil sands and that oil sands is immense. And it's a strategically important resource that is vital to our country's future. And I strongly believe that nuclear energy is a key to unlocking the full potential of the oil sands.

So I talked to Hank Swortout, the founder of Precision Drilling, Canada's largest oil well drilling contractor, and we formed Energy Alberta Corporation. Our goal is to use nuclear power to provide electricity, steam, hydrogen to support the growth in the oil sands.

The oil sands cover an area about the size of Florida - again, back to Florida - in the north east part of Alberta. In some places, the oil sands deposits sit at the surface level and others lay buried deep below the surface.

The oil sands look like sticky, tarry sand and that's basically what it is. Grains of sand covered with black, heavy oil called ``bitumen`` with a thin layer of water in between. That thin layer of water is important. It's the glue that holds the oil sands together. And that's what makes it possible to separate the oil from the sand. You simply add steam or hot water to the oil sand, the glue melts away and the oil floats to the top. Now I've said simply add hot water but the fact is nothing is simple in the oil sands. It's taken decades, billions of dollars, and a lot of hard work to make the oil sands profitable. It's a real Canadian success story with technology and innovations developed right here in Canada.

In some cases the shallow oil sands deposits are surfaced-mined before the oil is separated from the sand. In other cases, the steam is injected into underground wells to extract the oil while leaving the sand in place. This is called ``steam assisted gravity drainage`` or SAGD. That's where most of the growth in the oil sands is occurring today. Some of this bitumen is upgraded on-site basically by removing the carbon and adding hydrogen to turn the bitumen into crude oil. The rest is shipped via pipeline for upgraders to other areas often to the United States. But now, there's an exciting new plan to do much of this upgrading right here in the province of Alberta. And, we'll be doing it in Upgrader Alley which is near Edmonton.

In the last decades billions of dollars have been invested in the oil sands with billions more planned over the coming years but that investment comes at a cost that is measured in more than just dollars. That's because the oil sands production requires a tremendous amount of energy. Today, the oil sands produce over one million barrels of oil per day. This requires 700 million cubic feet of natural gas per day. It creates a steam used in the extraction process. It generates electricity and creates a hydrogen feedstock that is used for the upgrading.

The National Energy Board has forecasted that the oil sands production would increase fourfold by 2015, largely using steam assisted gravity drainage. If all the SAGD projects planned were to use natural gas as the fuel in cogeneration systems that would see natural gas demands in the region skyrocket to over 3 billion cubic feet by 2015. That's more natural gas than all the rest of Alberta uses now. It's more than twice the quantity of natural gas that would enter Alberta using the Mackenzie Delta Pipeline if, and when that pipeline is built. It is expected the level of demand would strain Canada's domestic and international export commitments; such that by 2015 Canada would need to import natural gas to meet its commitments. Think of that& 2015 is not that far away. And, that's a problem.

Putting the brakes on the oil sands development is not the answer. Canada needs the oil sands. Conventional oil and gas reserves are declining. Energy conservations are important and necessary but they won't eliminate the need for fossil fuels in our economy. In addition, oil sands activities will lead to significant economical impact not only to Albertans but across the nation with substantial increase in gross domestic product, employment generating over $123 billion in tax revenues. Worldwide the demand for oil continues to grow. Global demands have grown 150% since 1965 to 80 million barrels a day of production and they expect to grow by 50% more in the next 20 years. With much of this growth in China and India - as these countries embrace the kind of lifestyle that we have all enjoyed for decades - the oil sands are an immense resource
within our borders, and we do mean immense. There's over 174 billion barrels of recoverable oil using today's technology. And another further 450 barrels are locked in the carbonate rock formation just west of the oil sands. It's the second, biggest oil deposit in the world after Saudi Arabia and it contains enough energy to power this nation for another 400 years. The oil sands will make a difference between energy dependency and energy self-sufficiency. We need the energy. We need to be smart about how we produce it. It makes no sense to squander precious and declining reserves of natural gas to make oil in the oil sands. That's simply like burning gold to make coal. The answer for this is using nuclear power.

And that's why our company, Energy Alberta Corporation, is participating with Atomic Energy of Canada to bring nuclear energy to the oil industry. We're proposing to bring CANDU Technology, another Canadian technology success story we have, to the oil sands.

In August of last year we entered into an exclusivity agreement with the Atomic Energy of Canada Limited to market own and operate a CANDU reactor to support the expansion of the oil sands development. The energy outputs will be contracted with oil companies under long-term off-taker agreements. We are now looking for a suitable site for our first two reactors for initial operations to start by 2016 to meet our obligations. We are counting on turnkey construction of AECL and its 10 team CANDU partners to guarantee a fixed-base price using AECL's excellent track record. Since 1996, all six of AECL`s CANDU plants have been built on time and on budget. Its current project in Romania will go into service in the middle of this year. So when much of the nuclear industry went through a long, quiet period, here, actually in Canada, AECL and its partners were constructing CANDU plants around the world and retaining a strong supply chain much of which is right here in Canada. Together, AECL and Energy Alberta Corporation are focusing on a four-prong strategy.

The first strategy is using CANDU nuclear electricity generation to extract the oil from the carbonate triangle involving potentially 450 barrels of bitumen. This is new. The second strategy is generating hydrogen electricity for the upgrading of the bitumen. The third is providing steam supply for the SAGD process in the oil sands; and finally, generating electrical needs for the utility companies in Alberta to keep up with our provinces projected growth.

In addition to offering a cost-effective alternative to natural gas, we would also drastically reduce nearly all the greenhouse emissions required in the production of upgrading the bitumen. This would result in major oil sands projects having near zero increase in greenhouse gas emissions over its life expectancy. Contrast that with conventional sources of energy such as coal and natural gas. With those fuels, greenhouse gas emissions are expected to rise drastically by 2020. Numbers like these are becoming increasingly unacceptable to Canadians, and our provincial and federal governments. And the Canadians and their governments are putting increasing pressure on industry to reduce greenhouse emissions. One ACR1000 reactor would result in an annual displacement of around 500 million tons of CO_2 compared to an equivalent gas fired generator - accounting to a savings of $100 million, annually, of carbon dioxide cost if it was at $20. Many experts argue that the true social cost of CO_2 production is much higher than that.

That's the benefit our company is offering: a way to meet the tremendous energy needs for the oil sands development without increasing the greenhouse gas and emissions and other fuels that would be created. Now to do this, we need the support, clear direction from our government. Supportive government policies are essential for continuing nuclear development in Canada. From a regulatory perspective we know that we have to come forward with a qualified proponent and operator. And we also know, there is a resource issue at CNSC. We would like to see government address these issues so that when we come forward with a project, this year, the regulatory has the resources it needs to make the licensing process as efficient as possible. In my wine merchant role, I learned that the timing is everything: the timing in the growing season of the wine, the timing of the harvest, the timing of the fermentation, even in the timing when you drink the wine. So I believe right now - as we talked earlier a number of people talked about the timing - I believe the timing for nuclear in Alberta is now.

There's a window for opportunity that wasn't here before. The province energy sector is in a major growth curve. All public concerns about emissions are driving an evolution for new technology for the energy development. And we can deliver that technology now in the form of Canadian proven nuclear technology.

When I first started I wanted to know what Albertans thought about nuclear energy. Remember, this is a province that you see pump Jackson Oil derricks all over the place. Albertans have no first-hand experience about nuclear power so in December 2005, I commissioned a public opinion poll for 500 Albertans. They were asked how they would rate nuclear power in the oil sands. I was amazed at the results. 42% of the respondents were in favour and nearly the same number, 33%, were neutral.

Now more recently in February 2007, the Canadian Nuclear Association conducted a national opinion poll on nuclear energy response. Alberta showed the greatest year over year increase in favour of nuclear power in Alberta. These results were astonishing to me, but they shouldn't be so astonishing. After all, Canada's nuclear energy has a stellar 30-year history of providing safe, clean, affordable energy.

And yet from my own experience as a business man in Calgary, I can tell you that a great many people don't know some very basic information about nuclear energy. They're shocked to hear, for example, that a windmill emits more CO_2 than a nuclear reactor in its lifecycle. They're amazed to hear that spent fuel from CANDU reactor waste can be recycled and reused. That's why I was astonished at the positive results of my survey. Just imagine what our results would have been if more people would have known about CANDU reactor energy, it's track records, its successes, and the potential for our industry.

It's our job here to tell them. We need to work together to increase the level of knowledge about our successes in the nuclear industry. And how nuclear can be a very positive thing for Canadians. We have a great story to tell and people want to hear it. We are living in a nuclear renaissance and there are new frontiers just waiting to be explored in the oil sands and dozens of other areas. And, the timing is now.

In closing, the Alberta energy sector is on the verge of a major growth curve. Public concerns about emissions are driving the evolution of new technology for energy development. And, I believe the answer is nuclear. But we need support and clear direction from government. We need the CNSC to have resources in place to make the licensing process as efficient as possible. And as an industry, our responsibility is to remind the global community about the environmental benefits, the safety and the proven track record of the Canadian nuclear technology. Ladies and gentlemen, thanks for having me here and for your kind attention today. If you have any questions, I'm here to answer them.