Speaking Notes

Slide 1 - Title

- Good afternoon. I'd like to thank Dave and Jan and the Ontario Energy Network for inviting me to this luncheon.

- It's been referred to as:
  "the largest and most destructive project on planet earth"
  "the dirtiest project on earth"
  "a toxic sacrifice zone the size of England"

- I'm referring to the Alberta oil sands or as some would say "the dreaded tar sands"

- Clearly the image of oil sands continues to be a challenge globally for those engaged in its development.

- There is no doubt that the oil sands have considerable impact on the environment

- However, these impacts need to be put into perspective and placed in the context of both past and future environmental progress as well as reflecting a balance of economic, social and environmental considerations that input to the business decision-making process.

- Although I am a proponent for orderly oil sands development, my purpose today is not to advocate oil sands but rather to portray the development and the environmental challenges as accurately as possible.

- Have any of you visited the oilsands?

- Interesting to note that recent high profile visitors to the oilsands including Nancy Pelosi, James Cameron and David Suzuki departed with a different view than on their arrival.

Slide 2

- What are oil sands?

- The Athabasca oil sands, which is the largest deposit of oil sands in Canada, was discovered 100's of years ago by aboriginal people who extracted the exposed bitumen deposits along the banks of the Athabasca River to waterproof their canoes.

- As the term implies oil sands are a mixture of sand, silt, clay and bitumen and they occur anywhere from surface level to 100's of meters in depth.

- The bitumen itself has the consistency of thick molasses and on its own, will not flow.

- Extraction of bitumen is either by surface mining or in situ technology which means injecting either heat or diluent into the reservoir enabling the bitumen to flow.

- The estimated oil in place in the Alberta oil sands is a staggering 1.7 trillion barrels making it the second largest deposit of oil in the world behind Saudi Arabia.

- It is important to note that only about 20% is recoverable by mining operations with the vast majority recoverable by in situ technology.

- Over half of Canada's current production of approximately 2.8 M bpd of oil is from the oil sands. A little over ½ of this production is exported to the U.S.

- The oil sands also generated over $800 M in 2009 in Aboriginal business undertakings.

- As I just mentioned, the oil sands represents the second largest oil reserve in the world containing 170 B barrels of oil recoverable using current technology.

- This makes Canada a major contributor to growing global demand for fossil fuels.
- So before I launch into the environmental discussion, allow me to put the oilsands into the context of the Canadian economy and on global energy, security and supply.

Slide 3

- Oilsands development makes a significant contribution to the Canadian economy and is projected to grow by $68 billion per year over the next 25 years.

- Almost every region in Canada has been stimulated by oilsands development through job creation and economic activity.

- The number of direct, indirect and induced jobs is expected to quadruple over the next 25 years with 32% created in Ontario.

- The goods, materials and services used to construct and operate oilsands activities come from across North America.

- Many of the components such as trucks, gauges, valves, pumps, tires are produced in central and Eastern Canada.

- Ontario will account for about $55 billion in goods and services.

Slide 4

- Under the scenario shown on the chart, world primary energy demand is projected to increase by 47% between 2008 and 2035.

- Fossil fuels remain the dominant source of primary energy worldwide accounting for more than ¾ of the overall increase in energy use.

- Oil remains the single largest fuel and is projected to grow 1% pa from its current level of 85 M bpd to 105 M.

- Unconventional oil is projected to account for 10% of world oil demand by 2035 with Canadian oil sands and Venezuelan extra-heavy oil dominating the mix.

Slide 5

- This slide shows the contribution of oil sands relative to the other categories of crude oil.

- HO – oil that does not flow easily. HO<20, EHO<10.

- On the supply side of the equation, geopolitical events continue to threaten disruption of supply.

- Libya's production had been running at about 1.6M bpd which accounts for about 2% of global production.

- The turbulence in that country resulted in production cuts of about 75%.

- Saudi Arabia is compensating for the shortfall by stepping up its own production.

- In addition strategic oil reserves held by the IEA could be employed which could bring 2 M bpd onto the market for 2 years.
- Regardless of the outcome of geopolitical unrest in North Afica and the Middle East, Canada will become an increasingly important contributor to global supply of oil, with most of the additional production coming from the oilsands.

NOTE:
- current total Canadian production 2.8 M bpd with oilsands accounting for 1.5 M bpd.
- by 2025 total + 4.3 M bpd, oilsands 2.5 M bpd

Slide 6

- Turning now to the environmental challenges.

- The 4 main categories of environmental impacts (non prioritized) related to oil sands development are:

    - Land use
    - Water use
    - Greenhouse gas emissions
    - Tailing ponds

Slide 7

- First, looking at surface disturbance;
- Alberta's oil sands occupy a surface area of over 140 K km^2 and are located in the boreal forest which totals approximately 3.2 M km^2.
- The yellow depicts the surface area where the oil sands are recoverable by surface mining.
- The Alberta government requires companies to return the land to a sustainable landscape that is as good as or better than it was originally.
- The 2 largest oil sands operators, Syncrude and Suncor have already reclaimed and restored vast areas to productive land use.
- Approximately 10% of disturbed area already reclaimed – on-going.

Slide 8

- This slide puts into perspective the difference in the environmental foot print between mining and in situ production.

- Long Lake – SAGD
  - 70 k bpd

- Syncrude – mining
  - 400 k bpd Production

- The majority of surface disturbance for a mining operation is the open pits and tailings ponds whereas an in situ operation's surface disturbance is largely confined to processing and upgrading facilities.

Slide 9

- Truck and shovel operation.
- Can strip mine to maximum overburden of about 70m (200 ft).
- Payload of trucks 380 t.

Slide 10

- Nexen photo.

- Well pad with 10 well pairings
  - 1 steam injector and 1 producer.

- Length of horizontal well approximately 700 – 1000 m
  - Offset from centre.

- About 500 m overburden

Slide 11

- The image of the oil sands that has been projected globally in many instances portrays a very negative picture of oil sands development.

- What is rarely projected are the positive actions that are undertaken to restore and reclaim the disturbed areas into productive land use.

Slide 12

- Portion of Syncrude’s reclaimed mine
- Now supports buffalo herd that’s managed by local 1st Nations Band.

Slide 13

In terms of water use:

- Water is used in open-pit mining primarily for oil separation and in situ operations to make steam. Both require a significant amount of water per barrel of oil produced.

- Considerable success has been made in reducing water requirements by recycling and by using only non-potable ground water.

- The Athabasca River is the main source of water for oilsands mining projects.

- Extract .2-3.4% total flow depending on the time of year

- About 44% of total allocation of water is for agricultural use

- 7% o/s – use approximately 1/3 allocation

NOTE:
- Recycle 80-95% of water used.

Slide 14

- While oil production has increased dramatically in recent years, the rate of fresh water withdrawal has been tempered by an increase in the use of non-potable saline water.

- Some operations currently looking at using municipal sewage.

Slide 15

- This chart shows a comparison of water usage for oil sands operations versus other energy types.

- Note the difference in oil sands compared with ethanol and biodiesel.

Slide 16

- Another interesting comparison between oil sands and other consumer products.

Slide 17

Turning to air emissions:

- The nature of the oil sands makes them more energy intensive to produce and on a well to wheel basis generate approximately 6% more emissions.

- Energy is required to separate the oil from the sand in the case of mining operations and to create the steam in in-situ operations. Energy is also required to produce hydrogen to upgrade the heavy bitumen into a light, conventional type crude.

- All of these steps generate greenhouse gases.

- To put into perspective, this slide shows that the amount of ghg generation from oil sands compared to coal-fired power plant emissions in the U.S. is relatively minor but nevertheless, continued efforts are required to reduce the impact even further.

- In 2008, oil sands generated 37.2 mega T of CO_2 which is 1/60 of the emissions from coal-fired power plants.

Slide 18

- This slide shows Canada’s and the oil sands relative contribution to global greenhouse gas emissions.

- Again, I stress this doesn’t mean we don’t have to do anything, but rather points to the need for further cooperation and coordination by all emitters including consumers.

Slide 19

- In terms of progress made to date, technology has facilitated a 40% reduction in ghg emission since 1990 on a per barrel basis.

- Notwithstanding this achievement, we need to do better.

Slide 20

- Tailing ponds have been in the news frequently of late.
- While only 20% of the oil sands is developed by open-pit mining, those operations produce tailing ponds.
- Tailings consist of a mixture of water, sands, clay and bitumen.
- When tailings are released to a pond, the heaviest material, mostly sand, settles to the bottom while water rises to the top and is recycled.
- The middle layer consists of fine clay particles suspended in water and they remain suspended in water for long periods of time making evaporation extremely slow.
- Slide shows successful reclamation on pilot tailings pond.
- New technology will reduce tailings ponds.

Slide 21

- Reclamation on larger scale.
- Courtesy of Suncor.
- Considerable progress has been made in addressing the tailings challenge and Suncor recently achieved a major milestone in transforming a tailings pond into re-vegetated and reclaimed productive ecosystem.

Slide 22

With regards to technology and innovation considerable progress is being made. The 4 key areas of focus for technological innovation are:

1) water treatment and recycle

2) tailings reduction and more effective handling

3) ghg emission reduction including carbon capture and storage

4) land reclamation processes with a focus on restoration to productive wetlands and boreal forest.

Slide 23

Some specific examples include:

- Lowering the temperatures used in oil extraction – Syncrude
- Thermal solvent hybrid
- Toe to heel air injection using O_2 to create a fire flood that is modulated with steam – Petrobank

Other examples:

- electrical heating pilot
  - < natural gas, H_2O, emissions

Shell – atmospheric fines drying process for tailings

- non-H_2O based extraction process

Slide 24

- However, it is not technology and innovation nor the sizeable investments required to seek further advancements in the greening of the oil sands that is the prime challenge we face.

- Rather, it is paramount that we seek further opportunities to cooperate among all sectors of society if we are going to be successful in meeting the growing demand for energy.

- Many examples of cooperation:

o Cumulative Effects Mgmt Assoc.
  - Multi-stakeholder
  - Air, water, community impacts
  - Sub groups:
    - Regional Aquatic Monitoring Pgm (RAMP)
o Integrated CO_2 network (ICO_2N)
  - Advancing CCS
o Oil Sands Leadership Initiative (OSLI)
  - Suncor, Con Phil, Nexen, Statoil, Total
    - E.g. can H_2O from tailings ponds be used for in situ ops
o Integrated Land Use Planning Review

- Role for all sectors:

  - Producers must focus on reducing their environmental footprint even further.

  - Governments must provide a regulatory environment that encourages investment and innovation and protects the public interest.

  - Consumers need to make wise decisions concerning their behaviour.

- Success will be measured by the extent to which communications among sectors, i.e. government, business, academia and NGO's can be and must be enhanced. This, in my opinion, requires the implementation of more effective and innovative ways to communicate.