Oil sands technical teach-in

April 4, 2018
Advisories and Forward-looking statements

This presentation contains certain “forward-looking statements” within the meaning of the United States Private Securities Litigation Reform Act of 1995 and “forward-looking information” within the meaning of applicable Canadian securities legislation (collectively, “forward-looking statements”), including statements about: future oil demand, its uses and sources; statements surrounding Canada’s oil sands, including reserves and resource estimates, estimated production growth, development opportunities and the recoverable amounts based on different extraction methods and future opportunities relating to cost reductions and GHG intensity; anticipated benefits of the next generation SAGD optimized centralized processing facility; expectations regarding autonomous haul trucks; potential future pipelines; the potential sustainability and economic benefits of next generation in situ extraction; and the impact of technology on the in situ process that are based on Suncor’s current expectations, estimates, projections and assumptions that were made by Suncor in light of its experience and its perception of historical trends. Some of the forward-looking statements may be identified by words such as “planned”, “estimated”, “target”, “goal”, “illustrative”, “strategy”, “expected”, “focused”, “opportunities”, “may”, “will”, “outlook”, “anticipated”, “potential”, “guidance”, “predicts”, “aims”, “proposed” and similar expressions. Forward-looking statements are not guarantees of future performance and involve a number of risks and uncertainties, some that are similar to other oil and gas companies and some that are unique to Suncor. Users of this information are cautioned that actual results may differ materially as a result of, among other things, assumptions regarding: commodity prices; timing of commissioning and start-up, cost, characteristics, and capacity of capital projects; fluctuations in foreign exchange and interest rates; product supply and demand; market competition; future production rates; the sufficiency of budgeted capital expenditures in carrying out planned activities; risks inherent in marketing operations (including credit risks); imprecision of reserves estimates and estimates of recoverable quantities of oil, natural gas and liquids from oil sands properties; the timing and the costs of well and pipeline construction; the timely receipt of regulatory and other approvals; the availability and cost of labour and services; changes in royalty, tax, environmental and other laws or regulations or the interpretations of such laws or regulations; and the timing and impact of technology development.

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Oil Demand? How do oil sands fit in the picture?

Multiple credible sources have indicated oil demand growing through 2040.

Oil use will continue beyond 2040 for lubricants, petrochemicals, long-distance travel and agriculture.

Oil sands expected to be part of the baseload supply in all scenarios.

Baseline long-term demand forecasts
Liquids (million barrels per day)

Key characteristics of the oil sands
Ensuring position in base supply

1. Low decline rate
2. Low reservoir risk
3. Low cash costs
4. High recovery factor
5. Increasingly carbon competitive

Vast oil sands resource

Canada has the third-largest potentially recoverable oil resource in the world
Accounts for ~10% of world’s gross oil resource

Billion barrels of oil sands that can be potentially recovered economically with today’s technology

Million barrels per day of oil sands production
Represents ~74% of Canada’s total oil production

Oil sands production growth through 2030
In situ will be the primary driver of growth post 2018

Oil sands share of global GHG emissions
Represents 9% of Canada’s total GHG emission

Data Source: Canadian Association of Petroleum Producers – Publication#2018-0010, February 2018
Oil sands

Oil sands are a mixture of sand, water, clay and bitumen
Bitumen is too viscous to be transported through pipeline without being diluted

20% Oil sands reserves recoverable through mining*
< 200m deep, recovery factor ~100%

80% Oil sands reserves recoverable through in situ*
> 200m deep, recovery factor ~50%

*Source: Canadian Association of Petroleum Producers – Publication#2018-0010, February 2018
Common oil sands extraction methods

Steaming methods (in situ)

- **Cyclic Steam Stimulation (CSS)**
  - High pressure steam injection into and production from a single well

  - Stage 1 – Steam injected into reservoir
  - Stage 2 – Steam heats oil
  - Stage 3 – Heated oil and condensed steam pumped to the surface in the same well

- **Steam Assisted Gravity Drainage (SAGD)**
  - Low pressure steam injection into upper well with production from separate well ~5m below

  - Stage 1 – Injector/producer wells ~5m apart
  - Stage 2 – Steam injected to mobilize bitumen through upper injection well
  - Stage 3 – Bitumen pumped to surface through producer well

Mining

- Oil sands shallow enough to mine

  - Stage 1
  - Stage 2
  - Stage 3

Large shovels move oil sands into trucks

Trucks dump oil sands into crushers where the large clumps of oil sands and clay are broken down for extraction

Source: Canadian Association of Petroleum Producers – Publication#2018-0010, February 2018
Oil sands - mining and extraction

1 – Mining
Oil sands scooped out of mine and deposited into 400 ton trucks

2 – Ore preparation plant
Bitumen-rich sand is ground in an ore preparation plant before being sent by pipeline to the primary extraction plant

3 & 4 – Infrastructure & Utilities
Power house including co-generation
Control rooms
Maintenance facilities

5 – Primary extraction and tailings
Oil placed in large separation tanks where raw bitumen is separated from sand & water and tailings (sand, minerals, water) are sent to ponds

6 – Secondary extraction
Bitumen is mixed with naphtha or paraffin (further removes asphaltines) to remove remaining minerals and water

7 – Bitumen product
Bitumen is sent to the upgrader or diluted to be shipped to refineries
Advancing extraction technology

Bitumen froth (NFT and PFT feedstock) is typically ~60% bitumen, ~30% water and ~10% fine solids

### Napthenic Froth Treatment (NFT)
Solvents containing primarily naphthenic hydrocarbons
- Suncor – Base plant
- Syncrude - Mildred Lake
- Canadian Natural Resources - Horizon

**Average barrel extracted**
Does not meet pipeline/refinery specs and must be upgraded

- >75% bitumen
- ~20% asphaltenes
- ~2.5% water & sediment

### Paraffinic Froth Treatment (PFT)
Solvents containing primarily paraffinic hydrocarbons
- Suncor – Fort Hills
- Imperial Oil – Kearl
- Canadian Natural Resources – Muskeg River & Jackpine

**Average barrel extracted**
GHG emissions in line with the average crude refined in the U.S. Barrel is fungible and requires less diluent to transport No upgrading required

- >75% bitumen
- ~10% asphaltenes
- <0.5% water & sediment

Shipped directly to market

Deposited back into mine pit

- >2% water & sediment
Oil sands – Upgrading

The process of removing sediments and increasing the products hydrogen to carbon ratio

Two upgrading processes
- Hydro-cracking – Addition of hydrogen in presence of catalyst (adding hydrogen)
- Thermal-cracking – Rejection of carbon (removing carbon)

Thermal-cracking example
Heat bitumen to the point where it cracks into a vapour stream (coker gas oil & non-condensable gas) and a byproduct called coke residue (currently marketed as a fuel).

Hydro-treating
Coker gas oil is separated into fractions (in the fractionator) that are hydrotreated to remove sulphur and blended for shipments to refineries.
Oil sands mining – a manufacturing business

Oil sands mining - Not an exploration business, focused on continued system optimization and cost reduction

Manufacturing - Optimal way of transforming material into goods by integration of people, capital, processes, systems and enterprises to deliver products

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Manufacturing process</th>
<th>Crude oils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Sands</td>
<td>Process science &amp; equipment design</td>
<td>Sweet synthetic</td>
</tr>
</tbody>
</table>
|              | Separation Cells       |  • Suncor
|              | Machinery & automation |  • Syncrude
|              |                        |  • CNRL
|              | Crushers               |  • Husky
|              | Upgraders              | Diluted bitumen |
|              | Autonomous Haul Trucks |  • Fort Hills
|              |                        |  • Kearl
|              |                        | Value uplift products |
|              |                        |  • Diesel

Suncor’s partially upgraded crudes (sweet and sour synthetic blends) - Asset optimization and strong marketing relationships across North America allow for a wide range of cracked and sour synthetic crudes unique to the oil sands industry
SAGD extraction & process – Firebag example

Central Processing Facility (CPF)

Bitumen & water separation

Steam generation

Water treatment

Well pad

Wells pad

Wells pad

Well pad

Wells pad

Wells pad

Single well pad

(Multiple wells)

Steam to pads

Emulsion to CPF

Process water

Bitumen

Upgrader and/or refinery

Emulsion production

Steam injection

Treated water

CPF
SAGD – cost reduction history and enhanced future designs

Structural cost reductions

As the extraction technique matures, continuous optimization of the SAGD process allows for significant reduction in operating costs across the industry.

Next generation well pad design

Simplified sustaining well pad design currently being deployed.

New Central Processing Facility

Complete redesign of CPF for future green field in situ replication.

Operating cost trends of 5 key SAGD projects (C$/bbl)

![Graph showing operating cost trends from 2009 to 2017.]

Source: Wood Mackenzie SAGD Asset Reports

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost (C$/bbl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>$30</td>
</tr>
<tr>
<td>2010</td>
<td>$25</td>
</tr>
<tr>
<td>2011</td>
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<td>2014</td>
<td>$12</td>
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<tr>
<td>2015</td>
<td>$10</td>
</tr>
<tr>
<td>2016</td>
<td>$9</td>
</tr>
<tr>
<td>2017</td>
<td>$8</td>
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</tbody>
</table>

Suncor’s new in situ well pad compared to previous Suncor designs

- Reduced Engineering hours per well pair
- Reduced Manual valves per well pair
- Reduced Number of modules per well pair

15% Less equipment
20% Less piping
20% Fewer pumps
Reduced Maintenance & opex
Reduced Fugitive emissions
45% Smaller footprint

Suncor’s new in situ CPF compared to industry leading designs expected¹

¹ See Slide Notes.
Market access for oil sands production

1. See Slide Notes.
2. Data Source: Canadian Association of Petroleum Producers – Publication#2017-0009
Western Canadian L/H\(^1\) differential

WTI-WCS differential a factor of both quality and location

Royalty paid on bitumen production

Exposure mitigated

Exposure unmitigated

In Situ (CSS & SAGD)

Oil Sands Mining

Upgrading

Sweet

Sour

Refining

Influenced by Hardisty heavy pricing

Shipped by pipeline

to locations attracting global heavy pricing

Shipped by rail

Sold at Hardisty pricing

Oil sands bitumen production

1 See Slide Notes.
### Typical attributes of North American oil plays

#### Illustrative annual funds flow profiles

<table>
<thead>
<tr>
<th>Mining</th>
<th>SAGD</th>
<th>Offshore</th>
<th>Tight oil</th>
</tr>
</thead>
</table>

#### Table of Typical Attributes

<table>
<thead>
<tr>
<th></th>
<th>Initial capital</th>
<th>Decline rate</th>
<th>Sustaining costs</th>
<th>Operating cost</th>
<th>Reservoir risk</th>
<th>Recovery factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>High</td>
<td>Very low</td>
<td>Low</td>
<td>Medium</td>
<td>Very low</td>
<td>Very high</td>
</tr>
<tr>
<td>SAGD</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
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<td>Low</td>
</tr>
</tbody>
</table>

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1. 2 See Slide Notes.
The next phase of oil sands value drivers

Synergies
Capturing regional synergies through optimizing current infrastructure

Sustainability
Cost and carbon competitiveness

Collaboration
Technology and innovation

Mining & Upgrading
Further optimizing and automating the processes

SAGD
Turning point in optimization and technology
Regional synergies for existing assets – Suncor example

Regional synergy opportunities

- Upgrader feedstock optionality
- Turnaround planning optimization
- Unplanned outage impact mitigations
- Process and technology sharing
- Sparing, warehousing and supply chain management
- Regional contracts (lodging, busing, flights, etc.)
- Lease development optimization

1 See Slide Notes.
Oil sands mining – overcoming challenges

Beginning of oil sands mining in the 70s & 80s
- Unclear industry would survive
- Draglines & Bucket wheels adapted from mining industry
- Oil sands a very erosive material, mechanical availability at 22%
- Frequent shutdowns and freeze-ups in winter

Innovation in the 90s
- Transition to truck and shovel
  - Higher availability and better mining ore selectivity
  - Significant reduction in operating and sustaining costs
- Environmental challenge - “tailings ponds can't be reclaimed”
  - Suncor reclaims first tailings pond in 2013 – Wapisiw

Economic success in the 2000s
- Significant structural cost reductions
  - Innovation and process improvements
- Vast economic resource attracts international majors
- $billions of investment results in overheated market, rapid inflation and challenges attracting skilled labour post 2010

Future opportunities
- Further cost reductions and margin improvements
  - Automation such as AHS
  - Partial upgrading
  - Regional synergies and lease development optimization
- GHG intensity
  - Paraffinic Froth Treatment (PFT)
  - Non-aqueous extraction

1 See Slide Notes.
In situ – beginning of the technology wave

Only 15 years of commercial SAGD

1980

1984
SAGD process pilot at MacKay River UTF (underground test facility) AOSTRA

1990

2000
First solvent pilots
2000
First commercial SAGD oil
2004
First infill well pilot

2010
2009
First flow control device run
2013
First commercial NCG approval for SAGD operations

2018
Decrease cost and energy use by lowering temperatures and replacing water with solvent

Technology is the future of SAGD

Increasing extraction temperature

Increasing solvent content (0-100%)

- Mobilizing bitumen by injecting steam at temperatures over 200DegC
- Mobilizing bitumen utilizing solvents at reservoir temperatures

1 See Slide Notes.
Next generation in situ extraction

Nsolv - Vaporized solvent gravity drainage
- Vaporized solvent injected (injector well), heating and mobilizing bitumen
- Bitumen-solvent mixture produced (producer well)
- Solvent recovered, purified and reused

EASE - Electromagnetically Assisted Solvent Extraction
- Electrical energy converted to radio frequency energy at surface
- Energy is “broadcasted” into the reservoir (injector well), heating bitumen
- Minimal vaporized solvent is concurrently injected mobilizing the bitumen
- Bitumen-solvent mixture produced (producer well)
- Solvent recovered, purified and reused

Potential sustainability benefits
- GHG emissions reduced by 50-75%
- Significantly reduced or eliminated process water usage
- Reduction in bitumen carbon content

Potential economic benefits
- Lower operating pressure, access to new resource bases
- Higher value bitumen sent to refineries, less asphaltines
- Ability to transport with less diluent mix
Industry collaboration and innovation

Alliance of 10 producers representing >90% of oil sands production

Focused on accelerating the pace of improvement in environmental performance
- Greenhouse gases
- Land
- Water
- Tailings

936 distinct technologies developed

$1.3B+ invested by member companies

Suncor Energy Inc.
Syncrude Canada Ltd.
Teck Resources Limited
BP Canada
Canadian Natural Resources Limited

Imperial Oil
Devon Canada Corporation
ConocoPhillips Canada
Cenovus Energy Inc.

cosia®
The oil sands advantage

- Long-life, low-decline resource
- Low operating and sustaining costs
- Increasingly carbon competitive
- Socially responsible
- Track record of innovation
Slide Notes

Slide 12
(1) Expected benefits based on design specifications. Actual performance may differ materially. See Advisories and Forward-looking statements.

Slide 13
(1) Approximate total pipeline capacities based on publically sourced information available at www.capp.ca and www.enbridge.com
(2) Proposed future pipeline. There can be no assurance this pipeline will be built with the capacity indicated or at all. See Advisories and Forward-looking statements.

Slide 14
(1) L/H refers to Light-Heavy differential and reflects the difference between WTI and WCS crude pricing.

Slide 15
(1) Attributes are generalizations based on Suncor’s analysis of its own projects and industry data.
(2) Annual funds flow profiles are based on representative project economics (development capital, operating and sustaining costs) using consistent assumptions for future oil prices (including adjustments for quality, transportation and marketing costs), tax and royalty rates. Actual funds flows may differ materially. See Advisories and Forward-looking statements.

Slide 17
(1) Represents possible future opportunities currently being evaluated. There can be no assurance these opportunities will be pursued. See Advisories and Forward-looking statements.

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