



# Oil Sands: Fact Sheets

Focus on future Canadian oil sands projects capex and production

4th November 2014

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Find the report at: www.carbontracker.org/report/oilsands

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# Key takeaways:

- Recent oil price volatility shows the importance of stress-testing project economics against a range of price scenarios
- Rystad have recently updated their methodology for calculating transport prices, as discussed in an accompanying note. We have therefore updated our look at oil sands project economics in this light
- The vast majority (92%) of potential capex on discovery stage oil sands projects in the next decade has high oil price requirements which we would regard as particularly risky
- Relative exposure to high cost oil sands development projects varies between companies, but can reach 100% of total company potential capex. We consider this an extremely high stakes gamble
- A number of high cost oil sands projects have already been deferred this year, at rather higher prices than currently prevailing. Investors may question why similar projects are going ahead, given continuing cost pressures and an increasingly uncertain pricing outlook

# CTI

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November 4th 2014

# Methodology update

A separate paper summarising the evolution of our methodology for analysing Rystad data, particularly in respect to oil sands, is available. In summary:

- CTI/ETA continue to add a \$15/bbl contingency premium to the breakeven of all projects in order to reflect the desire for a higher IRR (15%) than the standard Rystad model (10%). This is consistent with Rystad's own approach when conducting a recent analysis for the Norwegian Government.
- CTI/ETA no longer adds a further \$15/bbl transport premium to oil sands projects, as Rystad has revised its approach to producing comparable breakevens for this region. Rystad's approach was updated over Summer 2014, to reflect the adjustments needed for transport costs and oil quality.

The data included in this paper was downloaded from the Rystad UCube database in October 2014.

"Update on Oil Sands Methodology", www.carbontracker.org/report/oilsands

# **Executive Summary**

Our May report "Carbon Supply Cost Curves: Evaluating Oil Capital Expenditures" highlighted oil sands as the largest potential destination for capital expenditure on new high cost production.

Our analysis and engagement by investors has prompted a new level of interest in the breakeven prices of oil projects. This has resulted in new information being provided to analysts and our data provider Rystad has updated some projects to reflect this. Specifically on oil sands, Rystad has now further integrated transport costs, removing the need for an additional cost to be added. Given recent updates on oil sands costs and movements in the oil price, we felt it timely to produce a report focusing on the Canadian oil sands sector.

The analysis still indicates that nine out of every ten barrels of potential oil sands production from discovery stage projects require over \$95/bbl to provide a 15% IRR, a level we regard as necessary to reflect the risks associated with oil developments, (see accompanying note on methodology). These high cost projects account for potential capital expenditure of \$271bn over the next decade.

The near \$30 fall in Brent prices over the past several months is an example of how vulnerable future projects could be if oil company planning assumptions do not factor in sufficient contingencies.

Meanwhile, the cost pressures facing the oil industry show few signs of abating, especially for capital intensive projects such as oil sands. Combined with recent price weakness, these pressures shows why oil companies should use some form of contingency before making investment decisions.

Several high cost projects have already been shelved by majors including Shell, Total and Statoil. Shareholders should question why other projects are not following suit if they require similar oil price levels, particularly given that oil prices have dropped significantly since those projects were deferred, and the economic pain that a sustained period of an oil price at around \$85 has yet to fully come through the system in terms of financial results.

For example, Goldman Sachs' recent revision of its estimates for Brent crude to \$80-85 for 2015 would, if achieved, undermine the economics for those projects that need an oil price over \$95 to achieve a minimum level of 15% IRR.

The proportion of each company's total capex earmarked for oil sands projects needing above \$95/barrel ranges from 2-3% of total capex on liquids for some majors up to 100% for smaller oil sands players are in this high cost category. For the latter category, rising costs and falling prices - if sustained - could threaten their business models. Operating projects which are only breaking even do little to generate value for shareholders. Companies with limited cash flow and higher leverage lack financial flexibility and might struggle to carry high cost projects for long.

This output identifies the largest projects each company has options on over the next decade which require a market oil price above \$95 to be sanctioned, which is \$80/bbl break even oil price ("BEOP") with a \$15 contingency added to achieve a c.15% IRR and so cover unforeseen risks. This is designed to inform shareholder engagement with companies on whether capital expenditure should be maintained for high cost projects.

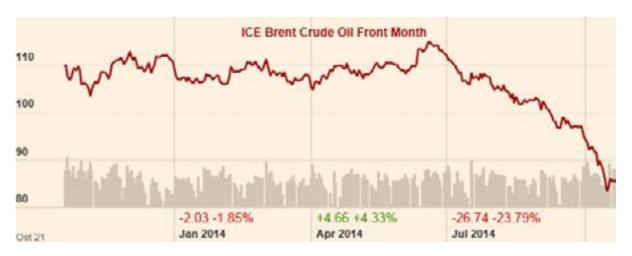
Some companies are already revisiting projects in order to cut both costs and capex so we expect the numbers to continue to be updated. We also anticipate further confirmations that borderline high cost projects have been shelved by the oil majors. We welcome greater transparency about the cost ranges of the portfolio of projects each company has, and the process by which the board approves capital expenditure. Recent oil price developments have demonstrated how important it is to conduct a sensitivity analysis against a range of oil prices.

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## 1. Introduction

The recent decline in the Brent oil price has caught many by surprise, after a period of relative stability around the \$110 mark. With Brent in the mid-eighties at the time of writing, this changes the whole dynamic for regions of marginal production – most notably the oil sands of Alberta.



Source: Financial Times website (21 October 2014)

At the time of writing our global cost curve analysis published in May 2014, there was a debate around whether it was useful to think about \$95/bbl as a threshold price for oil. \$75/bbl was indicated as a price more consistent with a 2 degree warming reference scenario. We established \$95/bbl as a long run equilibrium price based on demand trends in the next 30 years, as discussed in our May research. When the oil price undershoots this it may be cyclical, or indicate an even weaker outlook. This demonstrates the importance of challenging assumptions and stress-testing portfolios against a range of demand and price scenarios.

Shareholders now have an opportunity to revisit the issue with companies, to demand transparency on the price ranges major projects requiring investment decisions fall into. Even if companies are not willing to provide specifics, they should be able to indicate which price band projects are in.

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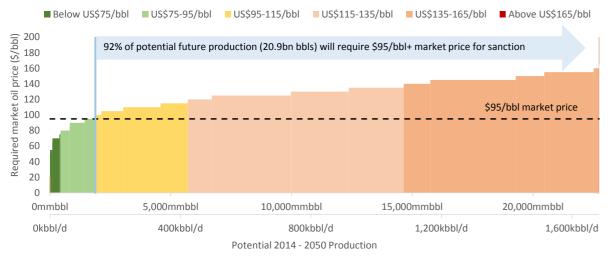
# 2. Focus on future oil sands projects capex and production

#### Potential production

Looking at potential future production, undeveloped oil sands projects generally seem to be much higher cost than those already in production or development; this point is illustrated by the below chart that focuses on discovery stage projects only.

Figure 1: 2014-2050 potential future oil production by market price required for sanction (including \$15 contingency) (mmbbl, average kbbl/d) – discovery stage projects only

#### 2014-2050 potential future oil production by required market price (discovery stage only)



Note: Price bands relate to required market price for sanction, including \$15/bbl contingency above Rystad base breakeven Source: Rystad, CTI

As can be seen, fully 92% of potential production requires a market price of \$95/bbl for sanction. This amounts to 20.9bn bbls over the period, or 30 years of production at 2013 rates. By 2030, output from these high cost new projects could total 2.0 mmbbl per day, or over 40% of CAPP's overall oil sands production forecast<sup>1</sup>. Virtually all (98%, or 22.3bn bbls) requires a market price of \$75/bbl (i.e. consistent with the 2°C scenario). By way of comparison, for all projects (including currently producing and in development projects), 44% of total potential production (31.4bn barrels) over the period 2014-2050 requires \$80/bbl to breakeven, equivalent to \$95/bbl market price required for sanction. Whilst this is clearly still a very significant proportion to be exposed to the risk of lower prices (like those seen in the market at present), it pales in comparison to the future projects contemplated by oil companies.

Given the current oil price environment, investors will no doubt question the reliance on sustained high prices for this high level of oil sands development. Note that these prices include the \$15/bbl contingency we believe is needed for prudent planning, as demonstrated by the \$30 fall in oil prices already witnessed in a few months of 2014.

#### Potential capex

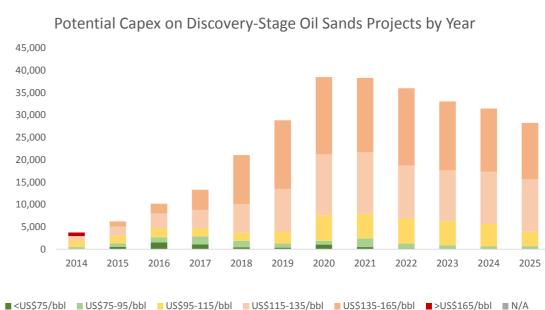
(¢m)

Capex

Moving from potential production in the period 2014-2050 to potential capex in the nearer term, over the period 2014-2025, a similar pattern emerges.

Over the next decade (again, focusing on discovery stage projects), the picture is one of an environment where it is increasingly difficult to make a commercial return. 94% of potential spend on discovery stage projects will require \$95/bbl for sanction; this amounts to \$232bn over the next decade on high risk undeveloped projects.

#### Figure 2: Potential capex on oil sands projects by year (\$m) – discovery stage projects only



Note: Price bands relate to required market price for sanction, including \$15/bbl contingency above Rystad base breakeven Source: Rystad, CTI

For context, if we extend the analysis to all oil sands assets (i.e. including those producing or in development), projects requiring \$80/bbl to breakeven or \$95/bbl for approval account for a combined potential capital budget of \$364bn, or 66% of total spend on oil sands projects. Projects requiring \$60/bbl or more to break even, or \$75/bbl to approve, account for a combined potential budget of \$505bn, or 92% of total spend on oil sands.

We believe shareholders should be concerned at this potential level of expenditure and should consider whether it is prudent to risk such large amounts of capital on high cost projects that need high oil prices to be commercial.

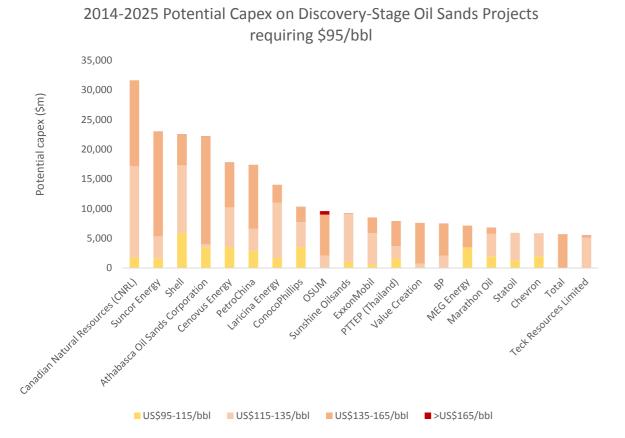
CAPP, "Crude Oil Forecast, Markets & Transportation". 2013 production from oil sands was 1.9 mmbbl/d, forecast 2030 1 production is 4.8 mmbbl/d

http://www.capp.ca/getdoc.aspx?DocId=247759&DT=NTV

#### Company-level potential capex

Focusing again on high cost (requiring at least \$95/bbl market price for sanction) discovery stage projects, the companies with the highest exposure to oil sands projects are shown in the below chart. The 20 companies shown are those with potential capex of over \$5bn on these projects in the period 2014-2025. In aggregate across the 20, this amounts to a total of \$246bn, or 91% of total potential capex on high cost oil sands discoveries in this period and 76% of total potential capex on all oil sands discoveries at all price requirements.

Figure 3: 2014-2025 potential capex (\$m) on oil sands projects requiring \$95/bbl market price for sanction by company – discovery stage projects only



Note: Price bands relate to required market price for sanction, including \$15/bbl contingency above Rystad base breakeven Source: Rystad, CTI

This potential capex on high cost discovery stage oil sands projects is shown in the below table, with comparison to the companies' overall potential capex on oil projects whether they are oil sands or not (above and below \$95/bbl required, and all life-cycle stages).

#### Figure 4: 2014-2025 potential capex (\$m) on discovery stage oil sands projects

Company	Capex on oil sands discoveries requiring >\$95/bbl (\$m)	Total capex on all projects (\$m)	Oil sands discoveries >\$95/bbl (% of total capex on all liquids projects)
Canadian Natural Resources (CNRL)	31,619		
Suncor Energy	22,989	,	34%
Shell	22,505		
Athabasca Oil Sands Corporation	22,314	,	
Cenovus Energy	17,765		
PetroChina	17,399	,	
Laricina Energy	14,027	15,040	
ConocoPhillips	10,328	,	
OSUM	9,596	,	96%
Sunshine Oilsands	9,204		
ExxonMobil	8,524		3%
PTTEP (Thailand)	7,928		47%
Value Creation	7,590	,	
BP	7,444	,	
MEG Energy	7,139	,	36%
Marathon Oil	6,745	,	10%
Statoil	5,928	,	
Chevron	5,761	,	
Total	5,709		
Teck Resources Limited	5,499		

Total top 20	
Others	
Total	

Note: Price bands relate to required market price for sanction, including \$15/bbl contingency above Rystad base breakeven. Companies with over 50% of their total potential capex on discovery stage oil sands projects requiring a market price of at least \$95/bbl for sanction are highlighted in pink; those with over 30% in yellow. Source: Rystad, CTI

Many of the companies can be seen to be very significantly leveraged to continued high oil prices and the oil sands development cost environment (as previously, the \$95 plus oil price includes a \$15 contingency). Some of the above companies are clearly taking on a great deal of risk by pressing ahead with development of these projects, particularly in the context of falling oil prices.

#### **Targeted returns**

As discussed in our methodology update Rystad's breakeven prices for projects are calculated on the basis of a 10% IRR. In our analysis, we add a further \$15/bbl to represent the contingency that a prudent company will require in order to allow the sanction of a project, which has the effect of raising the targeted IRR slightly to say c.14-15%.

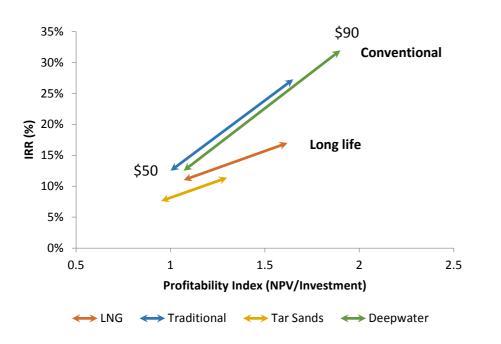
Whilst the long production lifetimes of oil sands projects are borne in mind, we believe that investors should ask themselves whether these levels represent an adequate return considering the risks that come with the high and increasing costs, and hence high operational gearing of oil sands projects as well as other sector specific issues of route-to-market limitations and the possibility of greenhouse gas regulations. The recent drop in the oil price also serves as a reminder of the shifts in the market which few predict, but can undermine profitability.

Return targets are rarely published by oil sands developers, although guidance is provided occasionally. In a presentation from 2009, Shell showed a chart (recreated below) that indicated the range of internal rates of return for different classes of projects. (Internal rate of return or IRR is the annual discount rate needed deliver a zero net present value). It also shows a "profitability" index which is the ratio between the net present value of the projects cash flows and the net present value of the capital invested.

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24	5,891
2	4,826
27	0,717

Figure 5: Shell, Profitability of new projects (2009 presentation)



Source: Shell March 17, 2009 Investor presentation<sup>2</sup>

Although a few years old, the chart makes one point very clearly, a point that we believe is still true today - on average, capital intensive, long-life projects such as tar sands generate materially lower returns (IRRs) than conventional projects. Furthermore, oil sands investments don't just deliver relatively low returns; they have high operational gearing due to high costs, adding greater risk to the portfolio.

As a further example on an individual project level, the Fort Hills project (Suncor 40.8% and operator, Total E&P Canada 39.2%, Teck 20%) has been sanctioned, and Suncor have disclosed that there is a targeted return of 13%<sup>3</sup>. Rystad's analysis suggests that even this may not be achieved, with Brent equivalent prices of \$106 and \$136/bbl required to make 10% IRR on phase 1 and a debottlenecking phase respectively.

The Fort Hills project itself was previously shelved in 2008 but was revived when Suncor merged with Petro-Canada<sup>4</sup>. Investors may be concerned that the use of cash on a project with such tight economics and associated risk may not be as attractive as simply returning it to shareholders.

## 3. Key projects/cancellation candidates

#### "Cancellation candidates"

In the table below we isolate large-scale projects (in this case, those with 2014-2025 potential capex of \$2bn or more) that are currently at the discovery stage and require a market price of at least \$95/bbl for sanction. Where a project has multiple stages or expansion phases, only those phases caught by the above criteria are shown. In order to avoid any confusion with lower-cost, more advanced project phases, the specific field or expansion phase in question is named. Data is shown based on the October edition of the Rystad UCube database.

Figure 6: Table of discovery stage projects requiring a market price of >\$95/bbl for sanction, with 2014-2025 capex above \$2bn

Rank	Project name	Field/Phase(s)	Companies (share of capex)	Project type	2014-2025 capex* (\$m)	Required market price** (\$/bbl)
1	Sunrise, CA	Sunrise phase 2B	BP (50%), Husky Energy (50%)	In-situ	8,624	152
2	West Kirby Phase 1, CA	West Kirby Phase 1	Cenovus Energy (100%)	In-situ	3,686	152
3	Sepiko Kesik, CA	Sepiko Kesik Phase 1, Sepiko Kesik Phase 2	OSUM (100%)	In-situ	2,763	150 - 161
4	Joslyn, CA	Joslyn (Deer Creek) Mine Phase 1 (North), Joslyn (Deer Creek) SAGD Phase 2	Inpex (10%), Oxy (15%), Suncor Energy (37%), Total (38%)	Mining	6,188	147 - >16
5	Advanced Tristar, CA	ATS-1, ATS-2, ATS-3	Value Creation (100%)	In-situ	6,470	145 - 149
6	Surmont Oil Sands project, CA	Surmont MEG Energy, Surmont Phase 3	ConocoPhillips (29%), MEG Energy (41%), Total (29%)	In-situ	8,862	145 - 158
7	Dover West AOSC, CA	Dover West Sands Phase 1 , Dover West Sands Phase 2 , Dover West Sands Phase 3 , Dover West Sands Phase 4 , Dover West Sands Phase 5	Athabasca Oil Sands Corporation (100%)	In-situ	10,965	144 - 154
8	Carmon Creek, CA	Carmon Creek Phase 2	Shell (100%)	In-situ	4,089	138
9	Telephone Lake, CA	Telephone Lake Phase A, Telephone Lake Phase B	Cenovus Energy (100%)	In-situ	3,870	136 - >16
10	Aspen, CA	Aspen	ExxonMobil (70%), Imperial Oil (Public traded part) (30%)	In-situ	3,793	135
11	Dover JV, CA	Dover North Phase 2, Dover South Phase 3, Dover South Phase 4, Dover South Phase 5	Athabasca Oil Sands Corporation (40%), PetroChina (60%)	In-situ	18,003	135 - 153
12	Taiga Project, CA	Taiga/Marie Lake (Cold Lake OSUM) Phase 1, Taiga/Marie Lake (Cold Lake OSUM) Phase 2	OSUM (100%)	In-situ	2,717	135 - >16
13	Frontier, CA	Fontier Phase 4 Equinox, Frontier Phase 1, Frontier Phase 2, Frontier Phase 3	Teck Resources Limited (100%)	Mining	5,102	134 - >16
14	Saleski Laricina, CA	Saleski Laricina Phase 2, Saleski Laricina Phase 3, Saleski Laricina Phase 4	Laricina Energy (60%), OSUM (40%)	In-situ	10,277	130 - 142
15	Gregoire Lake, CA	Gregoire Lake Phase 1, Gregoire Lake Phase 2	Canadian Natural Resources (CNRL) (100%)	In-situ	5,035	128 - 13
16	Kearl, CA	Kearl Phase 3 (Debottleneck)	ExxonMobil (79%), Imperial Oil (Public traded part) (21%)	Mining	6,724	127
			/	In-situ	2,478	122
17	East McMurray, CA	McMurray East Phase 1	Cenovus Energy (100%)	III-SILU	2,470	122
17 18	East McMurray, CA Terre de Grace, CA	McMurray East Phase 1 Terre de Grace Phase 1, Terre de Grace Pilot	Cenovus Energy (100%) BP (75%), Value Creation (25%)	In-situ	4,175	
	12	,	0/ 1		,	122 - 14 121
18	Terre de Grace, CA	Terre de Grace Phase 1, Terre de Grace Pilot	BP (75%), Value Creation (25%) Canadian Natural Resources (CNRL) (100%)	In-situ	4,175	122 - 14 121
18 19	Terre de Grace, CA Grouse, CA Narrows Lake, CA	Terre de Grace Phase 1, Terre de Grace Pilot Grouse	BP (75%), Value Creation (25%) Canadian Natural Resources (CNRL) (100%) Cenovus Energy (50%),	In-situ In-situ	4,175 4,556	122 - 14
18 19 20 -	Terre de Grace, CA Grouse, CA Narrows Lake, CA Top discoveries with	Terre de Grace Phase 1, Terre de Grace Pilot Grouse Narrows Lake Phase B, Narrows Lake Phase C	BP (75%), Value Creation (25%) Canadian Natural Resources (CNRL) (100%) Cenovus Energy (50%),	In-situ In-situ In-situ	4,175 4,556 3,852	122 - 14 121

\*\* market price required for sanction includes \$15/bbl contingency on top of project breakeven price

Source: Rystad, CTI

Given the risk profile of such potentially high cost projects, it may be that management should consider deferring projects, returning additional capital to shareholders instead. We note that there have already been a number of deferrals/cancellations of oil sands projects during 2014.

#### **Project deferrals**

The oil sands projects that have been confirmed to be deferred in 2014 to date, along with the companies involved (\* denotes operator) are listed below.

It is important to note that these deferrals/cancellations took place before the recent fall in oil prices. We suspect that there will be more to come if oil prices remain significantly below previous levels.

1) Pierre River (Shell\* 60%, Chevron 20%, Marathon 20%)

Pierre River was the first oil sands project to be postponed this year, with Shell announcing in February that

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http://s00.static-shell.com/content/dam/shell/static/investor/downloads/presentations/2009/gatar-presentationspa-2 ck23112009.pdf

http://business.financialpost.com/2013/10/31/suncor-energy-fort-hills/?\_lsa=f7aa-12c2 3

http://www.suncor.com/pdf/2013\_Fort\_Hills.pdf, p5 (assuming a bitumen price of \$60.50) 4

<sup>\*</sup> company share of capex requiring \$95/bbl+ shown only

it would be postponed indefinitely<sup>5</sup>. A bitumen mining project, it was previously anticipated to have a maximum capacity of 200,000 barrels of oil per day ("bopd"). With a required market price above \$165/bbl in Rystad's data, Rystad have assumed that it will not go ahead and we have not included it in the above table.

#### 2) Joslyn (Total\* 38.25%, Suncor Energy 36.75%, Inpex 10%, Oxy 15%)

The Joslyn project was delayed indefinitely in May 2014, due to rising industry costs.<sup>6</sup> Total had previously planned to expand planned capacity from 100k bopd to 150-160k bopd in order to improve the per-bar-rel economics<sup>7</sup>. Like Pierre River, Joslyn North was to be a mining project. Given Joslyn's potential capex of \$6.2bn and required market price for sanction ranging from \$147/bbl to above \$165/bbl, our research based on the Rystad database confirms it as a suitable project to be deferred. The capital requirements and the potential for cost inflation for two overlapping projects (Total are also developing the Fort Hills project) may have contributed to Joslyn North's cancellation.

#### 3) Kai Kos Denseh - Corner (Statoil\* 100%)

The 40,000 bopd Corner project was deferred by Statoil in September 2014, for a minimum of 3 years<sup>8</sup>. Due to the project's high capex requirements and high market price required for sanction, we believe that is a prudent choice. The Corner and Corner Expansion phases could have incurred a potential capex budget of \$5.9bn over 2014-2025, and would have required market prices of \$110-128/bbl for sanction based on Rystad data.

As well as the issue of rising costs, Statoil also explicitly cited "limited pipeline access" as a contributory factor behind the decision, with the negative implications for crude prices in Canada affecting margins. Furthermore, Corner is notable as being the first thermal in-situ project to be postponed. This production technique is generally considered lower cost than mining, for example being much less labour-intensive, and is already in use by Statoil in Canada.

Statoil owns a further lease on the Kai Kos Denseh area, Leismer, which produced first oil in January 2011. The project remains in production and has an operating capacity of 20,000 bopd.

The Voyageur upgrader project (Suncor 51%, Total 49%) was also cancelled in March 2013<sup>9</sup>, with \$3.5bn spent<sup>10</sup>.

In addition to the above projects, it has been rumoured in the media that the Northern Lights project (Total\* 50%, Sinopec Group 50%) will be deferred or sold<sup>11</sup>. With a market price of \$158/bbl required for sanction, it has been assumed not to go ahead in Rystad's analysis, and accordingly isn't shown in the table above. We would consider a deferral decision as sensible given the high risk of wasting shareholders' capital.

# 4. Company exposure to high cost projects

The projects identified in Rystad as being potential new developments (currently at the discovery stage) between now and 2025 requiring a market price of \$95/bbl are summarised for each company in the table below.

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Constant  Dover NU CA  Dover Nuth Phase 2, Dover South Phase 3, Dover West Sands Phase 2, Dover West Sands Phase 2, Dover West Sands Phase 2, Dover West Sands Phase 3, Dover More 3, Sands Phase 4, Dover More 1, Dover More 1, Sands Phase 4, Dover 1, Dover 1, Sands Phase 4, Dover 1, Do					Required
Company  Project Name  Phase  2002  Synchro    Athabasca OII Sands Corporation  Dover IV CA  Dover North Phase 2, Dover South Phase 3, Dover South Phase 4, Dover South Phase 4, Dover West Sands Phase 2, Dover West Sands Phase 2, Dover West Sands Phase 4, Dover West Sands Phase 6, Dover Mest Sands Phase 7, Dover Sandt Phase 7, Dover Sandt Phase 7, Dover Mest Sands Phase 7, Dover Mest Sands Phase 7, Dover Mest Sands Phase 7, Dover Sandt Phase 7				Company	
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Athabasca OII Sands Corporation  Dover /VX, CA  Dover Nouth Phase 2, Dover South Phase 3, Dover South Phase 2, A Dover South Phase 3, Dover West Sands Phase 4, Dover Phase 4	Company	Project Name	Phase	2025 capex	sanction
Phase 4, Dover South Phase 3  Status  Status    Athabesco 0II Sands Corporation  Dover West Sands Phase 3, Dover West Sands Phase 4, Dover West Sands Phase 3, Dover West Sands Phase 4, Dover West Sands Phase 3, Dover West Sands Phase 4, Dover West Sands Phase 3, Dover West Sands Phase 4, Dover West Sands Phase 3, Dover West Sands Phase 4, Dover West Sands Phase 3, Dover West Sands Phase 4, Dover West Sands Phase 2, Hangingstone AOSC Phase 3, Estimate 4, Dover West Sands Phase 2, Hangingstone AOSC Phase 3, Estimate 4, Dover West Sands Phase 2, Hangingstone AOSC Phase 3, Estimate 4, Dover West Sands Phase 2, Barlon Mountain, Phase 2, Barlon Mountain Phase 2, Sands 122, 145 BP  Status 4, Sands 122, 145 Status 4, Sands Phase 2, Sands 122, 145 Status 4, Sands Phase 4, Mountain Phase 2, Sands 122, 145 Status 4, Sands Phase 1, Cala Composition Phase 4, Mortan Phase 5, Sands 112,					
Altrabisca Oil Sands Corporation  Dover West Sands Phase 1, Dover West Sands Phase 2, Over West Sands Phase 3, Over Mest Sands Phase 4, Over Mest Sands Phase	Athabasca Oil Sands Corporation	Dover JV, CA		\$7,201	135 - 153
Construct West Stands Phase 3, Dover West Stands Phase 4, Dover West Stands Phase 3, Daver Mest Stands Phase 4, Daver Mest Stands Pha	Athabasca Oil Sands Corporation	Dover West AOSC CA	*	\$10.965	144 - 154
Caracterization  Dover West Sands Phase 3  Sign 0  Sign 20  Sign 20 <th< td=""><td>Athabasta on Sanus corporation</td><td>Dover west A03C, CA</td><td></td><td>\$10,905</td><td>144 - 134</td></th<>	Athabasta on Sanus corporation	Dover west A03C, CA		\$10,905	144 - 134
Athabasca Oli Sands Corporation  Hangingstone AOSC Phase 2, Hangingstone AOSC Phase 3, 51,500  1081-157    Athabasca Oli Sands Corporation  TOTA ALL PEOLETS  -  51,600  1081-157    BP  Terre de Grace, NG  Terre de Grace Pilose 1, Terre de Grace, Pilose 1, Terre de Grace Pilose 1, Terre de Grace, Pilose 1, Terre de Grace, Pilose 1, Terre de Grace Pilose 1, Terre de Grace, Pilose 1, Terre 1, Terre 1, Terre 1, Terre 1, Terre					
pi pi piSumits, CASumits, C	Athabasca Oil Sands Corporation	Hangingstone AOSC, CA		\$3,500	108 - 157
gibTerre de Grace PAue 1, Terre de Grace Phote 2, Te	Athabasca Oil Sands Corporation	TOTAL ALL PROJECTS	-	\$21,666	108 - 157
pip  TOTALLIPROJECTS	BP	Sunrise, CA	Sunrise phase 2B	\$4,312	152
Canadan Natural Resources (CNR)Birch Mourtain (CABirch Mourtain Phase 1, Birch Mourtain Phase 255,700120 - 127Canadian Natural Resources (CNR)Grouse, CAGrouseStatistics121Canadian Natural Resources (CNR)Horizon Olisods Project, CAGrouse, CAGrouseStatistics121Canadian Natural Resources (CNR)Horizon Olisods Project, CAKirby North CNR Phase 2, Kirby South CNR Phase 3, Bolizon Phase 4, Morizon Ph	BP		Terre de Grace Phase 1, Terre de Grace Pilot		
Canadan Natural Resources (CNR)Gregoire Lake, Phase 1, Gregoire Lake Phase 2, Gregoire Lake Phase 2, Gregoire Lake Phase 2, Gregoire Lake Phase 2, Morizon Phase 4, Mor	BP		•		
Canadan Natural Resources (NRI)  Grouze, CA  Grouze  54,556  121    Canadan Natural Resources (NRI)  Norton Ol Sansk Pilor, CA  Norton NBace J, Morton Phase 4, Morton Phase 5  51,518  113 - 165    Canadian Natural Resources (NRI)  Kirby CNR, CA  Kirby North CNR Phase 2, Kirby South CNR Phase 2  54,609  112 - 145    Canadian Ol Sands  Syncrude Midred Lake Oli  Syncrude Midred Lake Oli  51,243  107 - 165    Canadian Ol Sands  TOTAL ALL PROJECTS  -  51,243  107 - 165    Canadian Sund Resources (CNR)  Kirby CNR, CA  Christina Lake, CA  Foster Creek Phase 1  53,107  127    Canovas Energy  East McMarray, CA  MoMurray East Phase 1  51,478  122  121    Canovas Energy  Foster Creek, A  Foster Creek Phase 1  53,107  1307  1307  1307  1307  1307  1307  1307  1307  1307  1307  1307  1307  1307  1308  1317  1308  1307  1307  1307  1307  1307  1307  1307  1308  1307					
Canadian Natural Resources (CNR1)  Horizon Dias Shore (CA  Horizon Phase 2A, Horizon Phase 4, Horizon Phase 5  511,558  112 - 165    Canadian Natural Resources (CNR1)  TOTA ALL PROJECTS  -  511,658		•	•		
Canadian Natural Resources (CNNI)  Kirdy North CNR Phase 2, Kirdy South CNR Phase 2  54,869  122-165    Canadian Autural Resources (CNNI)  STOTA ALL REDORCTS  -  STAIL 91					
Canadian Natural Resources (CNRL)  TOTA ALL PROJECTS  Status		• •			
Canadian Oli Sands  Syncrude Mildred Lake Oli  Syncrude Mildred Lake Canous Energy ConocoPhilips Pake H, Syncrude Mildred Lake Onious Energy ConocoPhilips Pake H, Syncr			-		
Mining CA  Syncrude Stage 4 (Aurora South)  Number of the second s	Canadian Oil Sands		Syncrude Mildred Lake and Aurora Stage 3 Debottlenecking.		
Canadia Oli Sands  TOTA ALL PROJECTS  St. 200  St.		•			
Christina Lake Cenovus Energy ConcoPhillips Optimization (Phases C, DE)  S2,478  122    Cenovus Energy  East McMurray, CA  McMurray East Phase 1  S2,478  122    Cenovus Energy  Foster Creek, CA  Foster Creek Phase H, Foster Creek Phase J  S3,107  107    Cenovus Energy  Telephone Lake, CA  Telephone Lake Phase A, Telephone Lake Phase B, Strowus Lake Phase B  S3,870  136 - 3165    Cenovus Energy  Telephone Lake, CA  Telephone Lake Phase A, Telephone Lake Phase B, Strowus Lake Phase B  S3,870  136 - 3165    Cenovus Energy  TOTAL ALL PROJECTS  -  S5,761  104 - 123    Chevron  TOTAL ALL PROJECTS  -  S5,761  104 - 123    CNOOC  TOTAL ALL PROJECTS  -  S5,761  104 - 123    CNOOC  TOTAL ALL PROJECTS  -  S5,761  104 - 123    ConcoPhillips  Christina Lake, CA  Christina Lake Cenovus Energy ConcoPhillips Phase H, ConcocoPhilips Phase H, ConcoPhillips Phase H, ConcoPhillips	Canadian Oil Sands		• ·	\$1,243	107 - 165
(Phases C,D,E)(Phases C,D,E)Cenovus EnergyEast McMurray, CAMcMurray East Phase 1\$2,478122Cenovus EnergyPoster Creek, CANorrows Lake Phase L\$3,107107Cenovus EnergyNarrows Lake, CANarrows Lake Phase C\$1,926121 - 131Cenovus EnergyTelephone Lake, Phase A, Levek Phase A, Levek Phase B\$3,807136 - 156Cenovus EnergyWest Kirby Phase 1, CAWest Kirby Phase 1, CA\$17,76588 - 156Cenovus EnergyTOTA LAL PROJECTS-\$17,76598 - 156ChevronCAExpansion and Debottlenecking\$25,761104 - 123ChevronTOTA LAL PROJECTS-\$24,55107 - 165CNOCCTOTA LAL PROJECTS-\$24,55107 - 165ChocorephillipsChristina Lake, CASyncrude Midred Lake and Aurora Stage 3 Debottlenecking\$24,55107 - 165ConocoPhillipsSprarude Stage (Aurora Stage)\$24,55107 - 165107 - 165ConocoPhillipsFoster Creek, CAFoster Creek Phase H, Foster Creek Phase J\$3,107107ConocoPhillipsSurrom Chase G, D, Surrow Takes C, D, Surrow Takes C, Surrow These 3\$25,597158ConocoPhillipsSurrow Stake, CANarrows Lake Phase 3 (Debottleneck)\$5,222127 - 165ConocoPhillipsSurrow Stake, CANarrows Lake Phase 3 (Debottleneck)\$5,223107 - 165ConocoPhillipsNarrow Stake, CAKearl Phase 3 (Debottleneck)\$5,224107 - 165ConocoPhillipsSyncrude Mi	Cenovus Energy	Christina Lake, CA	Christina Lake Cenovus Energy ConocoPhilips Phase H,	\$2,698	98 - 115
Cenous: Energy  Eat McMuray, CA  McMaray East Phase 1  \$2,478  122    Cenous: Energy  Foster Creek, CA  Foster Creek Phase H, Soter Creek Phase J.  \$3,107  107    Cenous: Energy  Telephone Lake, CA  Narrows Lake Phase A, Telephone Lake Phase B.  \$3,807  136 ->155    Cenous: Energy  Telephone Lake, CA  Telephone Lake Phase A, Telephone Lake Phase B.  \$3,807  136 ->155    Cenous: Energy  Total ALL PROJECTS  West Kirly Phase 1, CA  West Kirly Phase 1, CA  \$47,668  132 -    Cenous: Energy  Athabasca Oil Sands Project  Jackpine Extension, Jackpine Phase J, Mase Marcors Stage 3 Debottlenecking  \$57,61  104 - 123    Chevron  TOTAL ALL PROJECTS  -  Concor Phillips  \$57,61  107 - 165    COOC  TOTAL ALL PROJECTS  -  Concor Phillips  \$57,61  107 - 165    ConcorPhillips  Spracude Mildred Lake Oil  Spracude Mildred Lake Oil  \$57,61  107 - 165    ConcorPhillips  Foster Creek, CA  Foster Creek Phase H, Foster Creek Phase J  \$3,107  107    ConcorPhillips  Narrow Stake Phase 2, Marrow Stake			Christina Lake Cenovus Energy ConocoPhillips Optimization		
Cenows Energy  Foster Creek, CA  Foster Creek, Phase H, Foster Creek Phase J  \$3,107  107    Cenows Energy  Narrows Lake, CA  Narrows Lake Phase B, Narrows Lake Phase C  \$1,926  121 - 131    Cenows Energy  West Kirby Phase 1, CA  West Kirby Phase 1, CA  West Kirby Phase 1, CA  \$1,756  88 - 165    Cenows Energy  West Kirby Phase 1, CA  West Kirby Phase 1, CA  \$1,756  88 - 165    Cenows Energy  TOTAL LIPROJECTS  -  \$1,765  88 - 165    Chevron  TOTAL ALL PROJECTS  -  \$1,761  104 - 123    Chevron  TOTAL ALL PROJECTS  -  \$245  107 - 165    Chococ ChorocoPhillips  Mining, CA  \$1,977 - 165  \$1,077 - 165    ChococPhillips  Foster Creek, CA  Christina Lake Cenows Energy ConocoPhillips Phase 4, \$2,608  98 - 115    ConocoPhillips  Foster Creek, CA  Narrows Lake Phase 9, Narrows Lake Phase 1  \$3,107  107    ConocoPhillips  Surrow To Nare CA  Narrows Lake Phase 9, Narrows Lake Phase 1  \$3,107  107    ConocoPhillips  Surrow To Nare A  Narro					
Cenous Energy  Narows Lake, CA  Narows Lake Phase B, Narows Lake Phase C  51,926  121-31    Cenous Energy  Telephone Lake, CA  Telephone Lake Phase A, Telephone Lake Phase C  53,870  136-216    Cenous Energy  TOTAL AL PROJECTS  -  57,61  98-2166    Chevron  Athabasca Oli Sands Project, Zapansion and Debottlenecking  55,761  104-123    Chevron  TOTAL ALL PROJECTS  -  104-123    Chevron  TOTAL ALL PROJECTS  -  55,761  104-123    CNOOC  TOTAL ALL PROJECTS  -  55,761  104-123    CNOOC  TOTAL ALL PROJECTS  -  53,761  104-123    ConcoPhillips  Syncrude Midred Lake Oli Syncrude Stage 4 (Aurora Stage 3 Debottlenecking, CA  51,976  107-165    ConcoPhillips  Christina Lake, CA  Christina Lake Cenovus Energy ConcoPhilips Phase H, S1,926  121-131    ConcoPhillips  Narows Lake, CA  Narows Lake Phase B, Hoster Creek Phase I  53,107  107    ConcoPhillips  Narows Lake Phase G, Aurora Stage 3 Debottlenecking  52,927  121-131    ConcoPhillips<	Cenovus Energy	11			
Cenovus Energy  Telephone Lake, CA  Telephone Lake Phase A, Telephone Lake Phase B  53,870  136 - 5165    Cenovus Energy  West Kirby Phase 1, CA  West Kirby Phase 1, CA  Starbart  152    Cenovus Energy  TOTAL ALL PROJECTS  -  Starbart  152    Chevron  TOTAL ALL PROJECTS  -  Starbart  104 - 123    Chevron  TOTAL ALL PROJECTS  -  Starbart  Starbart  104 - 123    CNOOC  TOTAL ALL PROJECTS  -  Starbart  Starbart  107 - 165    Concorbhillips  Totistina Lake, CA  Syncrude Starge 4 (Aurora South)  Starbart  107 - 165    Concorbhillips  Total ALL PROJECTS  -  Starbart  Starbart  107 - 165    Concorbhillips  Foster Creek, CA  Christina Lake Cenovus Energy Concorbhillips Optimization (Phases C, D, E)  107  107    Concorbhillips  Total ALL PROJECTS  -  Starbart  Starbart  108 - 165    Concorbhillips  Total ALL PROJECTS  -  Starbart  Starbart  107 - 165    Concorbhillips					
Cenous Energy  West Kirby Phase 1, CA  West Kirby Phase 1  53, 66  152    Cenous Energy  TOTAL ALL PROJECTS  -  57, 76  98 ->165    Chevron  Athabaca Oil Sands Project, Expansion and Debottlenecking  55, 761  104 - 123    Chevron  TOTAL ALL PROJECTS  -  68, 765  104 - 123    Chevron  TOTAL ALL PROJECTS  -  55, 761  104 - 123    Choron  TOTAL ALL PROJECTS  -  5245  107 - 165    ConcoPhillips  Forster Creek, CA  Christina Lake Cenovus Energy ConcoPhillips Phase H, Christina Lake Cenovus Energy ConcoPhillips Phase H, ConcoPhillips  53, 107  107    ConcoPhillips  Narrows Lake, CA  Narrows Lake Phase B, Narrows Lake Phase J  53, 107  107    ConcoPhillips  Narrows Lake, CA  Narrows Lake Phase B, Narrows Lake Phase C  51, 262  121 - 131    ConcoPhillips  Surrout Oil Sands project, CA  Surroute Mildred Lake and Aurora Stage 3 Debottlenecking  55, 761  107 - 165    ConcoPhillips  TOTAL ALL PROJECTS  -  55, 761  107 - 165    Concophillips  Narrows Lake					
Cenovus Energy  TOTAL ALL PROJECTS  -  \$17,765  98 - 156    Chevron  Athabasca Oil Sands Project, CA  Jackpine Extension, Jackpine Phase 1B, Muskeg River Mine  55,761  104 - 123    Chevron  TOTAL ALL PROJECTS  -  55,761  104 - 123    CNOOC  Syncrude Mildred Lake Oil  Syncrude Stage 4 (Aurora South)  5245  107 - 165    ConcoPhillips  Christina Lake, CA  Christina Lake Cenovus Energy ConcoPhillips Phase H, Schoophillips  52,459  107 - 165    ConcoPhillips  Foster Creek, CA  Christina Lake Cenovus Energy ConcoPhillips Optimization (Phases C, D, E)  52,397  107    ConcoPhillips  Narrows Lake, CA  Narrows Lake Phase B, Narrows Lake Phase C  51,326  121 - 131    ConcoPhillips  Sumon Plase B, Narrows Lake Phase C  52,597  158    ConcoPhillips  Sumon Plase B (Debottleneck)  52,297  121 - 131    ExoonMobil  Kearl Phase 3 (Debottleneck)  52,297  127    ExoonMobil  Kearl Phase 3 (Debottleneck)  52,297  127    ExoonMobil  Kearl Phase 3 (Debottleneck)  52,292  127		1 ,			
ChevronAthabasca Oil Sands Project, CAJackpine Extension, Jackpine Phase 18, Muskeg River Mine Expansion and Debottlenecking\$5,761104 - 123ChevronTOTA ALL ROJECTS57,61104 - 123CNOOCSyncrude Mildred Lake Oil Mining, CASyncrude Mildred Lake and Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora South)\$245107 - 165CNOOCTOTA ALL PROJECTS-\$245107 - 165ConocoPhillipsFoster Creek, CAChristina Lake Cenovus Energy ConocoPhillips Phase H, (Phases C, D, E)\$3,107107ConocoPhillipsNarrows Lake, CANarrows Lake Phase H, Foster Creek Phase J\$3,107107ConocoPhillipsNarrows Lake, CANarrows Lake Phase B, Narrows Lake Phase J\$3,107107ConocoPhillipsSurmont Oil Sands project, CASurmont Phase 3, Narrows Lake Phase J\$3,107107ConocoPhillipsSurmont Oil Sands project, CASymcrude Mildred Lake and Aurora Stage 3 Debottleneck)\$2,2640135ExoanMobilAspen, CAAspen\$2,640135\$3,107107107ExoanMobilKearl, CAKearl Phase 3 (Debottleneck)\$52,22127120 - 165Gulfport EnergyTOTAL ALL PROJECTS-\$8,244107 - 165Gulfport EnergyTOTAL ALL PROJECTS-\$8,241107 - 165Gulfport EnergyTOTAL ALL PROJECTS-\$10,22120 - 165Gulfport EnergyTOTAL ALL PROJECTS-\$4,312120 - 165Gulfport EnergyT			-		
CA  Expansion and Debottlenecking    Chevron  TOTAL ALL PROJECTS  -  S5,761  104-123    CNOOC  Syncrude Mildred Lake Oil  Syncrude Mildred Lake and Aurora Stage 3 Debottlenecking, S24  107-165    CNOOC  TOTAL ALL PROJECTS  -  524  107-165    ConocoPhillips  Christina Lake, Canovus Energy ConocoPhillips Phase H, S2,698  98-115    ConocoPhillips  Foster Creek, CA  Foster Creek Phase H, Foster Creek Phase J  53,107  107    ConocoPhillips  Surront Oil Sands project, CA  Foster Creek Phase H, Foster Creek Phase J  53,107  107    ConocoPhillips  Surront Oil Sands project, CA  Narrows Lake Phase B, Narrows Lake Phase S  52,597  158    ConocoPhillips  Surront Oil Sands project, CA  Sagen  52,628  98-158    ExonMobil  Aspen, CA  Sagen  52,629  127    ExonMobil  Spincrude Mildred Lake Oil  Syncrude Sage 4 (Aurora South)  55,222  127    ExonMobil  May River Phase 1 & 2, May River Phase 3 Debottlenecking, CA  55,74  120-165    Guilport Energy  TOTAL ALL			Jackpine Extension, Jackpine Phase 1B. Muskeg River Mine		
ChevronTOTAL ALL PROJECTS-\$5,761104 - 123CNOOCSyncrude Mildred Lake Oil Mining, CASyncrude Stage 4 (Aurora South)\$245107 - 165CNOOCTOTAL ALL PROJECTS-\$248107 - 165ConocoPhillipsChristina Lake, CAChristina Lake Cenovus Energy ConocoPhilips Phase H, Christina Lake, CA\$2,69898 - 115ConocoPhillipsFoster Creek, CAFoster Creek Phase J\$3,107107ConocoPhillipsNarrows Lake, CANarrows Lake Phase B, Narrows Lake Phase Z\$2,597158ConocoPhillipsSurmont Oil Sands project, CASurmont Phase 3\$2,640135ExxonMobilKearl, CAAspen\$2,640135ExxonMobilKearl, CAKearl Phase 3 (Debuttieneck)\$5,292107 - 165ConocoPhillipsSyncrude Mildred Lake old Aurora Stage 3 Debottienecking, Mining, CASyncrude Mildred Lake and Aurora Stage 3 Debottienecking, Syncrude Mildred Lake old Aurora Stage 3 Debottienecking, Mining, CA\$2,640135ExxonMobilKearl, CAMay River Phase 1 & 2, May River Phase 3-4-5\$574120 - 165Gulfport EnergyTOTAL ALL PROJECTS-\$4,312152Husky EnergySunrise, CASunrise phase 28\$4,312152Imperial Oil (Public traded part)Kapen, CAKapen\$1,153135Imperial Oil (Public traded part)Syncrude Mildred Lake Oil Mining, CASyncrude Mildred Lake Oil Syncrude Mildred Lake Oil Mining, CASyncrude Stage 4 (Aurora South)107 - 165 <tr< td=""><td></td><td></td><td></td><td><i>40)101</i></td><td>101 125</td></tr<>				<i>40)101</i>	101 125
Mining, CASyncrude Stage 4 (Aurora South)CNOOCTOTAL ALL PROJECTS-\$245107 - 165ConocoPhillipsChristina Lake, CAChristina Lake Cenovus Energy ConocoPhillips Optimization (Phases C, D, E)\$2,69898 - 115ConocoPhillipsFoster Creek, CAFoster Creek Phase H, Foster Creek Phase J\$3,107107ConocoPhillipsNarrows Lake, CANarrows Lake Phase B, Narrows Lake Phase B, Varrows Lake Phase B, Sarrows Lake Phase B, Varrows Save B	Chevron	TOTAL ALL PROJECTS	-	\$5,761	104 - 123
CNOOCTOTAL ALL PROJECTS-5245107 - 165ConocoPhillipsChristina Lake, CAChristina Lake Cenovus Energy ConocoPhillips Phase H, (Phases C, D, E)53,107107ConocoPhillipsFoster Creek, CAFoster Creek Phase H, Foster Creek Phase J53,107107ConocoPhillipsNarrows Lake, CANarrows Lake Phase B, Narrows Lake Phase C51,926121 - 131ConocoPhillipsSurmont Oil Sands project, CASurmont Phase 352,597158ConocoPhillipsTOTAL ALL PROJECTS-510,32898 - 158ExxonMobilAspen, CAAspen52,640135ExxonMobilKearl, CAKearl Phase 3 (Debottleneck)55,292107 - 165ExxonMobilMining, CASyncrude Mildred Lake onlSyncrude Mildred Lake onl5574120 - 3165ExxonMobilTOTAL ALL PROJECTS-\$374120 - 3165ExxonMobilMay River (Whitesands), CAMay River Phase 1 & 2, May River Phase 3.4-5\$574120 - 3165Gulfport EnergyTOTAL ALL PROJECTS-\$34,312152Husky EnergySunrise, CASunrise phase 2.8\$4,312152Husky EnergyTOTAL ALL PROJECTS-\$31,432127Imperial Oil (Public traded part)Kearl, CAKearl Phase 3 (Debottleneck)\$1,432127Imperial Oil (Public traded part)Kearl, CAKearl Phase 3 (Debottleneck)\$1,432127Imperial Oil (Public traded part)Kearl, CAKearl Phase 3 (Debottleneck)\$1,43212	CNOOC	Syncrude Mildred Lake Oil	Syncrude Mildred Lake and Aurora Stage 3 Debottlenecking,	\$245	107 - 165
ConocoPhillipsChristina Lake, CAChristina Lake Cenovus Energy ConocoPhillips Phase H, Christina Lake Cenovus Energy ConocoPhillips Optimization (Phases C, D, E)\$2,69898 - 115ConocoPhillipsFoster Creek, CAFoster Creek Phase H, Foster Creek Phase J\$3,107107ConocoPhillipsNarrows Lake, CANarrows Lake Phase B, Narrows Lake Phase C\$1,226\$121 - 131ConocoPhillipsSurmont Oil Sands project, CASurmont Phase 3\$2,697158ConocoPhillipsTOTAL ALL PROJECTS-\$10,32898 - 158ExxonMobilAspen, CAAspen\$2,640135ExxonMobilSyncrude Mildred Lake Oil Mining, CASyncrude Stage 4 (Aurora Stage 3 Debottlenecking, Syncrude Mildred Lake and Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora Stage 3 Debottlenecking, May River (Whitestands), CAMay River Phase 1 & 2, May River Phase 3-4-5\$574120 - 165Gulfport EnergyMay River Phase 1 & 2, May River Phase 3-4-5\$574120 - 165120 - 165Gulfport EnergyTOTAL ALL PROJECTS-\$574120 - 165Husky EnergySunrise, CASunrise phase 2B\$4,312152Imperial Oil (Public traded part)Aspen, CAAspen\$1,153135Imperial Oil (Public traded part)Kearl, CAKearl Phase 3 (Debottleneck)\$1,432127 - 165Imperial Oil (Public traded part)Syncrude Mildred Lake Oil Mining, CASyncrude Stage 4 (Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora Stage 3 Debottlenecking, 		Mining, CA	Syncrude Stage 4 (Aurora South)		
Christina Lake Cenovus Energy ConocoPhillips Optimization (Phases C,D,E)ConocoPhillips Optimization (Phases C,D,E)ConocoPhillipsFoster Creek, CAFoster Creek Phase J, Foster Creek Phase J\$3,107107ConocoPhillipsNarrows Lake, CANarrows Lake Phase B, Narrows Lake Phase C\$1,926121 - 131ConocoPhillipsSurmont Oil Sands project, CANarrows Lake Phase B, Narrows Lake Phase C\$1,926121 - 131ConocoPhillipsTOTAL ALL PROJECTS-\$0,02898158ExconMobilAspen, CAAspenAspen\$5,292127ExconMobilKearl, CAKearl Phase 3 (Debottleneck)\$5,292127ExconMobilKearl, CAKearl Phase 3 (Debottleneck)\$5,292127ExconMobilMay River (Whitesands), CAMay River Phase 1& 2, May River Phase 3 Debottleneck)\$5,74120 - 165Gulfport EnergyMay River (Whitesands), CAMay River Phase 1& 2, May River Phase 3.4-5\$574120 - 165Gulfport EnergyMay River (Whitesands), CAMay River Phase 3 (Debottleneck)\$4,312152Husky EnergySunrise CASpen\$4,312152152Husky EnergySunrise, CAAspen\$1,153135135Imperial Oil (Public traded part)Aspen, CAAspen\$1,432107155Imperial Oil (Public traded part)Kearl, CAKearl Phase 3 (Debottleneck)\$2,431172Imperial Oil (Public traded part)Norude Mildred Lake OilSyncrude Mildred Lake Oil\$1,432<	слоос		•		
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ConocoPhillipsSurmont Oil Sands project, CASurmont Phase 3\$2,597158ConocoPhillipsTOTAL ALL PROJECTS-\$10,32898 - 158ExxonMobilAspen, CAAspen\$2,640135ExxonMobilKearl, CAKearl Phase 3 (Debottleneck)\$5,292127ExxonMobilKearl, CAKearl Phase 3 (Debottleneck)\$552107 - 165Gulfport EnergyMay River (Whitesands), CAMay River Phase 1 & 2, May River Phase 3 - 4-5\$574120 - 3165Gulfport EnergyMay River (Whitesands), CASurrise phase 28\$4,312152Husky EnergySunrise, CASurrise phase 28\$4,312152Husky EnergyTOTAL ALL PROJECTS-\$4,312152Imperial Oil (Public traded part)Aspen, CAAspen\$1,153135Imperial Oil (Public traded part)Kearl, CAKearl Phase 3 (Debottleneck)\$1,432107 - 165Imperial Oil (Public traded part)Syncrude Mildred Lake Oil Mining, CASyncrude Stage 4 (Aurora South)\$1,432107 - 165Imperial Oil (Public traded part)Kearl, CAKearl Phase 3 (Debottleneck)\$1,432107 - 165Inperial Oil (Public traded part)Syncrude Stage 4 (Aurora South)\$1,632107 - 165Inperial Oil (Public traded part)TOTAL ALL PROJECTS-\$619147 - >165Inperial Oil (Public traded part)TOTAL ALL PROJECTS-\$619147 - >165Inperial Oil (Public traded part)TOTAL ALL PROJECTS-\$619107 - 16	ConocoPhillips	,			
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Mining, CASyncrude Stage 4 (Aurora South)Imperial Oil (Public traded part)TOTAL ALL PROJECTS-\$2,839107 - 165InpexJoslyn, CAJoslyn (Deer Creek) Mine Phase 1 (North), Joslyn (Deer Creek) SAGD Phase 2\$619147 - >165InpexTOTAL ALL PROJECTS-\$619147 - >165JX Nippon Oil and GasSyncrude Mildred Lake Oil Syncrude Mildred Lake and Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora South)\$169107 - 165JX Nippon Oil and GasTOTAL ALL PROJECTS-\$169107 - 165Laricina EnergyGermain, CAGermain Phase 2, Germain Phase 3, Germain Phase 4\$7,858114 - 128Laricina EnergySaleski Laricina, CASaleski Laricina Phase 2, Saleski Laricina Phase 3, Saleski\$6,166130 - 142Laricina Phase 4Saleski Laricina Phase 4\$6,166130 - 142147 - 218		,			
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InpexJoslyn, CAJoslyn (Deer Creek) Mine Phase 1 (North), Joslyn (Deer Creek) SAGD Phase 2\$619147 - >165InpexTOTAL ALL PROJECTS-\$619147 - >165JX Nippon Oil and GasSyncrude Mildred Lake Oil Mining, CASyncrude Mildred Lake and Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora South)\$169107 - 165JX Nippon Oil and GasTOTAL ALL PROJECTS-\$169107 - 165JX Nippon Oil and GasTOTAL ALL PROJECTS-\$169107 - 165Laricina EnergyGermain, CAGermain Phase 2, Germain Phase 3, Germain Phase 4\$7,858114 - 128Laricina EnergySaleski Laricina, CASaleski Laricina Phase 2, Saleski Laricina Phase 3, Saleski\$6,166130 - 142Laricina Phase 4Saleski Laricina Phase 4\$6,166130 - 142147 - >165	Imperial Oil (Public traded part)		-	\$2,839	107 - 165
InpexTOTAL ALL PROJECTS-\$619147 - >165JX Nippon Oil and GasSyncrude Mildred Lake Oil Mining, CASyncrude Mildred Lake and Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora South)\$169107 - 165JX Nippon Oil and GasTOTAL ALL PROJECTS-\$169107 - 165Laricina EnergyGermain, CAGermain Phase 2, Germain Phase 3, Germain Phase 4\$7,858114 - 128Laricina EnergySaleski Laricina, CASaleski Laricina Phase 2, Saleski Laricina Phase 3, Saleski\$6,166130 - 142Laricina Phase 4\$7\$120 - 142140 - 142\$100 - 142	Inpex				147 - >165
Mining, CASyncrude Stage 4 (Aurora South)JX Nippon Oil and GasTOTAL ALL PROJECTS-\$169107 - 165Laricina EnergyGermain, CAGermain Phase 2, Germain Phase 3, Germain Phase 4\$7,858114 - 128Laricina EnergySaleski Laricina, CASaleski Laricina Phase 2, Saleski Laricina Phase 3, Saleski\$6,166130 - 142Laricina Phase 4Laricina Phase 4\$4	Inpex	TOTAL ALL PROJECTS		\$619	147 - >165
Laricina EnergyGermain, CAGermain Phase 2, Germain Phase 3, Germain Phase 4\$7,858114 - 128Laricina EnergySaleski Laricina, CASaleski Laricina Phase 2, Saleski Laricina Phase 3, Saleski\$6,166130 - 142Laricina Phase 4	JX Nippon Oil and Gas			\$169	107 - 165
Laricina EnergySaleski Laricina, CASaleski Laricina Phase 2, Saleski Laricina Phase 3, Saleski\$6,166130 - 142Laricina Phase 4	JX Nippon Oil and Gas	TOTAL ALL PROJECTS	-	\$169	107 - 165
Laricina Phase 4	Laricina Energy				
Laricina Energy TOTAL ALL PROJECTS - \$14,024 114 - 142	Laricina Energy	Saleski Laricina, CA			
	Laricina Energy	TOTAL ALL PROJECTS	-	\$14,024	114 - 142

Source: Rystad, CTI

#### 13 | Oil Sands Fact Sheets

<sup>5</sup> http://business.financialpost.com/2014/02/12/shell-halts-work-on-pierre-river-oil-sands-mine-in-northern-alberta/?\_\_\_\_\_ lsa=f7aa-12c2

<sup>6</sup> http://www.theglobeandmail.com/report-on-business/joslyn/article18914681/

<sup>7</sup> http://business.financialpost.com/2013/11/07/total-sa-seeking-to-upsize-flagship-joslyn-oil-sands-mine-in-alberta/?\_\_\_

lsa=f7aa-12c2

<sup>8 &</sup>lt;u>http://www.statoil.com/en/NewsAndMedia/News/2014/Pages/25Sept\_CornerPostponement.aspx</u>

<sup>10</sup> http://www.albertaoilmagazine.com/2014/03/economic-ruins-suncor-voyageur/

<sup>11</sup> http://business.financialpost.com/2014/07/09/sinopec-may-back-away-from-northern-lights-oil-sands-lease-source/?\_\_\_

			Company	Required market
			share of 2014-	price for
Company	Project Name	Phase	2025 capex (\$m)	sanction (\$/bbl)
Marathon Oil	Athabasca Oil Sands Project, CA	Jackpine Extension, Jackpine Phase 1B, Muskeg River Mine Expansion and Debottlenecking	\$5,761	104 - 123
Marathon Oil	TOTAL ALL PROJECTS	-	\$5,761	104 - 123
MEG Energy	Christina Lake Regional	Christina Lake MEG Phase 3C	\$3,472	102
	project, CA		40.000	
MEG Energy	Surmont Oil Sands project, CA	Surmont MEG Energy	\$3,668	145
MEG Energy Murphy Oil	TOTAL ALL PROJECTS Syncrude Mildred Lake Oil	- Syncrude Mildred Lake and Aurora Stage 3 Debottlenecking,	<b>\$7,139</b> \$169	<b>102 - 145</b> 107 - 165
	Mining, CA	Syncrude Stage 4 (Aurora South)	\$105	107 - 105
Murphy Oil	TOTAL ALL PROJECTS	-	\$169	107 - 165
OSUM	Saleski Laricina, CA	Saleski Laricina Phase 2, Saleski Laricina Phase 3, Saleski Laricina Phase 4	\$4,111	130 - 142
OSUM	Sepiko Kesik, CA	Sepiko Kesik Phase 1, Sepiko Kesik Phase 2	\$2,763	150 - 161
OSUM	Taiga Project, CA	Taiga/Marie Lake (Cold Lake OSUM) Phase 1, Taiga/Marie Lake (Cold Lake OSUM) Phase 2	\$2,717	135 - >165
OSUM	TOTAL ALL PROJECTS		\$9,590	130 - >165
Other partner(s) CA	May River (Whitesands), CA	May River Phase 1 & 2, May River Phase 3-4-5	\$1,722	120 - >165
Other partner(s) CA	TOTAL ALL PROJECTS	-	\$1,722	120 - >165
Оху	Joslyn, CA	Joslyn (Deer Creek) Mine Phase 1 (North), Joslyn (Deer Creek) SAGD Phase 2	\$928	147 - >165
Оху	TOTAL ALL PROJECTS	-	\$928	147 - >165
Paramount Resources	Hoole, CA	Hoole Phase 2_Cavalier Energy, Hoole Phase 3_Cavalier Energy	\$2,948	114 - 127
Paramount Resources	TOTAL ALL PROJECTS	-	\$2,948	114 - 127
PetroChina	Dover JV, CA	Dover North Phase 2, Dover South Phase 3, Dover South Phase 4, Dover South Phase 5	\$10,802	135 - 153
PetroChina	MacKay River, CA	MacKay River Phase 2_Petrochina, MacKay River Phase 3_Petrochina	\$6,597	98 - 119
PetroChina	TOTAL ALL PROJECTS	-	\$17,399	98 - 153
PTTEP (Thailand)	Kai Kos Dehseh, CA	Kai Kos Dehseh North Hangingstone, Kai Kos Dehseh South Leismer, Kai Kos Dehseh Thornbury, Kai Kos Dehseh West Thornbury	\$7,928	106 - 144
PTTEP (Thailand)	TOTAL ALL PROJECTS		\$7,928	106 - 144
Shell	Athabasca Oil Sands Project, CA	Jackpine Extension, Jackpine Phase 1B, Muskeg River Mine Expansion and Debottlenecking	\$17,282	104 - 123
Shell	Carmon Creek, CA	Carmon Creek Phase 2	\$4,089	138
Shell	TOTAL ALL PROJECTS	-	\$21,370	104 - 138
Sinopec Group (parent)	Syncrude Mildred Lake Oil Mining, CA	Syncrude Mildred Lake and Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora South)	\$306	107 - 165
Sinopec Group (parent)	TOTAL ALL PROJECTS	-	\$306	107 - 165
Statoil	Kai Kos Dehseh, CA	Kai Kos Dehseh Corner Expansion, Kai Kos Dehseh Corner	\$5,928	110 - 129
Statoil Suncor Energy	TOTAL ALL PROJECTS Firebag, CA	- Firebag Phase 5, Firebag Phase 6, Firebag Stages 3-6	<b>\$5,928</b> \$15,855	<b>110 - 129</b> 101 - 142
Suncor Energy	Joslyn, CA	Debottleneck Joslyn (Deer Creek) Mine Phase 1 (North), Joslyn (Deer Creek) SAGD Phase 2	\$2,274	147 - >165
Suncor Energy	MacKay River, CA	MacKay River Phase 2	\$3,679	115
Suncor Energy	Syncrude Mildred Lake Oil Mining, CA	Syncrude Mildred Lake and Aurora Stage 3 Debottlenecking, Syncrude Stage 4 (Aurora South)	\$406	107 - 165
Suncor Energy	TOTAL ALL PROJECTS	-	\$22,213	101 - >165
Sunshine Oilsands	Sunshine Thickwood, CA	Sunshine Thickwood Phase A1, Sunshine Thickwood Phase A2, Sunshine Thickwood Phase B	\$5,735	95 - 124
Sunshine Oilsands	West Ells, CA	West Ells Phase A3, West Ells Phase B, West Ells Phase C	\$2,595	121 - 139
Sunshine Oilsands	TOTAL ALL PROJECTS	-	\$8,331	95 - 139
Teck Resources Limited	Frontier, CA	Fontier Phase 4 Equinox, Frontier Phase 1, Frontier Phase 2, Frontier Phase 3	\$5,102	134 - >165
Teck Resources Limited	TOTAL ALL PROJECTS	-	\$5,102	134 - >165
Total	Joslyn, CA	Joslyn (Deer Creek) Mine Phase 1 (North), Joslyn (Deer Creek) SAGD Phase 2	\$2,367	147 - >165
Total	Surmont Oil Sands project, CA		\$2,597	158
Total	TOTAL ALL PROJECTS	-	\$4,964	147 - >165
Value Creation	Advanced Tristar, CA	ATS-1, ATS-2, ATS-3	\$6,470	145 - 149
Value Creation	Terre de Grace, CA	Terre de Grace Phase 1, Terre de Grace Pilot	\$1,044	122 - 145
Value Creation	TOTAL ALL PROJECTS	-	\$7,514	122 - 149

Source: Rystad, CTI



For further information about the Carbon Tracker Initiative please visit our website: www.carbontracker.org

