OILCHANGE INTERNATIONAL

BOLD ALLIANCE

JUNE 2017

REALITY CHECK:
THE END OF GROWTH IN THE TAR SANDS?

KEY FINDINGS:

- **Anticipated tar sands production growth is a legacy from before the 2014 oil price crash. The vast majority still to come on line was sanctioned in 2013.**
- **After those projects are completed in 2020, no new construction activity is planned.**
- **As reserves deplete, it will require substantial spending just to maintain production to a slow decline.**
- **Tar sands production growth depends on sustained oil price recovery that many analysts say is unlikely given changing economic and political conditions.**

CONTEXT

The Alberta tar sands are among the world's largest oil reserves. The sector currently produces upwards of 2.3 million barrels per day between mining and in situ operations. The tar sands are unique both in their high carbon intensity, and the long-lived nature of projects and related infrastructure. Large-scale projects, following high initial capital expenditure (capex), are expected to produce for multiple decades. With the soaring oil price of the last decade, the sector boomed, going from a relatively small operation of a few companies, to one of the world's largest oil production provinces, with massive investment from international oil giants as well as smaller Canadian companies.

This reality has changed dramatically in the last three years. In combination with the precipitous drop in global oil prices since 2014, political and public opposition to new infrastructure (notably pipelines), and increased regulatory stringency have eroded the economic and political climate that promised inevitable growth in the sector. The flight of international oil majors from the sector in recent months is a clear signal of the lack of potential for recovery[1].

There is a tendency among politicians, industry, and opinion leaders to defer to the cyclical nature of the oil market in anticipation of an uptick that will re-open the floodgates of capex. However, a bet on high oil prices appears highly risky. This is due in the short term to oversupply in the market as a result of new oil recovery techniques, and in the mid-term to demand reduction driven by climate regulation and rapid uptake of clean energy alternatives like electric vehicles[2].

The future of oil prices is of course uncertain and hard to predict but at the time of writing, light sweet crude futures for December 2025 were trading at $54[3].

Above: Tailings ponds in the Canadian tar sands. ©Akehurst/Greenpeace

1 http://ca.reuters.com/article/businessNews/idCAKBN17N2CT-OCABS
2 https://www.bloomberg.com/features/2016-ev-oil-crisis/
3 http://www.cmegroup.com/trading/energy/crude-oil/light-sweet-crude.html Accessed 6/6/2017 Prior settle price for Dec. 2025 was $53.84

ANALYSIS[4]

No new growth: Table 1 shows the projects that start production after 2015, showing the approval year, start-up year and nameplate capacity[5]. 89% of the capacity additions were sanctioned before 2014[6]. Only one project was approved in 2015 and two in 2016, the largest of which is a brownfield capacity addition to a long-running existing project that can be considered an unusually low-cost outlier compared to other brownfield projects (Christina Lake Phase G).

Table 1: Tar sands projects that start production after 2015[7]

Project Phase	Approval Year	Start-Up Year	Installed Capacity	Sub-total
Sunrise Phase 1	2010	2015	60,000	
Surmont Phase 2	2010	2015	118,000	
Black Gold Phase 1	2010	2018	10,000	
Kearl Phase 2	2011	2015	110,000	
Cold Lake Phases 14-16: Nabiye	2012	2015	40,000	
Hangingstone AOSC Phase 1	2012	2015	12,000	
Long Lake Phase 2 (Kinosis 1A)	2012	2015	20,000	
Hangingstone JACOS Expansion	2012	2017	20,000	
MacKay River Phase 1_Petrochina	2012	2017	35,000	
Narrows Lake Phase A	2012	2020	45,000	
West Ells Phase A1	2012	2020	5,000	
Lindbergh Phase 1_Pengrowth	2013	2015	11,240	
Christina Lake Cenovus Energy ConocoPhillips Phase 1F	2013	2016	50,000	
Foster Creek Phase G	2013	2016	30,000	
Horizon Phase 2B	2013	2016	45,000	
Fort Hills Phase 1	2013	2017	160,000	
Horizon Phase 3	2013	2017	80,000	
Foster Creek Phase H	2013	2020	30,000	
West Ells Phase A2	2013	2020	5,000	
Kirby North CNR Phase 1	2014	2020	40,000	926,240
Christina Lake Cenovus Energy ConocoPhillips Optimization (Phases CDE)	2015	2015	25,000	
Lindbergh Phase 1 Optimization_Pengrowth	2016	2017	3,500	
Christina Lake Cenovus Energy ConocoPhilips Phase G (North)	2016	2019	40,000	68,500
Grand Total				994,740

4 Analysis is based on data from Rystad Energy AS UCube, June 2017, unless otherwise noted.
5 Nameplate Capacity from AER, Alberta Oil Sands Industry: Quarterly Update. Spring 2017.
6 By 'sanctioned' we mean that a final investment decision (FID) to construct a project was made by the company. Approval year is the year in which FID took place. Start-up year is the year in which first production is expected to or has occurred. Note that projects take an average of four years to reach full production capacity. Also note that many projects rarely operate at full capacity and at any given time production in the tar sands sector is on average at least 20 percent below installed capacity.
7 Data sourced from Rystad UCube, June 2017 and the Alberta Energy Regulator's Oil Sands Update, spring 2017.

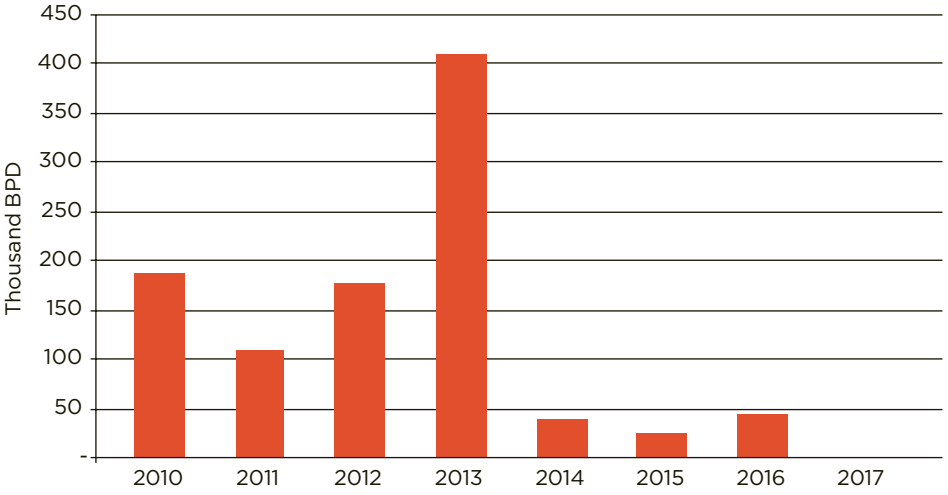
Figure 1 (right) charts the data in Table 1, clearly illustrating the steep decline in project approvals since 2013. Note that in 2017, no new capacity has been approved to date.

The decline in capex in new production: Figure 2 shows the annual capital expenditure (capex) spent on developing new tar sands production capacity since 2000. Projected capex beyond 2016 only includes investment in projects that have already been approved, i.e. the projects shown in Table 1. The capex counted here is only that which is spent up to the point the project begins first production. The tar sands is unusual in the oil and gas sector in that capex continues to be spent on bringing production up to full capacity long after production begins. Therefore, the capex shown in Figure 2 is only that spent on bringing new projects to first production. This capex will end in 2019 unless new projects are sanctioned.

Figure 3 shows the total capex spent in the tar sands including capex spent before and after production starts and on maintaining production at ongoing projects. This maintenance capex may be spent on, for example, drilling new wells at in situ projects within existing project boundaries (infill) in order to replace spent wells and maintain production. The capex shown after 2019 in this chart is to be spent on raising production rates at projects that have already started production and maintaining those production rates. In real (2017) USD, capex declines from $9.2 billion in 2017 to around $7.5 billion in 2019 and 2020. It then rises in the early 2020s, flattening out in the latter half of the decade at around $9.3 billion. During this time, production grows slowly through to 2023, then plateaus and declines slightly after 2025[8].

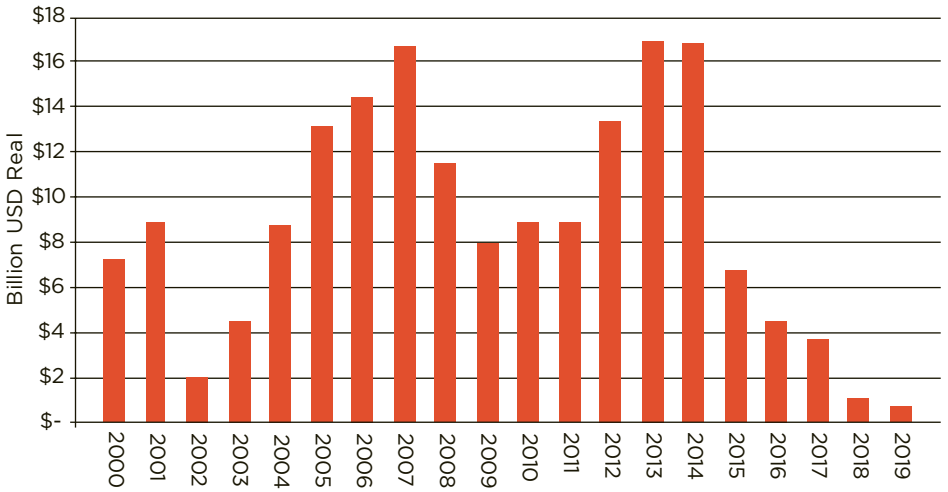
High expenditure to maintain production: But the capex needed to maintain production is, of course, not the only expenditure required to keep production going. Operational expenditure (opex), which pays salaries, fuel and other supplies, processing, maintenance, and transport costs, is the main expense of continued production.

Figure 1: Tar sands capacity additions by approval year



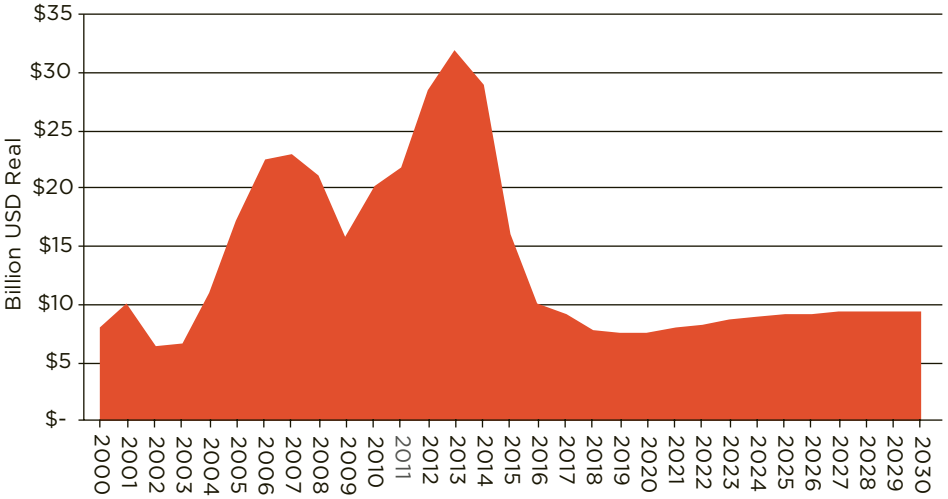
Source: Rystad UCube

Figure 2: Tar sands capex in new project construction/development



Source: Rystad UCube

Figure 3: Total tar sands capex (approved projects) between 2000-2030.



Source: Rystad UCube

8 Note that in querying the Rystad UCube database, we only allowed projects that have been approved to date to be counted in the future projection of capex. Commonly cited projections for capex and production in the oil sands (CAPP, IEA, EIA, AER etc.) assume new approvals will occur in line with an expectation of rising oil prices. We do not make that assumption in this projection in order to show the state of play today given the current project approvals. This is because as of today, there is very little clear commitment to production growth beyond that which was approved prior to the oil price crash in 2014.

Figure 4 (right) shows that opex is projected to rise from $19.5 billion to $23.2 billion between 2020 and 2030. This figure also shows that the total cost of maintaining the currently operational and sanctioned production capacity will rise to $32.6 billion by 2030.

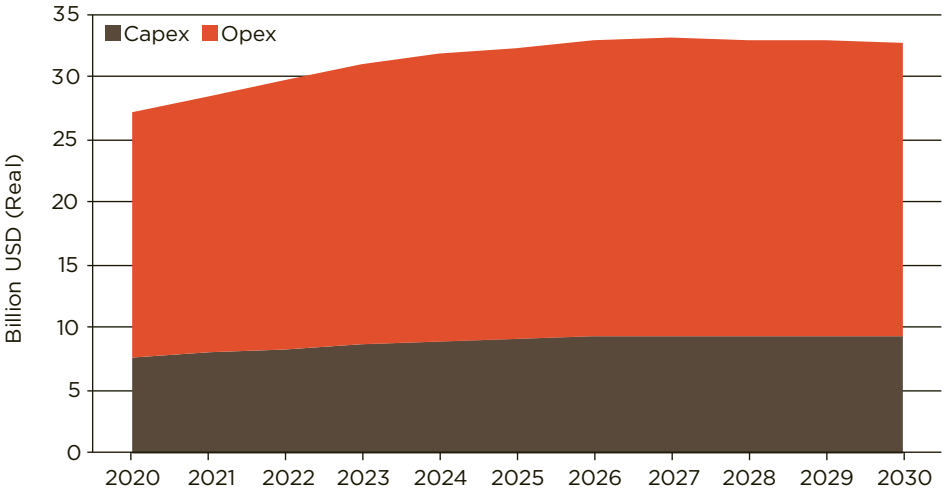
Further, as Figure 5 shows, despite this investment, production at the currently approved projects will start to decline from the mid-2020s as reserves deplete. Therefore, for production to grow, new capacity will need to more than make up for depletion at existing projects even as billions are spent at those same projects.

Economic and political conditions unlikely to favor major re-injection of capital: It's clear that production will continue to grow while the remaining under-construction projects are completed through 2020, and their production ramps up through 2025. For production to grow beyond that which is already committed, oil prices will need to rise substantially beyond current expectations. While costs have been cut from the highs of the pre-2015 boom, there remains a significant way to go before any projects can justify approval to move forward.

Figure 6 (right) indicates that no significant growth in the sector can be expected unless prices reach $70-75 USD per barrel[9]. The most substantial growth would only come at $75-80. However, companies will only develop projects if they expect prices to be sustained at that level for the 20-25 years required for the projects to break even. Small developments may occur at prices of $60-70, but well below previous growth rates in the tar sands, and not sufficient to fill even one new pipeline[10].

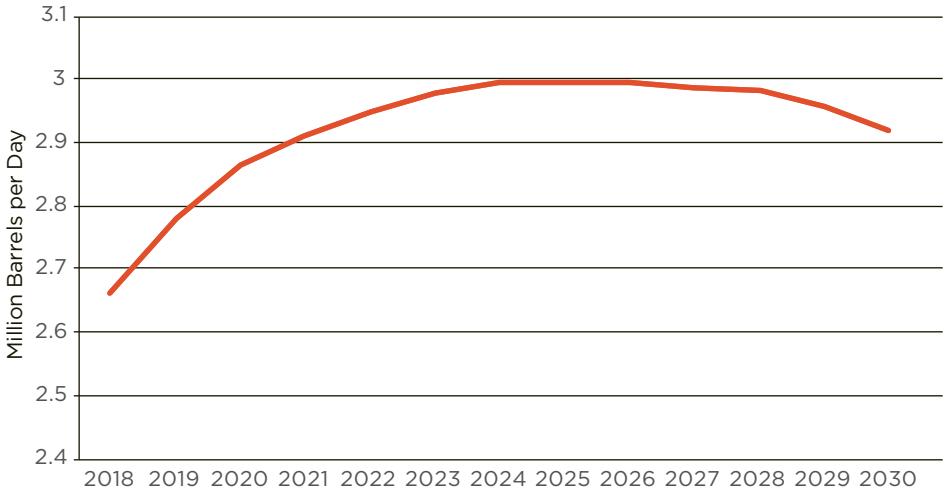
The future of oil prices is of course uncertain, but there are good reasons to believe prices may not be sustained at that level (barring war in the Middle East, for example). At the time of writing, WTI Futures for December 2025 were trading at $54 per barrel[11]. While futures prices do vary, this is the price financial institutions are currently betting on, and those who count on a return to growth in the tar sands will be betting against them.

Figure 4: Expenditure to maintain tar sands production capacity



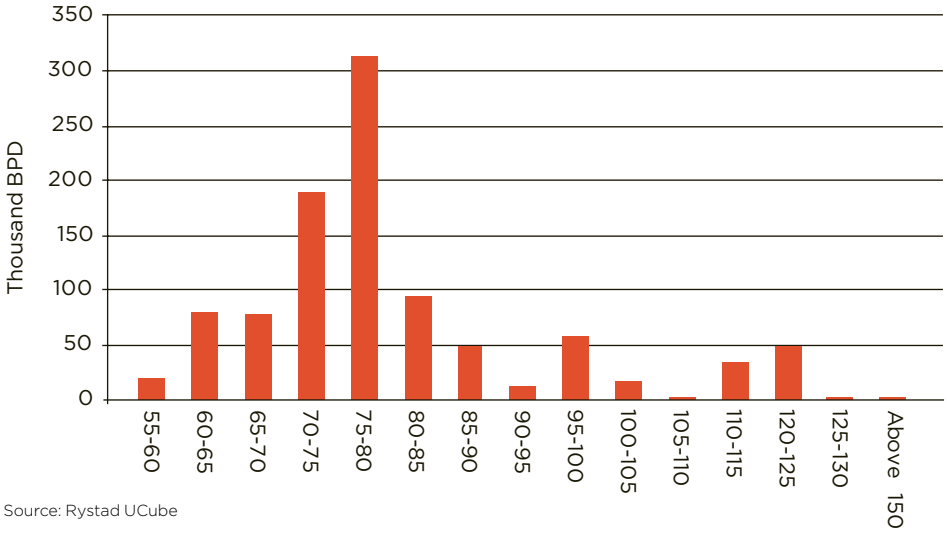
Source: Rystad UCube

Figure 5: Projected production at approved tar sands projects



Source: Rystad UCube

Figure 6: Breakeven price requirements for tar sands projects (2030 production point)



Source: Rystad UCube

9 These breakeven prices also assume the construction of major pipeline infrastructure, including Line 3 as well as one of the other major pipelines currently being debated. In the absence of major new pipeline capacity (if the Kinder Morgan and Keystone XL pipelines are blocked by legal, political or financial obstacles), breakeven prices would rise by about $20 per barrel. See http://www.greenpeace.org.uk/sites/files/gpuk/FlawedFundamentalsTarSands.pdf

10 At prices below $70, only around 170,000 bpd can be expected by 2030. The Kinder Morgan expansion pipeline has capacity of 590,000 bpd and Keystone XL 830,000 bpd. Analysis using our Integrated North American Pipeline model (INAP) shows that current pipeline capacity is sufficient for existing and under construction production. See http://priceofoil.org/content/uploads/2016/10/cappmath-biefing-final-v3.pdf

11 http://www.cmegroup.com/trading/energy/crude-oil/west-texas-intermediate-wti-crude-oil-calendar-swap-futures.html Accessed 6/6/2017 Prior settle price for Dec. 2025 was $53.84

Seismic lines and a tar sands mine in the Boreal forest north of Fort McMurray, northern Alberta. ©Rezac/Greenpeace

While the growth in tar sands was driven by prices above $100 between 2010 and 2014, these were actually historical anomalies. Indeed, after the price crashed, an analyst at Morgan Stanley observed that $50/barrel is in fact close to the average oil price over the last 100 years[12].

Over the next few years, the oil price is likely to be determined by US shale production, which has effectively become the swing producer. Any increase in prices (due to OPEC policy or supply disruptions) would likely enable more shale production, which would in turn bring prices back down to its own marginal cost, believed to be around $50-55[13]. In light of this dynamic, Goldman Sachs expects oil prices to stabilize around $55 over the long term[14].

Moving into the 2020s, we can expect downward pressure on oil prices due to market disruption from electric vehicle technology, rapidly improving vehicle fuel efficiency, regulatory measures to address climate change and the increased adoption of ridesharing and autonomous vehicle technology[15].

Oil industry commentators are increasingly talking about demand for oil peaking at some point in the 2020s. Shell's Chief Financial Officer Simon Henry has said he expects oil demand to peak within the next five to fifteen years[16]. Even OPEC expects oil demand to peak in 2029, if governments' Paris emissions reductions commitments are met[17]. In response to the recent U.S. withdrawal, major emitters like China and Europe are only strengthening their resolve and ambition[18]. Financial and political leaders are clear that they expect the transition to clean energy is now unstoppable[19].

Recent research from the Carbon Tracker Initiative and the Imperial College of London shows that by the mid- 2020s electric vehicles could reduce global oil demand on the same scale as the oversupply that drove the oil price crash in 2014 - illustrating the potential for massive market disruption by EVs[20]. EVs are undoubtedly in the exponential phase of a technological growth S-curve, and while their rate of growth is debated, if EVs continue to grow rapidly, they could end the growth in demand, and put downward pressure on prices. Incumbent auto manufacturers themselves are starting this shift: "The future is electric," says GM, the world's third largest car manufacturer[21]. VW, the equal largest, aims for 20-25 percent of its production to be all-electric by 2025[22].

12 https://www.bloomberg.com/news/2015-01-16/welcome-to-normal-crude-oil-price-trading-at-100-year-average.html/
13 https://www.ft.com/content/0a7a817a-4863-11e6-8d68-72e9211e86ab https://www.federalreserve.gov/econresdata/notes/feds-notes/2016/unraveling-the-oil-conundrum-productivity-improvements-and-cost-declines-in-the-us-shale-oil-industry-20160322.html http://www.marketwatch.com/story/why-50-is-the-new-ceiling-for-crude-oil-prices-2016-06-01
14 https://www.forbes.com/sites/jeffmcmahon/2017/05/25/fracking-now-the-dominant-oil-technology-will-stabilize-prices-around-55-goldman-sachs/#6f87d4a182d3 http://oilprice.com/Energy/Oil-Prices/Goldman-Sachs-Sees-Long-term-Oil-Prices-Below-60.html
15 https://www.bloomberg.com/features/2016-ev-oil-crisis/
16 https://www.bloomberg.com/news/articles/2016-11-02/europe-s-biggest-oil-company-thinks-demand-may-peak-in-5-years
17 https://www.ft.com/content/3f007354-a507-11e6-8898-79a99e2a4de6
18 https://www.theguardian.com/environment/2017/may/31/china-eu-climate-lead-paris-agreement
19 https://www.ft.com/content/71a43384-4707-11e7-8d27-59b4dd6296b8
20 http://www.carbontracker.org/in-the-media/no-growth-for-oil-and-coal-from-2020-as-electric-cars-and-solar-blossom/
21 https://www.usatoday.com/story/money/cars/2015/05/07/general-motors-electric-car-futures/70957296/
22 http://www.bbc.co.uk/news/business-36548893

IMPLICATIONS

This analysis has significant implications for ongoing political and financial discussions in Canada as well as for pipeline permitting processes in the United States. Among them are:

- **Pipelines: current pipeline capacity is sufficient for existing and under construction production[23]. New pipelines assume increased production levels that, as shown above, are not on the books.**
- **Climate and just transition: Canada is currently grappling with meeting its Paris climate goals. Recognising that there is no new growth planned for the sector provides an important political incentive to plan for the sector's inevitable decline in line with safe climate limits[24]. A diversification plan is critical to minimise risks for workers, communities and governments, while maximising benefits of the transition.**
- **Economic planning and financial decision making: budget and investment decisions are being made on the misplaced assumption that the sector will rebound into growth. This carries huge risks for governments and investors.**

The political and economic ramifications of no new growth in the sector should not be overlooked because of a misplaced faith in rising oil prices. By recognising the current conditions, political decision-makers and industry have an opportunity to prepare and manage the no-new-growth scenario such that it minimises impacts on communities, jobs, and provincial and federal budgets.

Shell Albian Sands tar sands mine and tailings pond in the Boreal forest. ©Rezac/Greenpeace

OIL CHANGE INTERNATIONAL

Oil Change International is a research, communications, and advocacy organization focused on exposing the true costs of fossil fuels and facilitating the coming transition towards clean energy.
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BOLD ALLIANCE

The Bold Alliance is a network of small but mighty groups protecting land and water.
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23 http://priceofoil.org/2017/01/19/climate-on-the-line-why-new-tar-sands-pipelines-are-incompatible-with-the-paris-goals/
24 http://priceofoil.org/content/uploads/2016/09/OCI_the_skys_limit_2016_FINAL_2.pdf