



# GETTING TO MARKET: EMERGING INVESTOR RISKS IN THE TAR SANDS

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Cover photo: Gas and Oil Pipeline Construction in the Lower Mainland, BC, Canada. © Lloyd Sutton / Alamy

Photo, p.2: Aerial view of Petro-Canada Sag-D site, a crown corporation of Canada in the field of oil and natural gas retained by Suncor Energy, in the Boreal forest north of Fort McMurray, northern Alberta.  
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Photo, p. 5: A view of the clean up operations at the Rainbow Pipeline oil spill, the worst in Alberta for 35 years, dumping 28,000 barrels of oil into a wetland area at Evi, near the community of Little Buffalo in Lubicon Cree, First Nation traditional territory in the Peace River region. The Rainbow Pipeline is owned by a Canadian subsidiary of Houston-based Plains All American Pipeline. © Greenpeace / Rogu Collecti

# SUMMARY

The Keystone XL pipeline, if it is built, could provide this access as it would bring tar sands crude to the world's largest concentration of complex refining capacity; the U.S. Gulf Coast. But the pipeline's future is now seriously threatened. The recently announced permitting delay potentially undermines its viability. This latest delay, coupled with emerging options for sourcing the heavy oil Gulf Coast refiners seek, reduces the incentive for refiners to stay committed to the project. Competing pipeline projects can relieve the glut at Cushing far sooner than Keystone XL ever will.

Other pipeline proposals, to the west and east coasts, also face major obstacles. Alternative solutions such as rail and barge can provide only incremental relief.

While it seems unlikely that all of these options will fail, the challenges they face may delay and disrupt the tar sands industry's ambitious schedule for growth. Keystone XL is already two years behind its original schedule and now faces a further delay of 12-18 months before construction can begin.

A further concern for tar sands producers are new sources of oil that were not on the horizon until recently. The tight oil boom in the U.S. diminishes the incentive to invest in any further complex refining upgrades in the traditional market for tar sands oil, the U.S. Midwest. Tar sands oil is now in competition with this growing source of domestic light sweet crude for pipeline and refinery access.

Meanwhile growing heavy oil supplies from Latin America and beyond are reducing the incentive for gulf coast refiners to remain committed to a Canadian oil supply. Adding to refiner's anxiety over dependence on Canadian heavy oil is the emerging possibility of legislation in Europe that may restrict products derived from tar sands oil into the European market. The Fuel Quality Directive in Europe may prove to be a disincentive for increasing tar sands oil processing for Gulf Coast refiners increasingly focused on diesel exports to Europe.

International oil companies have become significantly reliant on Canadian tar sands for their future growth. The resource constitutes the biggest single liquids component in the long term reserves of many of them. To achieve the production growth that would monetize these reserves will require all the currently proposed pipelines and more. Such is the size of the resource and the limitations of the regional market. Tar sands must access the open ocean to grow. Building enough pipeline capacity to deep water ports may turn out to be the greatest challenge facing tar sands production growth.

Tar sands extraction projects are moving forward with increasing pace. The industry ambition is to grow production from today's level 37 percent by 2015 and an extraordinary 138 percent by 2025. Environmental constraints to this ambition are a concern, particularly greenhouse gas emissions and water. Other constraints include intense labor, equipment and services inflation in the region.

However, an emerging and fundamental constraint now threatens tar sands production growth more directly than any of the above. Currently accessible markets for tar sands crude oil are becoming saturated and pipeline projects that would enable penetration of new markets are facing unprecedented delay and possible failure. It is the timely development of midstream infrastructure that could be the undoing of the industry's lofty ambitions.

The specific properties of tar sands crude require it to either be upgraded to synthetic oil in an upgrader before being refined into products – as was predominately the case until recently – or it is diluted with lighter liquids in order to be transported to specially equipped ('complex') refineries that can handle the heavy sour crude. Since the 2008 recession, the building of new upgrading capacity in Canada has slowed substantially. Additional tar sands production is increasingly processed in complex U.S. refineries equipped to handle the diluted heavy sour product.

New pipelines into the Midwest have overwhelmed complex refining capacity in the region, and while refinery upgrades due to come on stream over the next two years will return some balance, saturation is expected to return by 2015 if other markets are not opened up.







# INTRODUCTION

A return to growth in the world economy and high oil prices spurred a new wave of growth for the tar sands industry in 2010. Many of the extraction projects shelved during the 2008-9 financial crisis are moving forward while upgraders generally remain on hold or cancelled. But when it comes to realizing the vast reserves that many companies have invested in, there remain many headwinds.

Cost inflation remains an issue<sup>1</sup>. This is concentrated in the labor, equipment and services markets as the construction boom in Alberta's remote hinterlands pushes up against limits. Low North American natural gas prices counter this to some extent by easing operating costs.

The environmental impacts of tar sands production continue to haunt the industry. Despite claims of improved performance, and the move to in situ production implying less habitat destruction than mining, the sector has become the pariah of the energy industry in North America and beyond. The pariah status of tar sands production is at the root of the issues discussed in this brief.

In this briefing, we will detail how this low social acceptance is placing formidable barriers to a key component of the tar sands complex. Pipeline projects, fundamentally crucial to the growth ambitions of the industry, are facing unprecedented battles for approval. The industry's aggressive growth plans are seriously threatened by these battles, dramatically slowing and possibly curtailing the industry's ambitious trajectory.

Investors should take a critical look at the long term dependence on tar sands of the companies they are invested in and consider whether companies have overemphasized this resource in light of the limitations the issues discussed in this report present.



Gas and Oil Pipeline Construction in the Lower Mainland, BC, Canada.  
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# TAR SANDS PRODUCTION GROWTH: THE AMBITION

Tar sands production enjoyed vigorous growth in the early to mid-2000s. The 2008 recession and the drop in oil prices that followed saw a dramatic slump, and most projects that had not yet broken ground were shelved. Of the two million barrels a day (Mbd) of non-OPEC production capacity that was deferred or cancelled in this period, a full 1.7 Mbd – 85% – were Canadian tar sands projects<sup>2</sup>.

However, since the end of 2009 and the return of oil prices sustaining comfortably above \$70 per barrel many of these projects have restarted, with some of them reconfigured into more manageable phases.

The supply of upgraded and diluted tar sands product to markets<sup>3</sup> has grown 31 percent since 2008. The Canadian Association of Petroleum Producers (CAPP) forecasts growth of 37.5 percent to 2015 and an ambitious 138 percent by 2025 (see Table 1).

## MARKET ACCESS IS KEY

Alberta’s former energy minister, Ron Liepert, told the Financial Times in September that “(b)y 2020, we may need three Keystones”<sup>6</sup>. He suggested that Canada will need more than one pipeline to the US Gulf Coast and that “*Alberta could be producing 4m to 5m barrels a day (b/d) from the oil sands and other fields (...) but it needs more pipeline capacity to export to the US and world markets*”<sup>7</sup>.

But the specific properties of tar sands crude require it to either be upgraded to synthetic oil (syncrude) in an upgrader before being refined into products – as was predominately the case until recently – or it must be diluted with lighter

liquids in order to be transported by pipeline to specially equipped (‘complex’) refineries that can handle the heavy sour crude. This means that pipeline infrastructure has to be matched with appropriate refining capacity.

Since the 2008 recession, the building of new upgrading capacity in Canada has slowed almost to a halt. Only around 65,000 barrels per day (bpd) of new upgrading capacity is expected to be created in Alberta in the next few years (see Box 1). Additional tar sands production is increasingly processed in complex refineries in the U.S., equipped to handle the diluted bitumen (dilbit).

Surging production and new pipelines from Alberta into the U.S. Midwest have overwhelmed complex refining capacity in the region. The resulting buildup of Canadian crude at Cushing, Oklahoma is depressing oil prices in the Midwest and frustrating producers of Canadian and U.S. crude alike<sup>8</sup>.

Refinery upgrades due to come on stream over the next two years will return some balance to the situation in the Midwest but saturation is expected to return by 2015<sup>9</sup>. In light of the latest delay to Keystone XL, Jackie Forest, IHS CERA’s oil sands dialogue senior director, told the Oil and Gas Journal that “(b)y 2015, without new pipeline solutions to bring oil sands barrels to markets outside the Midwest (...) oil sands production growth could stall for lack of new demand.”<sup>10</sup>

With Canadian demand stagnant and Midwest capacity full, tar sands production needs to break out from its landlocked disposition. This is of course the strategy behind a number of pipeline projects, primarily TransCanada’s Keystone XL project and Enbridge’s Northern Gateway, among others. But can they be executed in time to accommodate the surge in production being planned by dozens of tar sands producers? And over the long term, can other pipelines be built to accommodate ever greater production?

**Table 1: Tar sands production growth 2008-2025**

Tar Sands Supply Growth <sup>4</sup>	2008	2011f	2015f	2025f
000 b/d	1,473	1,927	2,650	4,591
Percentage growth (to and from 2011)	-	31%	37.5%	138%

f = forecast. Source: Canadian Association of Petroleum Producers.<sup>5</sup>

## BOX 1: LANDLOCKED TAR SANDS

Pipelines out of Alberta generally lead to Canadian markets and the U.S. Midwest. One exception is the Kinder Morgan Trans-Mountain pipeline, which delivers 300,000 barrels per day (bpd) to Vancouver<sup>11</sup>. However, this line carries a mixture of heavy oil, light oil and products and currently delivers only around 80,000 bpd of tar sands crude. There is also the Pegasus Pipeline, a 96,000 bpd link from Illinois to the Gulf Coast operated by ExxonMobil<sup>12</sup>.

While two recently completed pipelines (Alberta Clipper and Keystone) have greatly expanded pipeline capacity into the Midwest, the market for tar sands oil remains constrained by heavy oil refining capacity in that region. IHS CERA expects Midwest heavy oil refining capacity to be saturated by 2015<sup>13</sup>. Our calculations concur with this analysis (see Table 2). Plans for new upgraders or heavy oil refineries in Canada are limited, so production growth relies on accessing heavy oil refining outside of the Midwest.

The industry is therefore focused on building pipeline infrastructure to transport diluted bitumen (dilbit) to new markets. If Keystone XL is not built, alternative solutions such as rail and barge or lines that link Cushing to Texas may not be able to accommodate the forecast level of production growth.

**Table 2: Tar sands refining capacity in the Midwest will be saturated by 2015.**

Tar sands (dilbit) processing capacity	000 b/d
2011 Consumption	655
Bitumen Supply Growth to 2015 (CAPP)	723
Confirmed Refinery Expansions (USA)	470
Confirmed Upgrader/Refinery Expansions (Canada)	65
<b>Shortfall</b>	<b>188</b>

Note: BP/Husky's expansion of the Toledo, Ohio refinery has not been included here as it has not yet received project sanction. If it were to be completed by 2015, the added capacity would still leave a shortfall of 78,000 b/d. Sources: CAPP 2011, Oil Sands Review and Deutsche Bank Global Markets Research reports.

**Table 3: Cancelled Canadian Upgrader Projects**

Company	Project	Capacity	Status
Shell	Scotford 2	391,000	Cancelled
Statoil	Strathcona	217,000	Cancelled
<b>Total</b>	Northern Lights	101,200	Cancelled
<b>Total</b>	Strathcona	271,000	Cancelled
<b>Value Creation</b>	Heartland	138,000	On hold

**Table 4: Canadian Upgrader projects that may go ahead but won't be operating before 2015**

Company	Project	Capacity	Status	Completion
Nexen	Long Lake (Phases 2-4)	175,500 (combined)	Unknown	TBD
Canadian Natural Resources	Horizon (phases 2B and 3)	125,000 (combined)	NYS	TBD
Suncor	Fort Hills	290,000	NYS	TBD
Suncor	Voyageur 3	127,000	NYS	2016?
<b>Value Creation</b>	Terre de Grace	8,400 (pilot)	NYS	TBD

**Table 5: Canadian Upgrader Projects that may be operating by 2015**

Company	Project	Capacity	Status	Completion
North West & Redwater	Upgrader/Refinery	50,000	NYS	TBD (possibly before 2015)
Canadian Natural Resources	Horizon (Tranche 2)	5,000	Construction	2012
Canadian Natural Resources	Horizon (Phase 2A)	10,000	Approved	2014

Notes: TBD = to be decided, NYS = not yet sanctioned.

Sources: Oil Sands Review November 2011. Except North West & Redwater. Information on this project was sourced from Global Data Financial Deals Tracker, 17 August, 2011. Canadian Natural Resources Forms Venture With North West Upgrading.





**KEY**

- Proposed pipelines
- Existing pipelines
- Refineries
- Oil Storage

**Capacity of existing major crude oil pipelines exiting Alberta.**

Pipeline	Crude Type	Capacity (000s b/d)
Enbridge Mainline	Light	1,069
	Heavy	796
Alberta Clipper	Heavy	450
Express/Platte	Light/Heavy (35/65)	280
TransMountain	Light/Heavy (80/20)	300
Keystone	Light/Heavy (25/75)	591
<b>Total</b>		<b>3,486</b>

Source: CAPP, June 2011, Crude Oil, Forecasts, Markets & Pipelines  
 Note: Many of these pipelines do not carry tar sands crude exclusively. Tar sands crude competes with conventional Canadian crudes and increasingly with US tight oil for space.

**Capacity of proposed tar sands export pipelines**

Pipeline	Capacity (000s b/d)
Northern Gateway	525
TransMountain Expansion	240-400
Keystone XL	700-900
Trailbreaker	50-240
Wrangler	800
Seaway	400
<b>Total</b>	<b>2,715-3,265</b>

Source: CAPP, June 2011 and company websites.  
 Note: Proposals are subject to change and will not necessarily all go ahead.

# KEYSTONE XL

Keystone XL would give tar sands producers access to the biggest pool of heavy oil refinery capacity in the world, the U.S. Gulf Coast (USGC). More than that, it grants tar sands oil access to international markets beyond the U.S. because many USGC refiners are exporting substantial and growing quantities of petroleum products<sup>14</sup>. This provides tar sands producers with the market growth needed to ensure production growth in spite of declining U.S. oil demand.

But the Keystone XL pipeline has proven to be much more difficult to build than initially thought. It was already two years behind schedule and the latest announcement by the State Department suggests a further delay of 12-18 months<sup>15</sup>. It remains far from certain that it can be completed as planned.

## **THE MOUNTING HURDLES: PAST, PRESENT AND FUTURE**

In recent months it will have been hard not to notice the increasing rancor surrounding the Keystone XL pipeline. Over 1200 people were arrested during a two-week sit-in outside the White House during August and September<sup>16</sup>. Nine Nobel Laureates including the Dalai Lama and Bishop Desmond Tutu added their voices to the opposition<sup>17</sup>. In November, over 10,000 people surrounded the White House to urge President Obama to deny the presidential permit<sup>18</sup>. Four days later, on November 10th, the decision to delay permitting in order to seek further information was announced.

The campaign against the proposed 1,700 mile link between Alberta and Texas has catapulted tar sands into the mainstream media like never before. It has become the premier environmental battle in North America for 2011.

The protests are primarily inspired by opposition to the tar sands production growth the pipeline would enable, with its associated increases in greenhouse gas emissions, water pollution and habitat destruction<sup>19</sup>. But the project has also met with localized opposition in the states the pipeline passes through, made significantly stronger by repeated leaks in the existing Keystone pipeline<sup>20</sup> and a major spill on an Enbridge pipeline carrying dilbit through Michigan<sup>21</sup>. Sixteen months on, that spill is proving difficult to remediate<sup>22</sup> raising concerns that the industry is unable to adequately clean up tar sands spills.

The State Department and White House have become the focus of these protests because Keystone XL requires a U.S. Presidential Permit as it crosses an international border. The application was filed in September 2008. TransCanada expected to have permitting done in 2009 and for construction to begin in 2010, with oil flowing to the Gulf Coast in 2012<sup>23</sup>. This schedule has not materialized. With the original completion deadline looming, the State Department has now deferred the decision until the first quarter of 2013.

Problems started when the State Department took until April 2010 to prepare a draft Environmental Impact Statement (EIS). This process led to the adoption of 57 project-specific



special conditions agreed between TransCanada, the State Department and the Pipelines and Hazardous Materials Safety Administration in January 2011<sup>24</sup>.

But the Environmental Protection Agency (EPA) was not satisfied with the EIS and public pressure led to the State Department announcing a Supplemental EIS (SEIS) in April 2011. This document was finalized in August, with the State Department concluding that there are no significant environmental impacts associated with the pipeline. This is something the EPA remains dissatisfied with<sup>25</sup>.

With the publication of the SEIS, the process potentially entered its final stage; a 90-day review period for the National Interest Determination. This was scheduled to end in late November and a final decision from the State Department was expected in December.

However, the State Department came under tremendous pressure following revelations of ‘cozy relationships’ between department staff and TransCanada lobbyists<sup>26</sup>. Additional questions were asked about whether the department’s hiring of consulting firm CardnoEntrix represents a conflict of interest. The firm was hired to conduct the review of the project but also does business with TransCanada. The State Department’s Inspector General opened a ‘special review’ of the project assessment process on November 7th following a letter from 14 Congressional Democrats to President Obama<sup>27</sup>.

The announcement to delay the permit and seek further information cites the controversy over the pipeline route through Nebraska. This raises the question of whether Nebraska might have stopped the project had State approved it, and whether, in effect, it already has.

## **DISSENT IN THE HEARTLANDS: NEBRASKAN LANDOWNERS CHANGE THE GAME**

A strange thing happened in the Memorial Stadium in Lincoln, Nebraska in mid-September. Following a highlights video of the home team’s best moments the 80,000 strong crowd did not cheer, they booed<sup>28</sup>. They weren’t booing the impressive achievements of the Nebraska Cornhuskers. They were booing the appearance of TransCanada’s logo above the words ‘Husker Pipeline’ that appeared on the giant screen at the end of the film. The following week the University of Nebraska-Lincoln athletic department ended the sponsorship agreement with TransCanada after receiving complaints from fans<sup>29</sup>.

TransCanada’s mishandling of Nebraskan landholders, mainly ranchers, is at the heart of this disaffection, along with popular concern that the pipeline threatens a major

source of water for the region and an important source of agricultural production for the nation; the Ogallala Aquifer (see Box 2 on p. 12).

TransCanada has been accused of heavy handedness in Nebraska, threatening landowners with ‘eminent domain’, which is a mechanism used by government for gaining access to land for public use<sup>30</sup>. Between 50 and 70 Nebraskan landowners are refusing to sign easements<sup>31</sup> and the issue moved to the very top of the agenda for the State’s legislature.

Nebraska’s Republican Governor, Dave Heineman, was initially supportive of the pipeline but in a letter to the White House in late August he urged President Obama and Secretary of State Clinton to consider rerouting the project around the Ogallala Aquifer<sup>32</sup>.

On 11 October, TransCanada met with four state legislators including State Speaker, Senator Mike Flood<sup>33</sup>. In that 4.5 hour meeting TransCanada officials refused to consider rerouting arguing that doing so would set the project back another two years. The company’s president for energy and oil pipelines Alex Pourbaix said that such a delay would be ‘unacceptable’ to Texas refiners<sup>34</sup>.

The Nebraskan lawmakers were unconvinced. On October 24th, Governor Dave Heineman called a special session of the Nebraskan legislature to debate a bill on rerouting the pipeline<sup>35</sup>. Five separate bills granting the state powers to reroute pipelines were tabled<sup>36</sup>. Senator Bill Avery, who tabled two of them, told Canadian reporters, *“(t)his issue has generated more public input than any issue I’ve seen in five years.”*<sup>37</sup>

It was the second week of the special session when the State Department’s decision trumped Nebraska’s move. However, at the time of writing it would appear that there is support for the session to continue to work towards a bill that gives Nebraska additional powers to negotiate pipeline routes through the state<sup>38</sup>.

## **CAN THE PROJECT SURVIVE THE DELAY?**

When Pourbaix mentioned in October that further delays would be unacceptable to TransCanada’s customers in Texas, he exposed a very real fear for the company. A rerouting in Nebraska, and the delay it would entail, is potentially a death blow to Keystone XL.

During TransCanada’s third quarter results call in early November, CEO Russ Girling told analysts that *“(s)hipping contracts have sunset clauses that could be triggered by a*

*long delay*”.<sup>39</sup> He continued, “(t)hey’re with us to the extent that we can get through this process in a reasonable time frame. But if the administration delays the project long enough that it becomes a low probability that they will ever get it through in a time frame that meets their needs, they are not going to support us anymore.”<sup>40</sup>

It would appear that the contracts signed between TransCanada and its customers – producers, traders and refiners – are potentially invalidated if oil is not flowing by the end of 2013<sup>41</sup>. With two years needed for construction, work would need to start in early 2012 to stand a chance of meeting these contractual agreements. That is now impossible.

In fact the shipping agreements state that TransCanada should obtain U.S. government approvals by 31 December, 2011<sup>42</sup>. Therefore TransCanada is now in the unenviable position of having to offer new terms on contracts that were signed under very different circumstances several years ago. Renegotiation is of course possible. But more timely options have become available to shippers, particularly the refiners and traders. With a legal opening to end their commitment to Keystone XL, some shippers may do exactly that. Losing committed shippers could undermine the economics of Keystone XL. Without Keystone XL, tar sands growth will struggle to keep in line with current industry ambition.

## **EMERGING OPTIONS FOR U.S. REFINERS**

The North American oil market has changed since 2008, when the Keystone XL application was first submitted to the State Department. At that time the consensus was that U.S. oil demand would continue to grow albeit slowly, while production would continue to shrink. The outlook has radically altered. Following the enactment of vehicle fuel efficiency standards and the continuing renewable fuel mandate, U.S. oil demand is considered to have peaked in

2007 and is projected to remain flat over the coming decade followed by a more pronounced decline in the 2020s<sup>43</sup>.

Additionally, the development of horizontal drilling and hydraulic fracturing in the Bakken and Eagle Ford shale in North Dakota and Texas has led to a new onshore oil boom that is reversing the decline in U.S. oil production for the first time since the 1980s. The shale oil, or tight oil, is very light crude. Production is expected to grow to over 1.3 million bpd by 2016 from 370,000 bpd in 2010 and may achieve 2-3 million bpd in the 2020s<sup>44</sup>.

All of this oil is available to the Midwest and USGC refiners that are the target of Western Canadian suppliers. Although some refiners are configured for the heavy sour tar sands crude, the emergence of this new oil stream makes it unlikely that any more U.S. refining capacity will be converted to complex heavy oil processing. The expense of investing in cokers and hydrocrackers loses its appeal when there is a growing source of light oil to hand.

Other sources of heavy oil from outside of Canada are also emerging as potential competition for Canada’s tar sands crude. Colombian heavy oil production is set to double by 2020<sup>45</sup> and there is growth expected from heavy oil fields in Saudi Arabia, Kuwait, Brazil, Colombia, Ecuador, Peru and others. A recent report on heavy oil from Hart Energy suggests that if the Keystone XL pipeline is not built “*there are ample supplies of heavy crude oil on the export market to supply Gulf Coast refineries*”<sup>46</sup>.

The growth of these new oil sources may reduce the urgency with which USGC refiners feel they need to secure contracted supplies from Canada. As TransCanada CEO Russ Girling suggested, it remains to be seen whether refiners will remain committed to Keystone XL and the Canadian tar sands oil it would deliver, if they are given the chance to retreat from those contracts.

## **BOX 2: THE OGALLALA AQUIFER**

The Ogallala Aquifer covers a vast area of the American High Plains east of the Rocky Mountains. Stretching from west Texas to South Dakota, it lies beneath most of the state of Nebraska.

Its High Plains location puts it at the center of U.S. agriculture and farming accounts for 94% of its use. Irrigated agriculture in the region supports nearly one-fifth of America’s cattle, corn, cotton and wheat production.

The aquifer’s depth is very shallow in places. Generally it is 50-300 feet (15-90 meters) below the surface but in parts of Holt County where the pipeline passes it is at the surface. Placing the pipeline directly in the water in these locations is of great concern to many Nebraskan landowners.

Nebraska accounts for two-thirds of the volume of Ogallala groundwater.

Source: [www.waterencyclopedia.com](http://www.waterencyclopedia.com)



## WITHOUT XL, SOME CANADIAN OIL WILL STILL GET THROUGH, BUT IS IT ENOUGH?

Since February 2011, when the first Keystone pipeline started delivering Canadian crude to the massive oil storage hub in Cushing, Oklahoma, inventories in Cushing have been building to record highs<sup>47</sup>. Increasing tight oil production from Texas and North Dakota has added to this surplus. Along with generally flat demand within the U.S., this has resulted in the widening discount between the price of the WTI benchmark, which is set at Cushing, and other oil benchmarks, notably Brent<sup>48</sup>.

Many refiners on the U.S. Gulf Coast, including Valero, Motiva (Shell and Saudi Aramco) and Total have invested in new equipment such as cokers and hydrocrackers in anticipation of the heavy sour crude that Keystone XL could deliver. The incentive for those investments is the discount between Canadian heavy crude and WTI. Western Canadian Select, a crude blend that reflects that which will be delivered by Keystone XL, is currently at an \$8-12 discount to WTI. WTI has been at a formidable \$25 discount to Brent, although in recent weeks it has narrowed to \$8-12. That it is at anything more than a dollar or so away from Brent was unprecedented until early 2011 and it has historically more often been at a premium.

With petroleum product prices more closely linked to Brent than WTI<sup>49</sup>, the profit margins gained by refining Western Canadian Select are substantial. In short, Texan refiners want that heavy Canadian crude as soon as possible. While easing the glut at Cushing may further narrow the WTI discount, rising U.S. production indicates that some discount may continue for years to come<sup>50</sup> and growing tar sands production would ensure the Western Canadian Select discount.

Other transport options look like they will beat Keystone XL to Texas and if refiners are no longer committed to shipments from TransCanada's pipeline then they may prefer to patronize these options, especially if they can deliver crude before Keystone XL will. So if the supply of tar sands crude building up in Cushing finds its way south to Texas without Keystone XL is that just as good for tar sands producers? Not really. Keystone XL is not just a link between Cushing and Texas; it would provide additional capacity for tar sands crude out of Alberta and into Cushing of between 700,000 – 900,000 bpd.

## THE WRANGLER AND SEAWAY PIPELINES

As soon as the latest Keystone XL delay was announced alternative projects to link Cushing to Texas moved forward.

The Wrangler Pipeline proposes to carry 800,000 bpd between Cushing and Houston with onward links to Port Arthur and is targeting an in-service date of mid-2013<sup>51</sup>. The project would link to an existing Enbridge line between Superior, Wisconsin, Chicago and Cushing<sup>52</sup>. This pipeline could handle some of Keystone XL's 'early volumes' according to Enbridge CEO Pat Daniels<sup>53</sup>. But he also warned that there would be bottlenecks between Wisconsin and Chicago if other pipelines were not built<sup>54</sup>.

But then Enbridge announced that it had bought a 50% stake in the Seaway Pipeline from ConocoPhillips<sup>55</sup>. This pipeline currently links Texas to Cushing but runs north. Enbridge says it can reverse the flow and deliver 150,000 b/d to Texas by mid-2012 and raise this to 400,000 by mid-2013. This has thrown into question whether Enbridge would still pursue Wrangler.

Both pipelines could be connected to Enbridge lines coming from the north that carry tar sands and other crudes and currently run with capacity to spare. However, these US-centered lines would have Canadian oil competing for space with the booming production coming out of North Dakota. Enbridge recently completed extensions of a line into the North Dakotan oil fields and has further plans to expand that capacity<sup>56</sup>.

IHS CERA certainly believes that to accommodate the growth potential of both U.S. tight oil and Canadian tar sands, the Enbridge lines will not be enough. *"Based on our view of growth in Canadian oil sands and tight oil production, over the next 5 years North America will need both the Keystone XL and the Enbridge projects in order to create enough takeaway capacity to prevent bottlenecks."*<sup>57</sup>

Essentially, these lines would not serve to replace Keystone XL for producers as they cannot match that pipeline's additional capacity across the border. However, they could go a long way to satisfying the USGC refiners' most pressing needs. The question that is yet to be answered is whether refiners will remain committed to the unpredictable Keystone XL when these other options are in play.







## OTHER EXPORT OPTIONS: ANY EASIER THAN XL?

There are of course other proposals to move tar sands oil out of Alberta to new markets. But these also face significant public opposition and therefore potential delay and possible failure. The overall picture is one of challenges, obstacles and delay to the ambitious industry goal of raising production to over 4 Mb/d in the 2020s and beyond. We briefly outline below these proposals and the challenges they face.

### ENBRIDGE NORTHERN GATEWAY

The Northern Gateway pipeline is a (CAD)\$5.5 billion proposal to build 1,100 mile twin pipelines to carry tar sands oil west and diluent east through the British Columbian mountains to the coast at Kitimat. The westward line would carry 525,000 b/d of dilbit and the eastward line would carry 193,000 b/d of diluent. The oil would be loaded onto tankers to service markets from the U.S. West Coast to Asia. Enbridge is targeting late 2016 for startup.

If Keystone XL is any guide, and if the level of opposition at this early stage of the government review process is an indication, the timeline is highly ambitious. The route through the mountainous British Columbian terrain poses a number of significant risks and challenges<sup>58</sup> but probably the most formidable challenge will be gaining land easement rights from around 100 First Nation communities who are determined to keep the project off their land. This opposition is particularly powerful in British Columbia because of the lack of land treaties in the province. In the words of Jim Prentice, former federal minister of Indian Affairs and Northern Development, *“the reality on the*

*ground is that the constitutional and legal position of the first nations is very strong”<sup>59</sup>.*

The strength of opposition is impressive. The first nation groups have turned down a \$1 billion benefits package offered by Enbridge and over 4,000 people have registered to testify at the upcoming regulatory hearings<sup>60</sup>. This number far exceeds (558) that which participated in another long delayed pipeline proposal in Canada, the Mackenzie Valley Pipeline<sup>61</sup>. The Yinka Dene Alliance controls around a quarter of the pipeline route and has stated that, *“the pipeline isn’t happening, period.”<sup>62</sup>*

Opposition is not just confined to the communities along the pipeline route. There are many communities on the coast, along the potential shipping lane that will be taken by oil tankers, who are also vehemently opposed<sup>63</sup>. Enbridge recently announced shipping agreements for the pipeline and is expressing confidence about the process<sup>64</sup>. But the facts on the ground are certainly not conducive to speedy and smooth approval.

### KINDER MORGAN TRANS MOUNTAIN PIPELINE EXPANSION

The Kinder Morgan Trans Mountain Pipeline is currently the only outlet for Western Canadian oil to a Canadian port. It currently delivers 300,000 b/d of both heavy and light oil as well as finished products such as gasoline and diesel to Vancouver. It accomplishes this by cycling the different products in batches<sup>65</sup>. Over a year, it delivers about 80,000 b/d of tar sands derived crude<sup>66</sup>. An expansion of this line’s capacity is perceived as a cheaper, quicker and less controversial option to Enbridge’s Northern Gateway proposal, although industry experts have stated that there will be a need for both lines over the long term. Either way it is certainly not without its own controversy and opposition.

The proposal involves increasing the size and quadrupling the frequency of tanker shipments in and out of the port of Vancouver and through the ecologically valued Georgia Strait and Gulf Islands<sup>67</sup>. This is not popular in the city that claims to be the birthplace of Canada’s environmental movement<sup>68</sup>. The area is part of a legally designated critical habitat of southern resident killer whales which are listed as “endangered” under Canadian law. Kinder Morgan’s application has been opposed by a number of local and national environmental groups<sup>69</sup>.

### ENBRIDGE TRAILBREAKER

This project involves the reversal of an existing line that links Sarnia, Ontario to Montreal, Quebec within Canada and then Montreal with Portland, Maine in the U.S. Currently the line brings imported oil into Canada to the refining centers in Montreal and Sarnia.

Photo: Aerial view of seismic lines and a tar sands mine in the Boreal forest north of Fort McMurray, northern Alberta. © Jiri Rezac / Greenpeace



This project was shelved in 2009 but has recently reemerged following moves by Enbridge to begin line reversal on a section of the line. Following Enbridge's request to the National Energy Board (NEB) to reverse flow on a section from Sarnia to Westover, Ontario, a group of Canadian and U.S. environmental organizations asked the NEB to deny the request. They asserted that for the NEB to consider the project in phases "*precludes the ability of the NEB to carry out its mandate to adequately assess the economic, technical and financial feasibility of the project and its environmental and socioeconomic impacts, many of which have cumulative dimensions*"<sup>70</sup>.

The NEB has since announced an oral public hearing on the partial reversal of the pipeline for the autumn of 2012<sup>71</sup>. Once again it appears that it will not be straightforward nor quick for Enbridge to open up a new export route for Western Canadian crude.

Like Keystone XL, this project would give Western Canadian crude access to the Atlantic Basin. While there is currently little heavy oil refining capacity on the U.S. East Coast and in Europe, the most likely destination would be the US Gulf Coast, where ample heavy oil refining capacity exists. As mentioned above, part of the attraction of USGC access is its increasing role in the U.S. petroleum products export market, which supports growth for refiners despite declining U.S. demand. A major component of that market is the demand for diesel in Europe. However, emerging EU legislation on fuel quality threatens to make Canadian oil a problem for those refiners. (See below)

### ALL ABOARD! COULD RAIL BE THE ANSWER?

While Keystone XL has remained stuck in regulatory limbo oil traders have been finding ways to get crude to market. Rail has emerged as a surprising alternative and has seen significant growth in recent months<sup>75</sup>. Goldman Sachs recently suggested that rail could be moving up to 800,000 b/d between Cushing and Texas by late 2012. That now seems unlikely with the emergence of the Seaway Pipeline.

But rail will never be able to accommodate the vast growth potential of tar sands production. It may relieve pressure between Cushing and Texas but it is doubtful that it can replace a 900,000 b/d pipeline from Alberta to Texas. Without Keystone XL, capacity for tar sands oil into Cushing and on to points south is limited by the capacity of the existing pipeline network over the U.S. border. While there is spare capacity on the existing Keystone and Enbridge lines, it does not match the industry's ambitious growth plans.

The recent boom in oil transport by rail relies substantively on the wide discount between WTI and Brent. Transport by rail can cost \$15 a barrel compared to \$3-\$6 by pipeline<sup>77</sup>. As the discount narrows large scale transport by rail will make less sense.

Rail offers a stopgap measure where necessary, but it will never achieve Ron Liepert's dream of three Keystone XL sized pipelines by the 2020s<sup>78</sup>.



# EUROPE'S FUEL QUALITY DIRECTIVE: A FURTHER CHALLENGE?

Aerial view of Syncrude upgrader and tailings pond in the Boreal forest north of Fort McMurray. © Jiri Rezac / Greenpeace



In March 2011, the European Commission's white paper on transport committed to a 20 percent cut in greenhouse gas emissions by 2030<sup>72</sup>. Transport is the only sector in Europe that has seen its emissions increase over the past two decades<sup>73</sup>. In addition to improving vehicle efficiency, the EU identified the need to reduce emissions from the extraction, production, processing and distribution of transport fuels. This is to be achieved through the Fuel Quality Directive (FQD).

Initially the FQD was designed to reduce pollutants such as sulphur. Article 7a of the revised FQD, agreed in 2008-9, requires suppliers to reduce the lifecycle greenhouse gas "intensity" of transport fuel 6% by 2020 compared with 2010. According to the Commission's proposal, different fuels and feedstocks receive different "default values" for their carbon intensity. In early October 2011, the European Commission recommended the inclusion of a specific "default" value for tar sands derived products that reflects the higher greenhouse gases emissions associated with the extraction and refining of tar sands crude and other heavy oil, not just from Canada, but also for example, from Venezuela and Colombia<sup>74</sup>.

Gasoline derived from conventional sources of crude oil will also receive a default value - 87.5 g CO<sub>2</sub>/MJ. In comparison, gasoline made from tar sands crude will receive a value of 107 g CO<sub>2</sub>/MJ, gasoline made from oil shale (kerogen) a value of 131.3 g CO<sub>2</sub>/MJ; gasoline made via a coal-to-liquids process a value of 172 g CO<sub>2</sub>/MJ, and gasoline made from a gas-to-liquids process, 97 g CO<sub>2</sub>/MJ<sup>75</sup>.

The requirement in the FQD for a 6% reduction in greenhouse gas intensity by 2020 – with further reductions to be mandated beyond 2020 – could make processing tar sands feedstock unattractive for the increasing number of USGC refineries that are exporting diesel to Europe. It could also have implications for the Trailbreaker Pipeline which intends to access the Atlantic Basin via Portland, Maine.







# OIL MAJORS ARE HEAVILY DEPENDENT ON TAR SANDS MARKET GROWTH

As the last decade has witnessed a reassertion of state control over national oil resources and new discoveries of conventional and easy to access oil have diminished, the international oil majors have increasingly looked to the Canadian tar sands for reserves replacement.

In January 2011, we revealed that tar sands reserves additions made up 20% of total reserves additions and 42%

**Table 6: Estimated Tar Sands Reserves Additions as a Percentage of Reserves Additions 2005-09<sup>80</sup>**

	As percentage of total reserves additions	As percentage of total liquids reserves additions
ConocoPhillips <sup>81</sup>	39%	71%
ExxonMobil <sup>82</sup>	20%	51%
Shell <sup>83</sup>	16%	34%
Total <sup>84</sup>	10%	26%
Chevron <sup>85</sup>	3%	7%
BP	0%	0%
Average (Excl. BP) <sup>86</sup>	19.8%	42.6%

Note: BP had not booked proved (1P) tar sands reserves during the period covered here. In December 2010, Husky and BP made a final investment decision for the Sunrise SAGD Project phase 1 and in March 2011 BP booked its first tar sands proven reserves.

Photo: Aerial view of well pads and seismic lines used for oil and gas exploration in the Boreal forest north of Fort McMurray, northern Alberta. © Jiri Rezac / Greenpeace

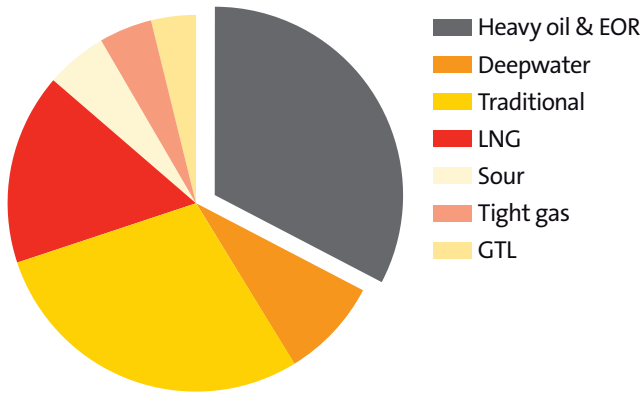
of liquids reserves additions for five of the top oil majors between 2005 and 2009<sup>79</sup> (see Table 6).

The reserves additions reported in these figures only reveals additions to a company's proven reserves, known as 1P reserves. This is based on the requirements of the Securities Exchange Commission (SEC). SEC reserves reporting rules were updated in 2009 and affected reporting from January 2010 but most of the period discussed here was covered by the earlier rules.

The companies occasionally publish estimates of their full resource base, often referred to as 'Total Resources'. The term generally refers to all the oil and gas a company expects to extract in the future from its current resource base. These disclosures are not guided by SEC regulations and are inconsistent between the companies. Nevertheless, their graphic representation does demonstrate the growing role the Canadian tar sands play in many of these companies' future. For some of these companies, the prospect of an ongoing lag in market access for tar sands oil poses a serious risk that some of these reserves could be stranded.

For Shell and ConocoPhillips, long-term reserves are substantially dominated by Canadian tar sands resources. ExxonMobil and Total also have significant tar sands reserves that form a large portion of their liquids reserves. Tar sands oil plays less of a role for Chevron and BP. But for BP, it is very clear that tar sands production will play a larger role in its future that it does today.

**Shell: total resources 2008**

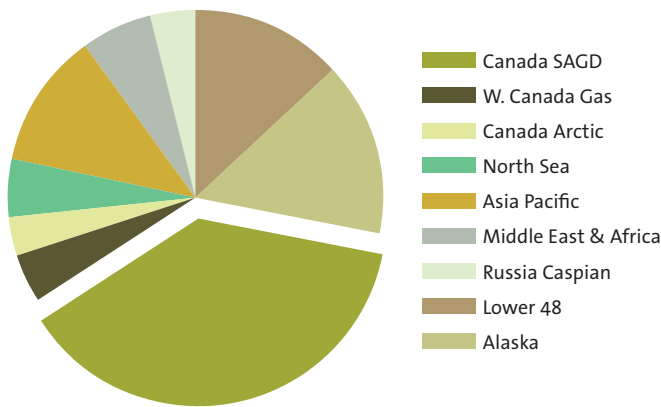


Source: Shell 2008 Strategy Update<sup>87</sup>

Shell has one of the highest concentrations of Canadian tar sands in its total resources of all six companies. In 2008 it stated that this graph represented 66 billion barrels of oil equivalent (BBOE) of which 20 billion barrels, 30%, were Canadian tar sands.<sup>88</sup> In its 2010 Annual Report, Shell reported under new SEC rules that some 11% of its proved developed and undeveloped reserves were in this resource, while tar sands production represented around 7.5% of its oil production or 4% of its total 2010 oil and gas production.<sup>89</sup> In 2011, Shell started up the Jackpine Mine as part of its Athabasca Oil Sands Project, adding 100,000 b/d of production capacity (60% Shell share).

At around 30%, tar sands reserves are a much larger part of Shell's potential future than they are part of its current production or proven reserves base.

**ConocoPhillips: year end 2010 resources by location**

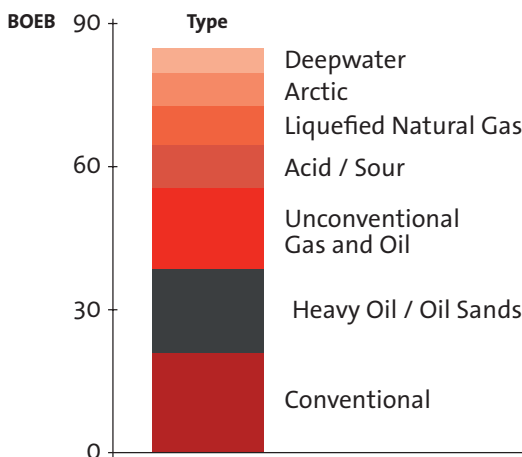


Source: ConocoPhillips 2011 Analyst Meeting, March 23, 2011

This chart clearly shows that Canadian tar sands resources are the biggest single resource in the ConocoPhillips resource base. Having sold its stake in Syncrude's mining venture in April 2010<sup>90</sup>, the company's tar sands reserves are concentrated in deeper reserves that will be produced through the SAGD method<sup>91</sup>.

Our analysis of its reserves additions for 2005-2009 shows that these resources made up 39% of its total reserves additions and a staggering 71% of its total liquids additions during the period, far greater than any of its competitors. While tar sands production was just 4% of its 2010 oil and gas production<sup>92</sup>, the chart above suggests that of its 43 BBOE of resources, tar sands (Canada SAGD) is somewhere nearer 40%.

**ExxonMobil: 2010 resource base**

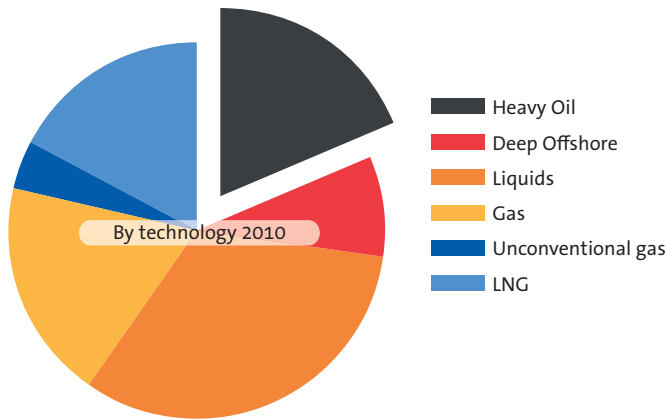


Source: ExxonMobil 2011 Analyst Meeting, March 9, 2011. New York Stock Exchange.

ExxonMobil is heavily invested in the Canadian tar sands, primarily through its 70% stake in Imperial Oil. Bitumen and synthetic oil production were 5.6% of its production in 2010<sup>93</sup>. A small portion of this was derived from its operations in Venezuela. The chart of its total resource base shows a far greater reliance on heavy oil, most of which is tar sands, in the future.



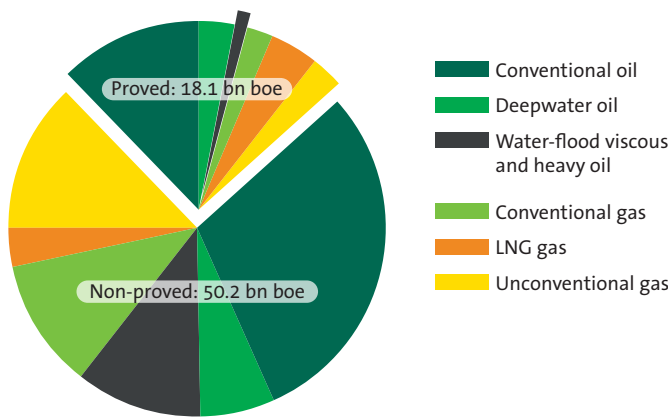
**Total: proved and probable reserves 2010**



Source: Total Investor Relations Meeting, September 26, 2011. Exploration & Production outlook.

Tar sands production was less than half a percent of Total's production in 2010<sup>94</sup> but its proved and probable reserves chart (Heavy oil) shows that it will become a major proportion of production in future years. Its 2010 SEC filing reported 789 million barrels of proved developed and undeveloped reserves, 771 million barrels of which were undeveloped. This is 9.5% of its total proved oil and gas reserves. It is unclear how much of the resource is in its probable reserves category. The chart suggests that proved and probable is greater than 9.5%.

**BP: 2010 resource base**

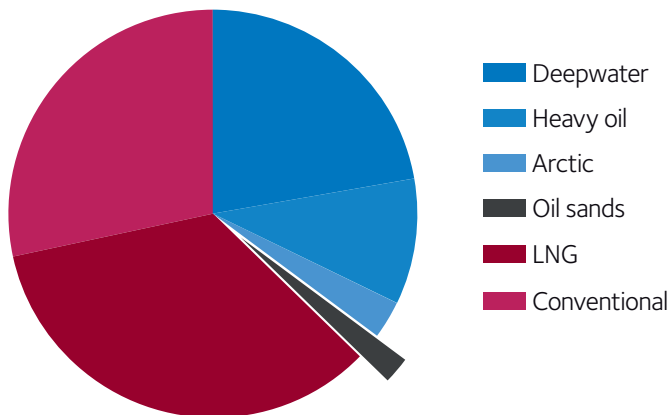


Source: BP 2010 results and investor update, February 1, 2011. London.

BP booked proven reserves for tar sands for the first time this year as it gave the go ahead to the Sunrise SAGD Project. However it is unclear whether it appears in the proved reserves part of this chart as the presentation that the chart appeared in was given before the group filed its 2010 SEC report in March 2011.

The 179 million barrels of bitumen reported in the company's 2010 SEC filing represented less than 1% of the company's proven developed and undeveloped reserves<sup>95</sup>. Tar sands reserves are buried in the 'water-flood, viscous and heavy oil' section of BP's chart. The chart shows that over time this category, likely dominated by tar sands, will grow substantially.

**Chevron: total resources 2010**



Source: Chevron 2010 Upstream Strategy Update

Tar sands production was just under 1% of Chevron's production in 2009<sup>96</sup>. While the tar sands portion of Chevron's reserves appears to be less than its peers, it does nonetheless appear to be a greater portion of its total resource than the 0.9% of production in 2009, indicating that the company expects growth in this sector.

# CONCLUSION

Oil majors are substantially invested in the long term growth of Canadian tar sands production. Announced and approved projects in the resource suggest an aggressive growth in production over the next fifteen years of nearly 140%.

Such ambitious production growth plans are probably only matched by Iraq and Brazil over the time frame. Like Iraq, realizing this growth depends to a large extent on developing the capacity to move the oil to market. While the circumstances are very different to Iraq, Canada faces a sizeable challenge in getting that infrastructure built in a timeframe compatible with the industry's growth potential.

The substantial environmental impacts of tar sands production appear to only place a constraint on production if the Albertan government acts to force the industry to internalize those costs. However, the midstream infrastructure that carries the production to market is vulnerable to a number of politics and societal pressures. The industry may yet find that these pressures place constraints on growth that are not so easily overcome.

Investors need to be critical of both excessive ambitions for tar sands production growth and excessive dependence on tar sands reserves.

# ENDNOTES

1. Ernst & Young, 29 August, 2011. *Rising costs and labour shortages among biggest risks for oilsands sector.*
2. International Energy Agency, Medium Term oil and Gas Market Report 2009
3. We use CAPP figures for *Blended Supply to Trunk Pipelines and Markets* as we are discussing supply to refineries in this document. These figures are generally higher than bitumen production as they include diluents derived from other sources. However, the percentage growth over time of both sets of figures is the same. See the appendices of CAPP, June 2011, *Crude Oil, Forecasts, Markets & Pipelines*. We use Appendix B.3.
4. Blended supply to trunk pipelines and markets.
5. CAPP, June 2011. *Crude Oil, Forecasts, Markets & Pipelines*.
6. Financial Times, September 13, 2011. *Alberta wants more oil sands pipelines.*
7. Ibid.
8. Financial Times, July 18, 2011. *WTI-Brent spread rises back above \$20 a barrel.*
9. IHS CERA 2011. *The Role of the Canadian Oil Sands in the US Market: Energy Security, Changing Supply Trends, and the Keystone XL Pipeline.*
10. The Oil & Gas Journal, November 11, 2011. *IHS CERA: State Department's Keystone XL delay creates new uncertainties.*
11. <http://www.kne.com/business/canada/transmountain.cfm>
12. The Daily Oil Bulletin, June 18, 2009. *Expansion of Pegasus Pipeline to Gulf Coast in Operation.*
13. IHS CERA 2011, Op. Cit.
14. Oil Change International. September 2011. *Exporting Energy Security: Keystone XL Exposed.* <http://priceofoil.org/2011/08/31/report-exporting-energy-security-keystone-xl-exposed/>
15. <http://www.state.gov/r/pa/prs/ps/2011/11/176964.htm>
16. Public Radio International, September 14, 2011. *Over 1200 protesters of oil pipeline arrested at White House.*
17. The Vancouver Sun, September 8, 2011. *Nobel winners join fight against pipeline.*
18. The Washington Post, November 6, 2011. *Oil pipeline protesters encircle White House.*
19. <http://www.nrdc.org/land/files/TarSandsPipeline4pgr.pdf>
20. USA Today, June 07, 2011. *U.S. Canada Keystone pipeline leaks, fuels outrage.*
21. Bloomberg Business News, July 27, 2010. *Pipeline leak pollutes major Michigan River.*
22. Detroit Free Press, October 21, 2011. *Cleanup of Kalamazoo River oil spill to extend through 2012.*
23. The Daily Oil Bulletin, September 10, 2009. *Pipeline Construction Contractors Preparing for a Lean Year.*
24. <http://www.keystonepipeline-xl.state.gov/>
25. The Energy Daily. June 8, 2011. *EPA Faults State Department Analysis of Keystone XL Pipeline.*
26. <http://foe.org/complaint-filed-re-illegal-keystone-xl-lobbying-transcanadas-paul-elliott>
27. Reuters, November 07, 2011. *State Dept review may delay Keystone decision.*
28. Lincoln Journal Star, September 14, 2011. *Huskers cut off deal with TransCanada.*
29. Ibid.
30. LJWorld.com, April 14, 2011. *TransCanada threatens using eminent domain to complete pipeline project.* <http://www2.ljworld.com/news/2011/apr/14/transcanada-threatens-using-eminent-domain-complet/>
31. Personal Communication with Jane Kleeb, Founder of BOLD Nebraska. 12 October, 2011. <http://www.boldnebraska.org>



32. [http://www.governor.nebraska.gov/news/2011/08/pdf/0831\\_President\\_Obama\\_Secretary\\_Clinton\\_Keystone\\_XL\\_Pipeline\\_LETTER.pdf](http://www.governor.nebraska.gov/news/2011/08/pdf/0831_President_Obama_Secretary_Clinton_Keystone_XL_Pipeline_LETTER.pdf)
33. Omaha World Herald, October 12, 2011. *TransCanada not budging on route.*
34. Ibid.
35. Lincoln Journal Star, October 24, 2011. *Heineman calls Nov.1 special session on pipeline.*
36. KHAS-TV, November 07, 2011. *Pipeline hearing continues into second week.*
37. Calgary Herald, November 08, *Keystone XL pipeline faces special U.S. review; Premier predicts project will be delayed further.*
38. KVNO News, November 11, 2011. *What's the next step in special session?*
39. National Post, November 02, 2011. *Pipe stall could be grim: CEO.*
40. Ibid.
41. Commercial terms for the pipeline are detailed in this submission to the Canadian regulator. <https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=549330&objAction=Open>
42. Ibid.
43. See for example Deutsche Bank Global Research reports on the 'Peak Oil Market'.
44. International Energy Agency, June 2011. *Medium Term Oil and Gas Markets 2011.*
45. Hart Energy Research Group 2011. *Heavy Crude Oil: A Global Analysis and Outlook to 2035.*
46. Ibid.
47. Tulsa World. February 27, 2011. *Super sized: Cushing oil hub grows in capacity but needs pipeline takeaway.*
48. Financial Times, July 18, 2011. *WTI-Brent spread rises back above \$20 a barrel.*
49. EIA Today in Energy, 27 October, 2011. *Recent gasoline and diesel prices track Brent and LLS, not WTI.* <http://www.eia.gov/todayinenergy/detail.cfm?id=3670>
50. Reuters, July 06, 2011. *Brent-WTI spread may reach \$40/bbl – Citigroup.*
51. <http://www.wranglerpipeline.com/>
52. The Calgary Herald, November 10, 2011. *Enbridge says shippers back \$2-billion Wrangler pipeline.*
53. Ibid.
54. Ibid.
55. CBS News, November 16, 2011. *Enbridge to provide early access to the Gulf Coast.*
56. CAPP, June 2011. *Crude Oil, Forecasts, Markets & Pipelines*
57. The Oil & Gas Journal, November 11, 2011. *IHS CERA: State Department's Keystone XL delay creates new uncertainties.*
58. Northword, October 2011. *The View from above: Looking down on the Northwest's proposed pipelines.* <http://northword.ca/october-2011/the-view-from-above>
59. The Globe and Mail, 13 May, 2011. *First nations dig in against Enbridge pipeline.*
60. Edmonton Journal, 20 October, 2011. *Thousands want a say at pipeline hearings.*
61. Ibid.
62. Marketwire, August 24, 2011. *Yinka Dene Alliance Reacts to Enbridge Announcement of Commercial Agreements for Proposed Pipeline.*
63. The Tyee, 13 September, 2010. *At Ground Zero for Next Huge Enviro War: Hartley Bay.*
64. Edmonton Journal, August 25, 2011. *Enbridge's proposed Gateway pipeline fully booked.*
65. <http://www.kindermorgan.com/business/canada/transmountain.cfm>
66. CAPP, June 2011, Op. Cit.
67. The Daily Oil Bulletin, July 07, 2011. *Trans Mountain Firm Service Proposal Facing Opposition From Environmental Groups.*
68. The Globe & Mail, February 03, 2011. *Pipeline race heats up.*
69. The Daily Oil Bulletin, July 07, 2011. Op. Cit.
70. Reuters, 26 August, 2011. *Green groups seek wider review of Enbridge project.*
71. The Globe and Mail, December 05, 2011. *Enbridge faces delay on bid to partly reverse flow of Ontario oil pipeline.*
72. European Commission, COM(2011) 144 final – White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system.
73. Skinner, I., et al. (2010). *EU Transport GHG: routes to 2050? – Towards the decarbonisation of the EU's transport sector by 2050.*
74. <http://www.guardian.co.uk/environment/2011/oct/04/oil-sands-imports-eu-ban>
75. [http://www.transportenvironment.org/Publications/prep\\_hand\\_out/lid/659](http://www.transportenvironment.org/Publications/prep_hand_out/lid/659)
76. The Globe & Mail, October 25, 2011. *Why rail is moving more crude these days.*
77. Ibid.
78. Financial Times, Sept. 13. Op. Cit.
79. Oil Change International, Greenpeace UK & Platform, 2011. *Reserves Replacement Ratio in a Marginal Oil World: Adequate indicator or Subprime Statistic.*
80. 2005–2009 average and excluding cost/price effects unless otherwise noted.
81. ConocoPhillips reserves are primarily in situ resources. Figures were primarily drawn from the company's 2010 10-K filing. Based on a sample size of only three years in the five year period.
82. We calculated 22% for tar sands additions 2006–09 excluding cost/price effects, and 20% for 'heavy oil/tar sands' 2005–09. Here, we present the smaller of the two values. Figures for the liquids column were primarily drawn from the company's 2010 and 2008 10-K filings, and the company's 2009 Financial & Operating Review.
83. Including cost/price effects.
84. Based on assuming that the total 5-year TS additions are covered in the single number reported by Total SA in 2009.
85. Based on a sample size of only two years in the five-year period.
86. Calculated using [average annual TS additions] / [average annual total additions].
87. Royal Dutch Shell, 17 March 2008 Strategy Update. This is the most recent update of this graph available. [http://www.shell.com/home/content/media/news\\_and\\_media\\_releases/archive/2008/strategy\\_update\\_17032008.html](http://www.shell.com/home/content/media/news_and_media_releases/archive/2008/strategy_update_17032008.html)
88. Ibid.
89. Calculated from Shell's 2010 Annual Report.
90. <http://www.marketwatch.com/story/conoco-sells-syn crude-stake-for-465-billion-2010-04-12>
91. Steam Assisted Gravity Drainage.
92. ConocoPhillips 2010 Annual Report.
93. ExxonMobil 2010 Annual Report.
94. Total SA 2010 Annual Report.
95. BP 2010 Annual Report.
96. Chevron Annual Report 2010.



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