

The Tar Sands Threat to Europe: How Canadian Industry Plans Could Undermine Europe’s Climate Goals

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Executive Summary

"You can have all the oil and gas in the world, but it's not much good if you can't get it to market...the FQD (European fuel quality directive) could stigmatise the oil from Canada and impact on our access to some markets. It would clearly not be helpful. While the growth in demand is not as high [as in Asia], Europe is the biggest single market in the world right now."

- Joe Oliver, Minister of Natural Resources, Government of Canada¹

As U.S. and Canadian citizen opposition to carbon intensive tar sands oil intensifies across North America, the tar sands industry has pursued an aggressive effort to propose new tar sands pipelines to coastal ports in order to access overseas markets - including Europe. Delays to these pipelines fueled by public opposition have prevented a flood of tar sands exports to Europe through the United States so far.² But Europe remains a close and logical market for the tar sands industry from either the U.S. Gulf Coast or Canada's east coast. The analysis presented in this document demonstrates that Europe is indeed on the short list of those potential new markets and could see greater volumes of tar sands unless action is taken. Canada's plans to grow exports of carbon intensive tar sands to Europe would impede efforts to combat climate change. The information in this memo should alert European decision-makers that now is the time to move ahead with enacting the proposed Fuel Quality Directive to guard against the rapid rise in the carbon intensity of Europe's fuel mix.³

A rise to the carbon intensity of Europe's fuel from tar sands is due to several different factors including:

- Expanded export capacity to Europe through new pipelines for tar sands oil that are already approved or under construction. Potential expanded export capacity to Europe through proposed tar sands pipelines, such as Keystone XL North and Energy East.
- The extent to which growth of domestic light crude oil production in the United States creates a preference for domestic supplies in the U.S. over heavy tar sands imports.
- The relatively high and growing demand for diesel in Europe compared to North America.

¹ Damian Carrington, "Europe 'stigmatising' Canada by labelling tar sands oil highly polluting," *The Guardian*, November 19, 2013, <http://www.theguardian.com/environment/2013/nov/19/canada-tar-sands-oil-eu>.

² This memo uses "tar sands" to generally describe a variety of forms of tar sands including tar sands derived fuel such as diesel, partially refined tar sands crude known as Synthetic Crude Oil, and heavier, unrefined grades including diluted bitumen.

³ This memo was drafted by NRDC Attorney Anthony Swift, NRDC Senior Advisor Shelley Kath, and NRDC Canada Project Director Danielle Droitsch.

Tar sands could make up an increasing share of Europe's fuel stock

The estimates of volumes of tar sands derived fuel in this memo are subject to several factors of uncertainty including dynamics of U.S. Gulf Coast diesel exports and the extent to which they contain tar sands, whether pipeline opposition to major tar sands pipelines such as Keystone XL and Energy East further delay approvals, and dynamics affecting European oil demand including refinery capacity. Nevertheless, for purposes of illustration, we calculated the volume of carbon intensive tar sands that could make up the European fuel stock by 2020 and 2030 looking at data from the International Energy Agency and ICF Consulting. See Figure 1 below. According to recent IEA forecasts of European crude oil demand, carbon intensive Canadian tar sands could make up between 5.3% and 6.7% of European fuel stock, in the form of tar sands crude and refined diesel derived from tar sands by 2020 and remain at that level through 2030.

Sources: International Energy Agency, *World Energy Outlook*, November 18, 2013, p. 505; ICF International, *Impact analysis of options for implementing Article 7a of Directive 98/70/EC – Revised 2020 baseline fuel mix and costs*, <http://www.endseurope.com/docs/160113c.pdf>, April 15, 2013, slide 24.⁴

Canadian tar sands crude currently only makes up 0.03% of European fuel stocks from an estimated 4,000 bpd of diesel imported from the U.S. Gulf Coast.⁵ However, changes in global energy dynamics left unchecked could lead to a significant rise in the use of tar sands derived fuel, increasing to upwards of 725,000 barrels per day (bpd) by 2020 and 640,000 bpd by 2030 according to estimates by NRDC.

This could make European Union goals to reduce greenhouse gas intensity in the transport sector more difficult. The projected increase in Canadian tar sands crude and tar sands derived diesel estimated by NRDC would have a significant impact on Europe's carbon emissions. Projected imports of tar sands crude and tar sands derived diesel in 2020 would increase Europe's carbon emissions by between 20.5 million metric tons (MMT) CO₂ and 25.7 MMT CO₂ per year.⁶

⁴ The IEA projects OECD Europe's oil demand to reach 10.9 million bpd in 2020. If Canadian tar sands make up between 574,500 bpd and 726,500 bpd, they would comprise between 5.3% and 6.7% of Europe's fuel stock in 2020. The IEA projects OECD Europe's oil use to decline to 9.4 million bpd by 2030. If tar sands make up between 519,125 bpd and 642,125 bpd, they would comprise between 5.5% and 6.8% of Europe's fuel stock.

⁵ Europe received approximately 4,000 bpd in tar sands derived diesel in 2012 while consuming 11.7 million bpd, approximately 0.03%. Hart Energy, "Evaluation of Potential Pathways for Tar Sands to the U.S. Northeast," Prepared for the Natural Resources Defense Council, June 2013
http://docs.nrdc.org/energy/files/ene_14011601a.pdf; IEA, *World Market Report*, Nov. 18, 2013, pg. 505.

⁶ Displacing between 454,000 bpd and 606,000 bpd of conventional crude in 2020 with tar sands would increase emissions by between 20.5 million metric tons CO₂ to 27.3 MMT CO₂, assuming that tar sands crude has 20.2 g CO₂/MJ greater emissions than EU conventional crude and that one barrel of crude is equivalent to 6,120 MJ according to the U.S. Department of Energy. Brandt, A. R.; *Upstream greenhouse gas (GHG) emissions from Canadian oil Sands as feedstock for European refineries*. Department of Energy Resources Engineering, Stanford University, 18 January 2011, p. 37, <https://circabc.europa.eu/d/d/workspace/SpacesStore/db806977-6418-44db->

Moreover, displacing 120,500 bpd of conventionally derived diesel with an equivalent volume of tar sands derived diesel would increase Europe's carbon emissions by an additional 5.2 million metric tons CO₂ per year.⁷ Taken together, the influx of tar sands crude and tar sands derived diesel estimated by NRDC would increase the carbon intensity of Europe's fuel stocks by up to 32.5 million metric tons in 2020 annually. The EU's FQD has an overarching goal of gradually reducing the "life cycle greenhouse gas emissions per unit of energy from fuel and energy supplied by up to 10%" by the end of 2020 (6% decarbonisation is mandatory and 4% is voluntary).⁸ Around half of the emissions associated with increased tar sands imports to Europe can be related to the road transport sector, which is covered by the Fuel Quality Directive. If European nations wish to avoid encouraging the growth of tar sands and becoming a destination for high carbon fuels, they must implement a policy, such as the Fuel Quality Directive, that discourages high carbon fuels from undermining the climate goals of the Union.

Rapidly changing oil markets change projections for low tar sands exports to Europe

Previous assessments provided to European decision-makers have not anticipated some of the rapid changes to the oil market affecting tar sands and diesel and have therefore assumed a very limited role for tar sands crude to enter Europe. One of the major assumptions is there has been a limited ability of tar sands crude to reach tidewater ports and more limited capacity by European refiners to take tar sands crudes. But as one example, TransCanada's recent Energy East tar sands pipeline proposal to bring 1.1 million bpd from Alberta to eastern Canadian ports, has explicitly targeted Europe as a destination. Moreover, market dynamics in the U.S. Gulf Coast region will likely facilitate even greater exports of diesel than projected.

Source: ICF, "Impact Analysis of Options for Implementing Article 7a of Directive 98/70/EC – Revised 2020 baseline fuel mix and costs," Powerpoint presentation, April 15, 2013.⁹

[a464-20267139b34d/Brandt_Oil_Sands_GHGs_Final.pdf](http://www.netl.doe.gov/energy-analyses/energy-calc.html); US Department of Energy, Energy Calculator, <http://www.netl.doe.gov/energy-analyses/energy-calc.html>.

⁷ Displacing 120,500 bpd of conventionally derived diesel with diesel derived from tar sands would increase emissions by 5.2 million MMT CO₂ per year, assuming that tar sands crude has 19.4 g CO₂/MJ greater emissions than EU conventionally derived diesel and that one barrel of diesel is equivalent to 6,145 MJ according to the U.S. Department of Energy. Transport Environment, Environmental benefits of robust implementation of the FQD, May 2013, pg. 2,

http://www.transportenvironment.org/sites/te/files/publications/2013%2005%20briefing%20on%20FQD%20Default%20Values_FINAL_CLEAN.pdf; US Department of Energy, Energy Calculator, <http://www.netl.doe.gov/energy-analyses/energy-calc.html>.

⁸ Directive 93/12/EEC of the European Parliament and of the Council of April 23, 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC, 2009 O.J. L 144/88, art. 7a, ¶ 2 [available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0088:0113:EN:PDF](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0088:0113:EN:PDF).

⁹ For example, an evaluation of the 2013 International Energy Agency, World Energy Outlook report released November 2013 differs dramatically with ICF's assumptions regarding U.S. diesel exports. ICF only estimates the United States will export 100,000 bpd of diesel in 2020 when the U.S. exported on average 335,000 bpd in 2012, and exceeded 600,000 bpd of exports in September 2013. See U.S. Energy Information Administration, Exports by

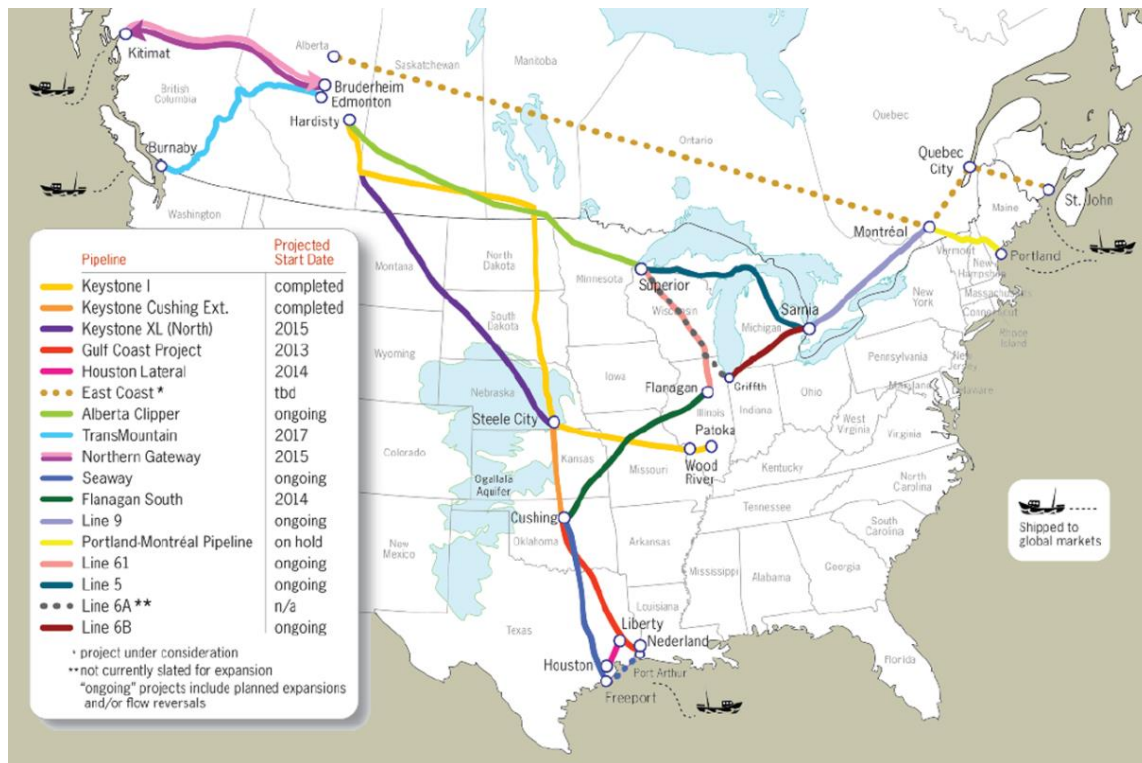
The recent evolution of oil markets and transport have set into motion certain dynamics that would likely lead to increased exports of carbon intensive tar sands from the United States to Europe. Tar sands may reach Europe in the future through at least two channels.

- Tar sands could enter Europe as a refined product exported from the Gulf Coast. Europe already imports diesel, petcoke and other products from the Gulf coast. Very little of this is derived from tar sands crude today but this will change as soon as next year when increasing quantities of tar sands crude will be delivered to the Gulf Coast's top export refineries via expanded pipeline capacity both already in operation and under construction and—to a more limited extent—rail.
- Tar sands crude could be exported to Europe in the future to feed an increasing number of European heavy oil refineries. This could happen if pipelines to Canada's east coast—particularly TransCanada's Energy East—are approved and built.

Until now, the United States has been the sole market for tar sands outside Canada. But the tar sands industry has substantially increased production in recent years and is no longer able to rely on the United States as its only market. Indeed, the growth of the tar sands industry in Canada over the next several decades depends on the ability of Canadian tar sands producers to access and take root in new markets overseas.

To connect the Alberta tar sands to tidewater ports in the U.S. Gulf Coast, the tar sands industry has focused on building the proposed Keystone XL tar sands pipeline, which has been delayed for at least four years. Meanwhile, the tar sands industry has not been able to access export markets from the Canadian west coast and so is looking to the country's east coast markets. Should these proposals move ahead, tar sands exports to Europe would become more feasible.

Destination, Distillate Fuel Oil, November 27, 2013, http://www.eia.gov/dnav/pet/pet_move_expc_a_EPD0_EEX_mbb1_m.htm; ICF International, "Impact Analysis of Options for Implementing Article 7a of Directive 98/70/EC – Revised 2020 baseline fuel mix and costs," Slide 28. December 20, 2012, <http://www.endseurope.com/docs/160113c.pdf>.



The proposed Energy East pipeline is represented in the above figure as East Coast* from Alberta to Quebec and New Brunswick.

Map: U.S. Climate News and National Wildlife Federation¹⁰

The United States is already an increasingly significant and competitive exporter of diesel to Europe, and U.S. exports of diesel to Europe are on the rise. While very small quantities of diesel refined from tar sands crude are already being exported to Europe, exports of tar sands-derived diesel could increase significantly if several proposed tar sands pipeline projects are approved.

Meanwhile, some refineries in Europe are starting the process to retool their operations in order to process larger quantities of heavy crude. Another dynamic at play is the boom in domestic light crude production in the United States, which provides an incentive for U.S. refineries to use more light oil produced domestically. And this in turn puts pressure on the tar sands industry to look beyond the United States for markets.

To be clear, many of the tar sands pipeline projects face strong opposition and could be rejected or, at a minimum, be delayed several years. Regardless, there are trends underway already likely to significantly increase tar sands exports—both refined products and crude—to Europe.

As the tar sands industry has sought expanding markets, there is now considerable attention paid to the carbon intensive nature of tar sands. Refined fuels made from unconventional tar sands cause more carbon pollution than refined products derived from conventional sources of oil. In

¹⁰ Source: [http://www.nwf.org/~media/Content/Environmental%20Issues/Tar-sands/Midwest OilPipeline_Map_1294x858.ashx](http://www.nwf.org/~media/Content/Environmental%20Issues/Tar-sands/Midwest%20OilPipeline_Map_1294x858.ashx).

comparison to conventional oil, which is processed after being pumped from wells, tar sands must be mined or steamed out of the ground, and undergo additional carbon-intensive refining processes. When including vehicle combustion emissions, or using a lifecycle “well-to-wheels” perspective, tar sands feedstocks are 23 percent more carbon intensive than average fuels refined in the European Union.¹¹

The proposed European Fuel Quality Directive (FQD) (has found tar sands to be significantly more greenhouse gas intensive than conventionally produced gasoline or diesel. The FQD sets forth a greenhouse emissions reduction program.¹² The FQD is an ambitious attempt by the EU to “reduce . . . life cycle greenhouse gas emissions per unit of energy from fuel and energy supplied by up to 10% by 31 December 2020,” compared to a baseline formulated in relation to comparable 2010 greenhouse gas (GHG) emissions.¹³ Under the FQD’s classification system, tar sands was determined to be significantly more greenhouse gas intensive than conventionally produced gasoline or diesel.¹⁴

I. Factors that Could Facilitate An Increase of Tar Sands Exports to Europe

Crude oil markets are rapidly evolving in North America. The factors shaping the North American oil market today are starting to move together in ways that threaten to increase tar sands exports to Europe. Increased vehicle efficiency and other factors have lowered demand for transportation fuel in recent years in the United States, the tar sands industry’s current market.¹⁵

¹¹ Brandt, A. R.; *Upstream greenhouse gas (GHG) emissions from Canadian oil Sands as feedstock for European refineries*. Department of Energy Resources Engineering, Stanford University, 18 January 2011, p. 37, https://circabc.europa.eu/d/d/workspace/SpacesStore/db806977-6418-44db-a464-20267139b34d/Brandt_Oil_Sands_GHG_Final.pdf. The average crude processed in EU refineries have lifecycle emission of 87.1 g CO₂ per megajoule (MJ) Lower Heating Value (LHV) while tar sands are estimated to generate 107.3 g CO₂/MJ LHV.

¹² The FQD was adopted as an amendment to the 1998 FQD on April 23, 2009. See generally Directive 93/12/EEC of the European Parliament and of the Council of April 23, 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC, 2009 O.J. L 144/88, art. 7a, ¶¶1, 2(a)-(b), 5(b) [hereinafter EUFQD], available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0088:0113:EN:PDF>. GHG emission reduction program at Article 7a was originally slated to take effect on January 1, 2011 but has since been delayed.

¹³ EUFQD, at art. 7a, ¶¶ 2(a)-(b), 5(b). See also Consultation Paper on the measures necessary for the implementation of Article 7a(5), European Commission on Transport & Environment, available at <http://ec.europa.eu/environment/air/transport/pdf/art7a.pdf>. One of the specific implementing provisions of the FQD requires fuel suppliers to report on the life cycle GHG emissions per unit of energy produced by that fuel. The EU, in an effort to ensure that this provision proves useful in actually reducing the GHG intensity of its fuel sources, has chosen to classify fuels based on their individual life cycle GHG intensities. Under this classification, the EU has classified the GHG intensity of fuels based on their original source or “feedstock.” (i.e., natural gas or tar sands).

¹⁴ *Id.* “Petrol” was assigned 85.8 grams of CO₂/MJ, and “tar sand” assigned 107 grams of CO₂/MJ.

¹⁵ National Energy Board, “Canada’s Energy Future 2013: Energy Supply and Demand Projections to 2035,” November 2013, p. 8. <http://www.neb-one.gc.ca/clf-nsi/rnrgynfntn/nrgyvrprt/nrgyftr/2013/nrgftr2013-eng.pdf>; U.S. Energy Information Administration, “Estimated U.S. gasoline consumption low compared to five-year average,” August 13, 2012, <http://www.eia.gov/todayinenergy/detail.cfm?id=7510>.

Against this backdrop, other dynamics will together encourage tar sands producers to focus their export aims to overseas markets – including Europe. These include rapid growth of tar sands production, efforts to aggressively expand crude oil transport capacity, and the recent surge in U.S. oil production.

In general, tar sands could enter Europe either as a refined product such as diesel or as crude oil. If exported as crude oil, they are most likely to appear either as a light, sweet synthetic crude (SCO) or as a heavy, sour diluted bitumen. Undiluted tar sands bitumen can also be exported, but to get to the coast via pipeline requires that it be diluted in order to flow. Tar sands as a refined product such as diesel could immediately enter European markets as an import from the U.S. Gulf Coast.

Tar sands can also be exported as crude oil—either as diluted bitumen or SCO. As extracted from the tar sands of Northern Alberta, bitumen is a tarry, dense hydrocarbon. Because bitumen is semi-solid, it is not amenable to transport by pipeline without prior dilution. Commonly diluted with natural gas liquids—very light hydrocarbons—diluted bitumen is often referred to by the name “dilbit.” Even after dilution, tar sands diluted bitumen can only be processed in refineries equipped to handle heavy crudes.

SCO is created when raw tar sands bitumen is partially refined in a process called upgrading, which generally occurs near the extraction site. Upgrading bitumen produces a product which is similar to light conventional crude oil. Europe, with a significant refinery sector favoring light sweet crudes, is a potentially attractive market to those looking to export SCO. Tar sands crudes would be most likely to be exported from Eastern Canada, in connection to the Energy East project discussed below in Section 3b.¹⁶ However, there are potential scenarios in which they could also be exported from the Gulf.

The next section outlines a list of factors that will together facilitate an increase in tar sands exports to Europe.

a. There has been a surge in plans to propose and build new pipelines for tar sands export

The tar sands industry is pursuing a massive rush to build pipelines which would increase access to export markets as tar sands production has increased and is no longer able to rely solely on U.S. markets. Pipelines transport tar sands from Northern Alberta where they are mined or extracted, drilled and generally either upgraded or diluted for transport to markets primarily outside of Canada. Until recently, tar sands producers did not seek markets other than the United States, which has imported and then processed tar sands in its Midwestern refineries. But as tar

¹⁶ Energy East will connect with two marine terminals Saint John, New Brunswick, and Gros Cacouna, Quebec. TransCanada Corporation, “Route Map,” <http://www.energyeastpipeline.com/home/route-map/>.

sands producers continue to expand production, the capacity of existing pipelines to move increasing volumes of tar sands crude to the United States has been strained.¹⁷

Because Canada has a very small domestic market and there is little pipeline capacity to Canada's east and west coasts, over 70% of its crude production is exported, virtually all to the United States.¹⁸ In 2012, the United States imported 1.65 million bpd of Canadian crude.¹⁹

The tar sands oil industry has plans to increase western Canadian tar sands production from 1.4 million bpd in 2012 to 5.8 million bpd by 2030.²⁰ Beyond its 2030 production plans, the industry has proposed a long-term goal of over 9.4 million bpd of tar sands production.²¹ But the ability to pursue expansion plans and move tar sands to export markets is significantly limited by a lack of pipeline capacity.

Furthermore, refineries in the Midwestern United States have become saturated with tar sands and are unable to absorb significant additional volumes.²² This glut of tar sands in the Midwest has resulted in a significant discount in tar sands prices, exceeding \$30 a barrel relative to North American benchmarks.²³ There are also pipeline capacity constraints from Alberta to the U.S. Gulf Coast region where there are refineries with available capacity to take tar sands crude. Therefore, additional pipeline capacity to the U.S. Gulf Coast would give the tar sands industry greater access to markets beyond North America.

“Much is at stake since the U.S., essentially our only energy export market, is becoming increasingly self-sufficient. This is due to growth in its domestic oil and natural gas supplies, but also because of a decline in energy demand due to energy efficiency gains. Canada is in competition with other jurisdictions to secure growing markets overseas, and could be left behind if we do not find a way to expand and diversify existing markets.”

- Standing Senate Committee on Energy, the Environment and Natural Resources, Government of Canada, August, 2013.²⁴

¹⁷ Jeff Lewis, “Canada’s oil industry boosts outlook amid pipeline pinch,” *Financial Post*, June 5, 2013, http://business.financialpost.com/2013/06/05/canadas-oil-production-to-more-than-double-by-2030-study-says/?_isa=a387-bfba.

¹⁸ Canadian Association of Petroleum Producers, “Crude Oil Forecast, Markets & Transportation,” June 2013, pp. 9-10, <http://www.capp.ca/getdoc.aspx?DocId=227308&DT=NTV>.

¹⁹ Oil Change International. Refinery Report: Tar Sands Refining in the United States and Canada 2010-2012. December, 2013, p. 3. http://priceofoil.org/content/uploads/2013/12/OCI_Refinery_Report-2012-Analysis-FINAL.pdf.

²⁰ Canadian Association of Petroleum Producers (CAPP), Crude Oil, Forecasts, Markets and Pipelines, June 2013, p. 37, <http://www.capp.ca/forecast/Pages/default.aspx>.

²¹ Oilsands Review, January 2014, http://issuu.com/jwnenergy/docs/osr_projectstatus_jan2014/1?e=2473097/5985396.

²² Sandy Fielden (RBN Energy), “Sailing stormy waters – The Gulf Coast market for Canadian heavy crude,” April 3, 2013, *Oil & Gas Financial Journal*, <http://www.ogfj.com/articles/2013/04/sailing-stormy-waters--the-gulf-coast-market-for-canadian-heavy-.html>.

²³ Goldman Sachs Equity Research, “Getting oil out of Canada v1.2: heavy oil diffs widening, rail growing,” October 8, 2013.

²⁴ Standing Senate Committee on Energy, the Environment and Natural Resources, “Moving Energy Safely: A Study of the Safe Transport of Hydrocarbons by Pipelines, Tankers and Railcars in Canada,” Government of Canada, August 2013, p. 5, <http://www.parl.gc.ca/Content/SEN/Committee/411/enev/rep/rep12aug13-e.pdf>.

Efforts to connect tar sands to coastal export market are also happening in Canada. For many years, the tar sands industry has been unsuccessfully advocating for pipeline projects to the Western Canadian coast that would connect to international export markets. Those plans have been delayed due to strong opposition by British Columbians and First Nation communities in the region.²⁵ With each delay and protest in British Columbia, the export pathway for tar sands to Canada's West Coast is increasingly viewed as unlikely.²⁶ This is due largely to the constitutional legal powers of First Nations to delay and block pipelines.²⁷ Faced with this obstacle, as well as delays on the proposed Keystone XL pipeline project to the U.S. Gulf Coast, tar sands producers are now looking to new pipeline projects that would connect Alberta tar sands production with Atlantic ports.²⁸

As one prime example, the recently-proposed 1.1 million bpd TransCanada "Energy East" project would connect tar sands production in Alberta directly with coastal ports in Eastern Canada.²⁹ While Energy East faces numerous obstacles, if approved, it would put tar sands output closer to Europe's doorstep than ever before.

In conclusion, because the U.S. is less of a destination for expanded tar sands production, the tar sands industry has been actively identifying possible export markets. With western Canadian pipeline access currently blocked, European markets have become the next logical destination.

b. Tar sands crude by rail proposals growing but at much lower volumes

Some companies in the U.S. are moving to add tar sands refining capacity to the U.S. west coast. These proposals face public opposition and could be delayed. While all of these new facilities are capable of handling Canadian tar sands crude, current shipments tend to be comprised primarily of light crudes from the Bakken formation in North Dakota. Further, these projects have faced increasing opposition as communities begin to question the environmental impacts of refining the dirtiest crudes.³⁰ Some examples of these proposals include:

²⁵ CBC News team, "B.C. officially opposes Enbridge Northern Gateway pipeline," *CBC News*, May 31, 2013, <http://www.cbc.ca/news/canada/british-columbia/b-c-officially-opposes-enbridge-northern-gateway-pipeline-1.1386317>. Gordon Hoekstra, "First Nations group calls for B.C. to reject Northern Gateway pipeline work permits," *Vancouver Sun*, June 27, 2013, <http://www.vancouversun.com/business/First+Nations+group+calls+reject+Northern+Gateway+pipeline+work+permits/8586827/story.html>.

²⁶ Jeffrey Simpson, "You heard it here: Northern Gateway's dead," *The Globe and Mail*, October 5, 2012, <http://www.theglobeandmail.com/globe-debate/you-heard-it-here-northern-gateways-dead/article4589760/>.

²⁷ Patricia Burke Wood and David Rossiter, "When Canada plans pipelines, it forgets the First Nations at its peril," *The Globe and Mail*, August 19, 2013, <http://www.theglobeandmail.com/globe-debate/if-aboriginal-issues-sink-northern-gateway-what-can-energy-east-learn/article13814943/#dashboard/follows/>.

²⁸ Rebecca Penty, "TransCanada Looks East Amid Keystone Pipeline Delay," *Bloomberg*, February 7, 2013, <http://www.bloomberg.com/news/2013-02-07/transcanada-looks-east-amid-keystone-pipeline-delay.html>; Lindsey Addawoo, "Go east, pipeline builders: Oilsands proponents look to the Atlantic," *Global News*, June 7, 2013, <http://globalnews.ca/news/622809/go-east-pipeline-builders-oilsands-proponents-look-to-the-atlantic/>.

²⁹ TransCanada Corporation, Energy East website, <http://www.energyeastpipeline.com/>.

³⁰ Spokane Clean Water Project, "Update: Revised Notice for Tesoro Savage's Crude Oil Terminal Application," November, 11, 2013), <http://www.spokanecleanwater.org/1/post/2013/11/update-revised-notice-for-tesoro-savages-crude-oil-terminal-application.html>.

- In California, Valero Energy has plans to receive North American-sourced crude oil via rail at its Benicia refinery capable of handling up to 70,000 bpd.³¹
- Valero also operates a refinery in Wilmington, California that has plans to increase refining of tar sands crude transported by rail.³²
- Tesoro Corp. operates a refinery in Martinez, California that is capable of refining heavy crudes and is seeking to build an offloading facility in Vancouver, Washington capable of handling up to 120,000 bpd.³³

Crude-by-rail projects available to the tar sands industry to ship its product westward are developing but should they proceed they would transport much smaller quantities of tar sands than pipelines like the proposed Keystone XL pipeline which would carry over 800,000 bpd. So while there is some growth in this westward growth transport option, it remains more limited than pipelines with much greater volumes going to the Gulf Coast and Eastern Canada which are more proximate to Europe.

c. Tar sands will likely enter existing diesel export paths from the U.S. to Europe once exported

Tar sands as a refined product such as diesel could immediately enter European markets as an import from the U.S. Gulf Coast. The United States is already an increasingly significant and competitive exporter of diesel to Europe from Gulf Coast markets.³⁴ U.S. exports of diesel to Europe are on the rise. Diesel shipments from the U.S. Gulf to Europe reached their highest volumes on record, growing from 66,000 bpd in 2007 to 335,000 bpd in 2012.³⁵ The International Energy Agency (IEA) projects U.S. surplus diesel production to increase from 2020 to 2030.³⁶

³¹ Tony Burchyns, “Benicia Calls for More Review of Valero’s Plan to Ship Crude by Railcar,” *Times Herald*, August. 8, 2013, http://www.timesheraldonline.com/ci_23823107/benicia-calls-more-review-valeros-plan-ship-crude.

³² Louis Sahagun, “Groups Seek Probe Into Low-Grade Crude Shipments to L.A. Refineries,” *L.A. Times*, April 2, 2013, <http://articles.latimes.com/2013/apr/02/local/la-me-0403-dirty-oil-20130403>.

³³ Tesoro Golden Eagle Refinery, <http://www.tsocorp.com/TSOCorp/ProductsandServices/Locations/RefineryLocations/001546>; Press Release: Tesoro and Savage Announce Joint Venture to Construct and Operate Crude-by-Rail Unloading and Marine Loading Facility at Port of Vancouver USA, Savage Servs. (April 22, 2013), <http://www.savageservices.com/pressroom/Tesoro%20and%20Savage%20Announce%20Joint%20Venture%20for%20Port%20of%20Vancouver%20Crude%20by%20Rail%20Project.html>.

³⁴ Valero Energy Corporation, Investor Presentation, November 2013, p. 57, <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9NTI1MzM3fENoaWxkSUQ9MjExMjQ3fFR5cGU9MQ==&t=1>.

³⁵ “Europe’s oil refiners choke on flood of U.S., Asian imports,” Reuters, September 26, 2013, <http://www.reuters.com/article/2013/09/26/europe-refining-idUSL5N0HK3Y520130926>; US Energy Information Administration, Data: Exports by Destination, Distillate Fuel Oil, 15 ppm and under, Annual-thousand barrels per day, <http://www.eia.gov/petroleum/data.cfm#imports>; Valero Energy Corporation, Investor Presentation, November 2013, p. 54, <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9NTI1MzM3fENoaWxkSUQ9MjExMjQ3fFR5cGU9MQ==&t=1>.

³⁶ U.S. diesel exports to Europe have increased from 66,000 bpd in 2007 to 335,000 bpd in 2012, reaching 637,000 bpd in September 2013. IEA, World Market Report, Nov. 18, 2013, pg. 553. U.S. Energy Information

As noted in a recent investor presentation by Valero, a major U.S. refiner with operations in the Gulf Coast, the United States now exports almost four million barrels per day of refined petroleum products, for which Europe is the second largest market.³⁷ Total diesel demand in Europe is expected to remain steady despite projections that by 2020, Europe will have lowered its overall oil consumption.³⁸ The share of diesel relative to petrol is expected to grow from approximately 70% of the refined product consumed in 2020 to 80 percent by 2030.³⁹ Diesel demand is expected to remain robust through 2030. According to CONCAWE, European diesel demand is expected to remain constant, declining only slightly from 4.11 million bpd in 2010 to 4.04 million bpd in 2030.⁴⁰ The IEA expects Europe's reliance on diesel imports to nearly double by 2020 due to refinery closures.⁴¹

Gulf Coast refineries increased diesel production by approximately 50% from 1998 to 2011.⁴² Many Gulf Coast refineries have already modified their refinery operations to increase the yield of diesel from heavy oil such as tar sands crudes. Valero added new capability to increase diesel yields in 2012 at its Port Arthur, Texas refinery and in 2013 at its Norco, Louisiana refinery.⁴³

Administration, Exports by Destination, Distillate Fuel Oil, November 27, 2013, http://www.eia.gov/dnav/pet/pet_move_expc_a_EPD0_EEX_mbbbl_m.htm.

³⁷ Valero Energy Corporation, Investor Presentation, November 2013, p. 57, <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9NTI1MzM3fENoaWxkSUQ9MjExMjQ3fFR5cGU9MQ==&t=1>.

³⁸ The IEA forecasts that diesel will take a larger share of overall fuel consumption in Europe as demand for other fuels decline. IEA, World Energy Outlook, Nov. 18, 2013, pg. 548. According to CONCAWE, European diesel demand is expected to remain flat, declining from 200 million metric tons, or 4.11 million bpd, in 2012 to 197 million metric tons, or 4.04 million bpd in 2012. "Europa: Contribution to EU energy pathways to 2050", July 2011, p. 24. <https://www.europia.eu/content/default.asp?PageID=412&DocID=30204>. The slight decrease in diesel demand is forecast by the IEA to be compensated by a higher percentage of diesel imports, which are expected to grow as a percentage of total demand. IEA, World Market Report, Nov. 18, 2013, pg. 549.

³⁹ The diesel used in Europe as compared with gasoline or petrol has increased in recent years and is expected to grow. Based on fuel quality monitoring reports reporting for 2003-2007, the diesel share by volume increased from 57 to 63 percent. See for example: EU Fuel Quality Monitoring Report – 2007 Summary Report, October 2009, p. 191, http://ec.europa.eu/environment/air/transport/pdf/fqm_summary_2007.pdf. See also: European Commission, Transport & Environment, Fuel Quality Monitoring for years 2002-2007, http://ec.europa.eu/environment/air/transport/fuel_quality_monitoring.htm. The trend of an increasing share of diesel in Europe is expected to grow as the freight sector's consumption (using a third of road fuel) is expected to grow and the diesel share from passenger cars will also grow. Europa, European Petroleum Industry Association, "2030-50 European Contribution to EU Energy Pathways to 2050," July 2011, p. 24, <https://www.europia.eu/Content/Default.asp?PageID=412&DocID=30204>.

⁴⁰ Europa, "Europa: Contribution to EU energy pathways to 2050," July 2011, p. 24, <https://www.europia.eu/content/default.asp?PageID=412&DocID=30204>. The IEA forecasts that diesel will take a larger share of overall fuel consumption in Europe as demand for other fuels decline. IEA, World Energy Outlook, Nov. 18, 2013, pg. 548. The slight decrease in diesel demand is forecast by the IEA to be compensated by a higher percentage of diesel imports, which are expected to grow as a percentage of total demand IEA, World Market Report, Nov. 18, 2013, pg. 549.

⁴¹ International Energy Agency, World Energy Outlook, November 18, 2013, pp. 548-549.

⁴² U.S. Energy Information Administration, "Gulf Coast (PADD 3) Refinery Yield of Distillate Fuel Oil, 1994-2012," Annual series: <http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=p&s=mdiryp33&f=a>.

⁴³ Sandy Fielden, "Pump Up the Volume – Using Hydrocrackers to Increase Refinery Diesel Yields," RBN Energy LLC, July 2, 2013, <http://www.rbnenergy.com/pump-up-the-volume-using-hydrocrackers-to-increase-refinery-diesel-yields>. Oil Change International, Exporting Energy Security: Keystone XL Exposed, September 2011, p. 7, http://priceofoil.org/content/uploads/2011/09/OCIkeystoneXL_2011R.pdf.

They are reportedly planning to expand existing units, called hydrocrackers,⁴⁴ at their other refineries as well to achieve similar results.⁴⁵

As noted in a November 2013 Valero investor presentation, the United States now exports almost 4 million barrels per day of refined petroleum products, for which Europe is the second largest market.⁴⁶ Valero is on course to raise diesel production from 33% to 43% of total product output. While gasoline demand is in decline in the United States, diesel is the growth fuel in the global market.

d. The U.S. crude oil “boom” and its influence on possible tar sands exports to Europe

The light, tight oil boom in the United States could also facilitate greater exports of tar sands to Europe. The United States is experiencing a dramatic rise in domestic oil production that could affect tar sands exports in the near term and possibly over the next couple of decades. The new oil being produced in the United States is light oil extracted from shale formations by horizontal drilling and hydraulic fracturing (“fracking”).⁴⁷

Light, tight oil production in the United States has risen sharply and rapidly.⁴⁸ The U.S. light, tight oil boom is pertinent to the issue of tar sands exports primarily because it could make the United States at least in the short-term less dependent on imports, including those from Canada. U.S. regulations that prohibit exports of domestically produced crudes may also factor in to increase tar sands heavy crude exports from the Gulf. While U.S. regulations restrict the export of domestically produced crude,⁴⁹ they do not restrict exports of crude produced outside the United States such as Canadian oil.⁵⁰ Refineries in the Gulf Coast are currently inundated with

⁴⁴ The hydrocracker upgrades low-quality heavy gas oils other refinery modules into high-quality, clean-burning jet fuel, diesel, and gasoline. EIA, Hydrocracking is an important source of diesel and jet fuel, Jan. 18, 2013, <http://www.eia.gov/todayinenergy/detail.cfm?id=9650>.

⁴⁵ Sandy Fielden, “Pump Up the Volume – Using Hydrocrackers to Increase Refinery Diesel Yields,” RBN Energy LLC, July 2, 2013, <http://www.rbnenergy.com/pump-up-the-volume-using-hydrocrackers-to-increase-refinery-diesel-yields>.

⁴⁶ Valero Energy Corporation, Investor Presentation, November 2013, p. 57, <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9NTI1MzM3fENoaWxkSUQ9MjExMjQ3fFR5cGU9MQ==&t=1>.

⁴⁷ Natural Resources Canada, “North American Tight Light Oil: North American Tight Light Oil: Key Facts,” <http://www.nrcan.gc.ca/energy/sources/crude/2114>.

⁴⁸ International Energy Agency, World Energy Outlook, November 18, 2013, p. 474-477. 2013, <http://www.reuters.com/article/2013/11/12/iea-outlook-idUSBQE7DN0FD20131112>.

⁴⁹ The ban against exports from U.S. ports of U.S.-produced crude oil, in place since the 1973 OPEC oil embargo and currently being questioned by some U.S. oil producers, is well-summarized in a new report: Oil Change International, “Should it Stay or Should it Go? The Case Against US Crude Oil Exports,” October 2013, pp. 20-21, http://priceofoil.org/content/uploads/2013/10/OCI_Stay_or_Go_FINAL.pdf.

⁵⁰ 15 CFR § 754.2. This regulation requires the Bureau of Industry and Security (BIS), which is part of the U.S. Department of Commerce, to “approve applications to export crude oil” for specified transactions “if BIS determines that the export is consistent with the specific requirements pertinent to that export.” One of the eligible transactions is exports “To Canada for consumption or use therein,” and another is foreign-origin crude oil where, based on written documentation satisfactory to BIS, the exporter can demonstrate that the oil is not of U.S. origin and has not been commingled with oil of U.S. origin.” If there has been no comingling with any U.S. crude, exports

domestic light crude.⁵¹ According to data from the U.S. Energy Information Administration, oil inventories in the Gulf region topped 197 million barrels in October 2013, the highest stockpile ever recorded for that time of year.⁵² The surplus of domestic light crude, created by the U.S. crude export ban, has led to a price discount for U.S. light crude.⁵³ This incentivizes Gulf Coast refineries to use more of it, which reduces the amount of heavy oil they refine. All of this adds even more pressure to export unrefined Canadian tar sands from the Gulf.

Therefore, the U.S. light, tight oil boom, combined with a prohibition on the export of domestically produced crudes, has the potential to make greater volumes of tar sands imports to the United States less appealing to U.S. refineries and therefore more likely to go for export.⁵⁴ Finally, because of the tight oil boom in the United States, U.S. refineries have little incentive to make the needed investments to retool in order to take greater volumes of tar sands crude.⁵⁵

e. Pacific options for tar sands exports to China are faint

Access to the Canadian Pacific coast for tar sands pipelines remains blocked. Despite a positive regulatory review of the pipeline, strong opposition from the public and First Nations make both the proposed Enbridge Northern Gateway and Kinder Morgan Trans Mountain Expansion tar sands pipeline projects very uncertain and by many accounts unlikely.⁵⁶

Enbridge's proposed Northern Gateway project is a controversial 525,000 bpd tar sands pipeline across the mountainous terrain and salmon-bearing rivers of north-central British Columbia. Most recently, in December 2013, Canada's Joint Review Panel released a report recommending approval of the pipeline with 209 conditions.⁵⁷ But despite this approval, public and First Nations opposition will likely derail or delay this project. British Columbia opposed the project

of crude produced solely outside the United States (such as in Canada) can be allowed. This provision for what are called "re-exports" could be used for exports of tar sands crudes via U.S. ports.

Oil Change International, "The Keystone XL pipeline will lead to a surplus of heavy crude oil on the Gulf Coast that will be exported," pp. 2-5, http://priceofoil.org/content/uploads/2013/07/OCI_KXL-Crude-Exports_07-11-13.pdf.

⁵² Elizabeth Douglass, "Need for Keystone XL erodes as U.S. oil floods Gulf Coast refining hub," *InsideClimate News*, November 6, 2013, <http://insideclimatenews.org/news/20131106/need-keystone-xl-erodes-us-oil-floods-gulf-coast-refining-hub>.

⁵³ Isaac Arnsdorf, "U.S. oil glut seen in 2015 as export ban tested." *Financial Post*, November 27, 2013, http://business.financialpost.com/2013/11/27/u-s-oil-glut-seen-in-2015-as-export-ban-tested/?_lsa=276b-b0f6

⁵⁴ John Schmuell, "Heavy oil discounts to persist in 2014," *Financial Post*, November 21, 2013, http://business.financialpost.com/2013/11/21/heavy-oil-discounts-to-persist-in-2014/?_lsa=2d9e-37c1.

⁵⁵ Oil Change International, "Should it stay or should it go? The Case Against U.S. Crude Oil Exports," October 2013, http://priceofoil.org/content/uploads/2013/10/OCI_Stay_or_Go_FINAL.pdf.

⁵⁶ Nathan VanderKlippe, "Opposition to Trans Mountain pipeline nearing Northern Gateway levels," *The Globe and Mail*, September 18, 2012, <http://www.theglobeandmail.com/news/british-columbia/opposition-to-trans-mountain-pipeline-nearing-northern-gateway-levels/article4551051/>. CBC News team, "B.C. First Nations protest Kinder Morgan pipeline," *CBC News*, October 14, 2013, <http://www.cbc.ca/news/canada/british-columbia/b-c-first-nations-protest-kinder-morgan-pipeline-1.2054039>. Sam Cooper, "Thousands rally in Vancouver against Enbridge's proposed Northern Gateway pipeline," *The Province*, November 18, 2013, <http://www.theprovince.com/news/Thousands+rally+Vancouver+against+Enbridge+proposed+Northern+Gateway+pipeline/9176134/story.html>.

⁵⁷ National Energy Board. "Joint Review Panel Report on Enbridge Northern Gateway Project," December 19, 2013. <https://docs.neb-one.gc.ca/ll-eng/llisapi.dll?func=ll&objId=2396699&objAction=browse&viewType=1>

in its formal comments to the Joint Review Panel in May 2013.⁵⁸ This announcement mirrors significant opposition from the public and from legally powerful First Nations. Polling shows that more than two-thirds of British Columbians oppose the Northern Gateway project.⁵⁹ More than 130 First Nations that have aboriginal rights and title and that are affected by the proposed pipeline have publicly opposed both the pipeline and the additional tanker traffic that would result from the project.⁶⁰ Given the strong legal rights afforded Aboriginal Peoples in Canada under the constitution, especially those on unceded territory such as in British Columbia, their opposition represents a considerable legal barrier to the likelihood of the project going forward.⁶¹ Even oil industry commentators and federal cabinet ministers who historically have been boosters of west coast pipelines have become significantly more muted in their support.⁶² In the unlikely event the Northern Gateway project is approved by 2017, as Enbridge projects, such a decision will likely be contested in courts for many years by concerned British Columbians and First Nations. These obstacles have led financial analysts to downgrade their expectations for Northern Gateway.⁶³ And despite the appearance of an agreement on west coast pipelines between the leaders of Alberta and British Columbia,⁶⁴ substantial First Nations opposition remains a clear legal barrier leaving most industry analysts believing the Northern Gateway project will not move ahead.⁶⁵

Similar obstacles face the proposed Trans Mountain pipeline by Kinder Morgan, which is being met by rising public opposition in the Vancouver region of British Columbia.⁶⁶ On December 16, 2013, Kinder Morgan formally applied to Canada's National Energy Board to expand its

⁵⁸ Argument of the Province of British Columbia Re: Hearing Order OH-4-2011 and File No. OF-Fac-Oil-N304-2010-01 01 Enbridge Northern Gateway Project Application, May 31, 2013, http://www.env.gov.bc.ca/main/docs/2013/BC-Submission-to-NGP-JointReviewPanel_130531.pdf; "B.C. officially opposes Enbridge Northern Gateway pipeline," *CBC News*, May 31, 2013, <http://www.cbc.ca/news/canada/british-columbia/story/2013/05/31/bc-northern-gateway-rejected.html>.

⁵⁹ "Your Insights on the Northern Gateway Pipeline," *Insights West*, February 4, 2013, <http://www.insightswest.com/news/your-insights-on-the-northern-gateway-pipeline/>.

⁶⁰ "First Nations Gain Powerful New Allies in Fight Against Enbridge Northern Gateway Pipeline and Tankers," Press Release, Yinke Dene Alliance, December 5, 2013, <http://savethefraser.ca/STF-Release-2013-12-05.pdf>.

⁶¹ Carrie Tait and Nathan Vanderklippe, "First Nations Dig In Against Enbridge Pipeline," *The Globe and Mail*, May 13, 2011, <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/first-nations-dig-in-against-enbridge-pipeline/article2021928/page1/>.

⁶² Andy Radia, "Northern Gateway may soon need extraordinary political measures to survive," *Yahoo News*, December 3, 2012, <http://ca.news.yahoo.com/blogs/canada-politics/northern-gateway-pipeline-may-soon-extraordinary-political-measures-183201589.html>.

⁶³ Canadian Press, "Oil industry faced with 'serious challenge' as pipelines pill up, TD warns," *Financial Post*, December 17, 2012, <http://business.financialpost.com/2012/12/17/oil-industry-faced-with-serious-challenge-as-pipelines-fill-up-td-warns/>.

⁶⁴ Ian Bailey and Brent Jang, "Clark, Redford have framework for pipeline deal," *Globe and Mail*, November 5, 2013, <http://www.theglobeandmail.com/news/national/clark-redford-reach-deal-on-pipelines/article15260483/>.

⁶⁵ Yadullah Hussain, "Enbridge's Northern Gateway stands least chance of approval among proposed pipelines, analysts say," *Financial Post*, October 25, 2013, http://business.financialpost.com/2013/10/25/enbridge-northern-gateway-pipelines/?_lsa=9fdd-09c3.

⁶⁶ Jeff Lewis, "Kinder Morgan's pipeline ambitions on West Coast raises oil tanker concerns," *Financial Post*, March 16, 2013, http://business.financialpost.com/2013/03/16/kinder-morgans-pipeline-ambitions-on-west-coast-raises-oil-tanker-concerns/?_lsa=9fdd-09c3.

TransMountain pipeline from 300,000 bpd to 890,000 bpd.⁶⁷ The expansion would require new permits, the renegotiation of landowner agreements along the route, agreements with First Nations, the dredging of the Vancouver harbor and changes in regulations to allow increased tanker traffic. Even at this early stage, some of these elements of the project proposal have already generated substantial opposition. The mayors of Vancouver and Burnaby, British Columbia, have spoken out strongly against the pipeline proposal and the associated tanker traffic.⁶⁸

“Today, the movement of oil and natural gas to new domestic and international markets – especially the growing Asia Pacific market – is at the forefront of energy policy discussions in Canada. This is because access to Asian markets for Western Canadian oil and natural gas production is virtually non-existent.”

- Standing Senate Committee on Energy, Canadian Senate report, 2013⁶⁹

The growing challenge faced by Canadian tar sands producers to access Pacific Coast exports has clearly led to new proposals to potentially transport tar sands to the Canadian east coast. Should tar sands be exported from the east coast, Europe is a more likely destination than Asia given its location in the Atlantic Basins. TransCanada’s Energy East project has identified Spain as a possible export destination citing refinery capacity to take heavy tar sands crude.⁷⁰ A number of Spain’s refineries already process heavy, sour crude and this number will increase as current projects go forward to upgrade refineries to increase use of heavy oil feedstocks. Refinery company Repsol, with five refineries in Spain, has several projects underway to increase its ability to process heavy crude.⁷¹ Of the five Repsol refineries in Spain, three currently have cokers (La Coruna, Puertollano and Cartagena) and one has a coker under construction (Bilbao). Cokers are used as a primary upgrading technology to convert heavy sour crudes, including tar sands bitumen, into a product capable of being refined into fuel, asphalt or other products.

⁶⁷ “Kinder Morgan files application to expand Trans Mountain pipeline,” December 16, 2013, <http://www.reuters.com/article/2013/12/16/kindermorgan-transmountain-expansion-idUSL2N0JV1GL20131216>.

Kinder Morgan proposes to expand the scope of the expansion project to 890,000 bpd from 300,000.

⁶⁸ Jeff Lee and Brian Morton, “Vancouver and Burnaby mayors decry Kinder Morgan pipeline expansion,” *Vancouver Sun*, April 14, 2012,

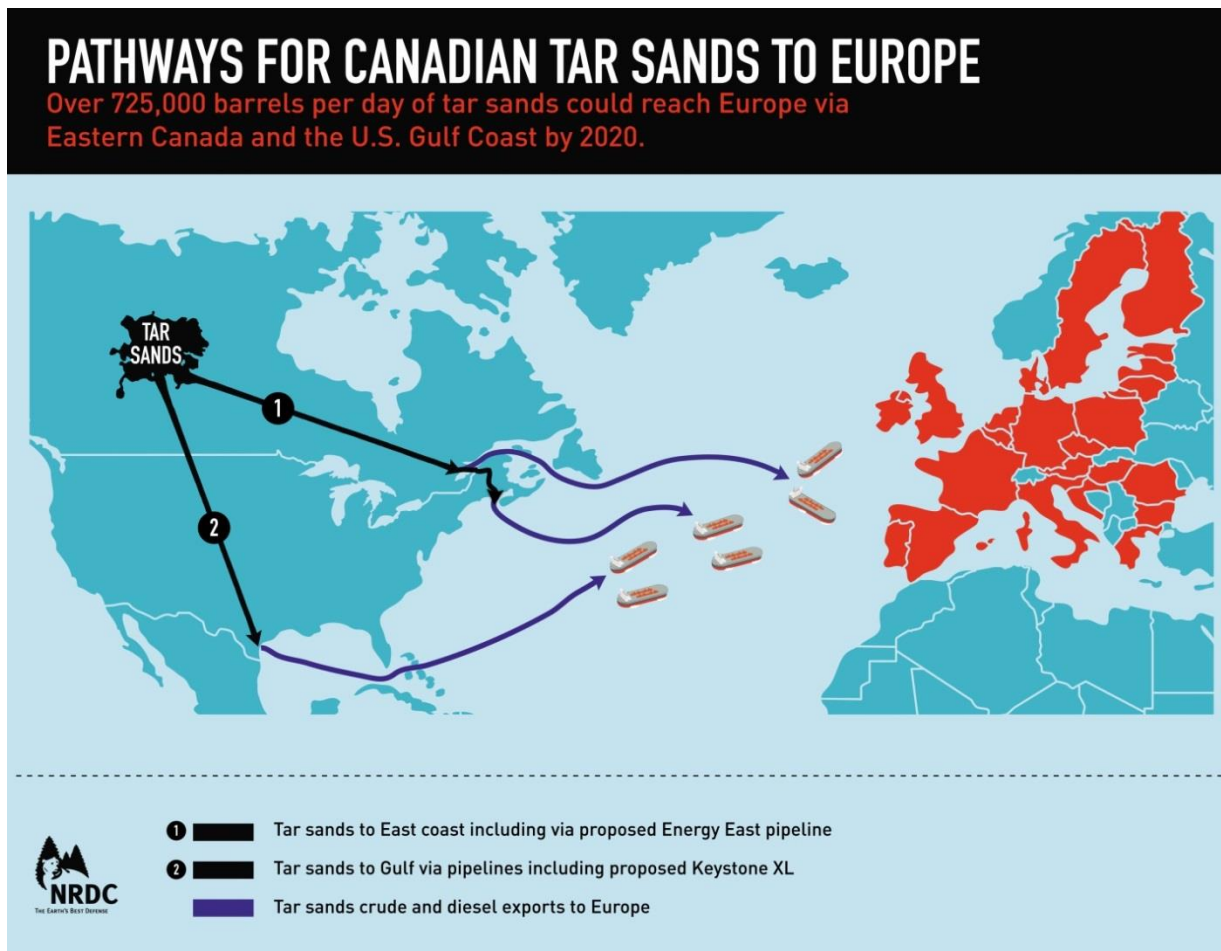
<http://www.vancouver.sun.com/business/Vancouver+Burnaby+mayors+decry+Kinder+Morgan+pipeline+expansion/6457014/story.html>.

⁶⁹ Standing Senate Committee on Energy, the Environment and Natural Resources, Senate (Canada), “Moving Energy Safely: A Study of the Safe Transport of Hydrocarbons by Pipelines, Tankers and Railcars in Canada,” August 2013, p. 5, <http://www.parl.gc.ca/Content/SEN/Committee/411/enev/rep/rep12aug13-e.pdf>.

⁷⁰ Jeff Lewis, “TransCanada to proceed with Energy East pipeline project, deep water port in Atlantic Canada,” *The Financial Post*, August 1, 2013, <http://www.vancouver.sun.com/mobile/business/news/TransCanada+proceed+with+Energy+East+pipeline+project/8738585/story.html>.

⁷¹ Repsol, Industrial complexes, http://www.repsol.com/es_en/corporacion/conocer-repsol/nuestra-actividad/downstream/complejos-industriales/default.aspx.

II. Potential pathways for tar sands exports to Europe



a. U.S. Gulf Coast pathway

Increasing pipeline capacity from Alberta to the Gulf Coast has been a top priority goal for the tar sands industry. While the Keystone XL Northern segment has not been approved, several other projects have advanced, enabling increased tar sands exports from Canada to the U.S. Gulf Coast. Below we list projects that enable the transport of Western Canadian crude oil, including tar sands, from the province of Alberta to the U.S. Gulf Coast.

1. Near-term options

- Seaway: This pipeline reversal began transporting crude south from Cushing, Oklahoma to the Gulf in May 2012. The Seaway project by Enbridge and Enterprise Product Partners had an initial capacity of 150,000 bpd, increasing to 400,000 bpd in January

2013, and by mid-2014 will carry 850,000 bpd to the Houston/Port Arthur, Texas area.⁷² It is expected this pipeline will carry a significant quantity of tar sands.

- Southern leg of TransCanada's Keystone XL project: Renamed the Gulf Coast Pipeline Project, this pipeline is under construction. TransCanada recently announced the timeframe for operation would be 2013-2014.⁷³ The Gulf Coast project's initial capacity will be 700,000 bpd; with the addition of more pumping, the ultimate capacity will be 830,000 bpd to the Houston/Port Arthur, Texas area.⁷⁴ The capacity of the Gulf Coast pipeline to transport tar sands will be limited without the Keystone XL northern segment.

While these projects will not increase Canada's cross-border export capacity, they provide a means for tar sands to flow from the saturated Midwestern refinery market to Gulf Coast refineries. These projects will add over 1.6 million bpd of pipeline capacity between Cushing, Oklahoma and the Gulf Coast refining complex within the next year.

2. Medium term options

- Eastern Gulf Crude Access: Formerly called the "Trunkline Conversion," this Energy Transfer Partners LP project would convert and reverse a pipeline between Patoka, Illinois (where several pipelines converge that could potentially carry tar sands from Canada) and Boyce, Louisiana.⁷⁵ Eventually, the project promoter hopes to extend the pipeline to reach Louisiana refineries on the Eastern portion of the Gulf of Mexico. The Patoka to Boyce project would create up to 420,000 bpd of new capacity if completed. Start-up is now anticipated for 2016, and it expects to receive the first of several approvals it will need from the U.S. Federal Energy Regulatory Commission.⁷⁶
- Southern Access Extension: Enbridge's "SAX" also referred to as "Flanagan South" pipeline project would if completed transport some 600,000 bpd of Canadian crude coming into the United States on Enbridge pipelines from Flanagan, Illinois, to Cushing, Oklahoma where it would then connect with the Seaway pipeline going to the Texas Gulf Coast (described above).⁷⁷
- Keystone XL: TransCanada's highly controversial pipeline project would bring tar sands from Hardisty, Alberta to Steele City Nebraska where it would connect with the rest of the Keystone system to the Texas Gulf Coast, potentially adding another 830,000 bpd of capacity from the tar sands to the Gulf coast. After over five years of significant public

⁷² Seaway Crude Pipeline Company LLC, "Seaway Pipeline," <http://www.seawaypipeline.com>.

⁷³ TransCanada Corporation, "TransCanada Investor Day, November 19, 2013," Presentation, p. 13, http://www.transcanada.com/docs/Investor_Centre/2013_TransCanada_Investor_Day_Presentation.pdf.

⁷⁴ Statement by CEO Russ Girling, President and CEO, TransCanada. Transcript of TransCanada Investor Days presentation, November, 19, 2013, "TransCanada's CEO Hosts 2013 Investor Day Conference, November 19, 2013," *SeekingAlpha*, <http://seekingalpha.com/article/1850441-transcanadas-ceo-hosts-2013-investor-day-conference-transcript>.

⁷⁵ Energy Transfer Partners LP, "Eastern Gulf Crude Access," http://www.energytransfer.com/ops_egca.aspx.

⁷⁶ Bridget Hunsucker, "Eastern Gulf Crude Access pipeline won't be linked to St. James: ETP," *Platts*, November 6, 2013, <http://www.platts.com/latest-news/oil/houston/eastern-gulf-crude-access-pipeline-wont-be-linked-21786375>.

⁷⁷ Enbridge, Flannigan South Project, July 2013, <http://www.enbridge.com/~media/www/Site%20Documents/Delivering%20Energy/Projects/Flanagan/ENB2013-FlanaganSouth-L05.pdf>.

opposition based on its significant climate and water impacts, approval is anything but certain. If it were to be approved, that project's start-up would occur no earlier than 2016.

Other more distant proposals are on the horizon, but have not yet reached concrete stages of project planning or approval. Possible projects include reversing the 1.2 million bpd Capline pipeline, which is currently underutilized moving crude from the Gulf (New Orleans area) to Patoka, Illinois.

Despite major efforts by industry to expand the pipeline network feeding the Gulf, it remains very uncertain as to which pipeline projects will go forward and when. While the proposed Keystone XL and other tar sands pipeline projects have encountered intense opposition and lengthy delays, other projects could add more than 1 million bpd of pipeline capacity to the system that enables transport of tar sands crude from Canada south to Gulf Coast refineries.⁷⁸ Increasing volumes of tar sands to the Gulf Coast will worsen the carbon intensity of refined products.

3. Gulf Coast export pathway will contain more and more tar sands

As increasing volumes of tar sands reach the U.S. Gulf Coast, more tar sands crude will be processed at Gulf Coast refineries. Many Gulf Coast refineries processing heavy crudes also specialize in producing diesel fuel. As the mix of tar sands in Gulf Coast refineries increases, so will the percentage of tar sands included in diesel fuel which is exported to Europe. A recent study by Hart Energy, commissioned by the Natural Resources Defense Council, evaluated the extent to which an increasing volume of tar sands to the Gulf Coast would increase the carbon intensity of fuel in the U.S. Northeast region.⁷⁹ The Gulf Coast supplies about 41 percent of the refined fuel to the U.S. Northeast and Mid-Atlantic region.⁸⁰ As carbon intensive tar sands volumes increase to the Gulf Coast, it would also increase the volume of carbon-intensive tar sands refined products such as gasoline flowing to the Northeast.⁸¹

In 2012, U.S. Gulf Coast refiners received about 110,000 bpd of Western Canadian crude, most of which is derived from tar sands.⁸² Of this amount, some 80,000 bpd is processed in refineries that could serve exports.⁸³ Hart Energy estimated the tar sands crude currently comprises approximately 1.2% of the crude processed in Gulf Coast refineries in 2012.⁸⁴ Based on possible estimates of additional volumes of tar sands crude expected to reach the Gulf in later years, Hart

⁷⁸ For example, if the Eastern Gulf Crude Access and the Southern Access Extension pipelines, described in the text, both went forward as planned before 2016, they could collectively add 1.2 million bpd (420,000 bpd and 800,000 bpd, respectively), to pipeline capacity, enabling greater volumes of tar sands to get to the Gulf Coast.

⁷⁹ Hart Energy, "Evaluation of Potential Pathways for Tar Sands to the U.S. Northeast," Prepared for the Natural Resources Defense Council, June 2013. http://docs.nrdc.org/energy/files/ene_14011601a.pdf.

⁸⁰ Ibid. p. 6, Table 4.

⁸¹ Ibid. According to the study, in 2012, tar sands contributed to only about 0.8% of the Northeast product market but that it could reasonably be expected to rise to 14.2% by 2020 and 14.6% by 2025 under a business as usual (BAU) scenario.

⁸² Ibid.

⁸³ Ibid.

⁸⁴ Ibid, p. 12. Figure 2. The combined capacity of the 30 (approximate) refineries operating in the Gulf today is approximately 6.75 million bpd.

Energy projects tar sands crude could grow to nearly 24% of all crude processed in Gulf refineries by 2020.⁸⁵

Meanwhile diesel exports from the US are rising sharply, surpassing one million barrels a day for the first time in mid-2013.⁸⁶ According to U.S. Energy Information Administration data, total diesel exports to Europe for 2012 were 335,000 bpd.⁸⁷

Another dynamic that may lead to exports of tar sands heavy crudes from the Gulf independent of U.S. regulations is that demand for these crudes in the United States may be limited due to refinery ownership and supply arrangements. Consequently, heavy crude from Canada may bypass refineries and be exported. Not all Gulf Coast refiners able to process heavy crudes are necessarily interested in high volumes of heavy crude from the Canadian tar sands.

b. Canada-based pathways: TransCanada's Energy East Pipeline Project

In contrast with the U.S. pathways discussed above, with their focus on the export to Europe of tar sands-derived diesel, the Canadian pathways focus primarily on the export of tar sands crudes. The Canadian option involves primarily one large pipeline, originating near Alberta's tar sands mines and drilling sites, and terminating at a major deepwater port on Canada's Atlantic Coast.

This new pipeline proposal was announced by TransCanada in August 2013; however, the company has delayed filing of a formal application with the National Energy Board (NEB) until 2014. This project is a combination of 3,000 km (1,860 miles) of converted gas pipeline and 1,500 kms (930 miles) of new oil pipeline construction. It would run from a tar sands terminal in Hardisty, Alberta to eastern Canadian refineries and ports in Quebec and New Brunswick and terminating in Saint John, NB. It includes building two new marine terminals dedicated for exports, highlighting its role as an export project.

Energy East would be longer than Keystone XL and possesses a larger transport capacity (1.1 million bpd). TransCanada has said that "Energy East will transport diluted bitumen," but it will also carry light crudes.⁸⁸ Some of the light crude would come from Saskatchewan, while some would come from tar sands upgraded in Alberta.⁸⁹ While it is not yet clear what proportions of

⁸⁵ Ibid. This assumes a "Business As Usual scenario" in which pipeline/rail capacity is sufficient to move the volume of Canadian crude calculated to be processed in the Gulf Coast. This assumes availability of the Pegasus pipeline, the Enbridge Flanagan South, the Enbridge ETP and the Keystone XL northern segment.

⁸⁶ Ben Lefebvre, "U.S. refiners export more fuel than ever," *Wall Street Journal Online*, October 8, 2013, <http://online.wsj.com/news/articles/SB10001424052702304441404579123604287854862>.

⁸⁷ In 2012, European nations imported an average of 335,000 bpd of diesel from the United States. U.S. EIA, Exports by Destination, Distillate Fuel Oil, November 27, 2013, http://www.eia.gov/dnav/pet/pet_move_expc_a_EP00_EEX_mbb1_m.htm.

⁸⁸ TransCanada Corporation. Energy East website, "Inside the Pipeline: Crude Oil Facts,"

<http://www.energyeastpipeline.com/wp-content/uploads/2013/08/Energy-East-Crude-Oil-Facts.pdf>.

⁸⁹ Energy East's president, Steve Pohlod, said in April 2013 that the pipeline would carry a mix of light and heavy blends of Alberta crude: "TransCanada mainline conversion opens doors to offshore oil exports," *National Post*, April 2, 2013: http://business.financialpost.com/2013/04/02/transcanada-mainline-conversion-opens-doors-to-offshore-oil-exports/?_lsa=4575-66cb. Ibid.

heavy versus light crude⁹⁰ would flow through this pipeline, Energy East would likely carry substantial volumes of heavy crudes from the tar sands.⁹¹ Canada's National Energy Board has said that it expects heavy crude oil exports will rise by 182% from 2012 to 2035, "reflecting increases in blended bitumen production from Alberta's oil sands."⁹²

Like Keystone XL, Northern Gateway and other tar sands pipelines, the Energy East pipeline would encourage continued expansion of tar sands extraction and upgrading, with its known harms to water sources, forests, habitat, wildlife, First Nations communities and residents of northern Alberta communities. Consequently, greenhouse gas emissions from the tar sands would increase, since a large part of Energy East's crude would originate in the tar sands.

While Energy East was only recently proposed, there is already considerable uncertainty over its viability. This highly complex project requires multiple approvals from Canadian regulators for different aspects of the project including permits in the six provinces and hundreds of towns through which it would pass.⁹³ Ontario, a large Canadian province through which the pipeline will pass, has announced its intention to hold provincial hearing on the impacts of the pipeline including its greenhouse gas impacts.⁹⁴ A portion of Energy East will require taking a natural gas line out of service and converting it to crude – something that by itself is a contentious issue for local governments, industrial customers and consumers alike. Communities potentially affected include over 180 First Nations from Saskatchewan to New Brunswick.⁹⁵

⁹⁰ TransCanada officials and project allies have mentioned on a number of occasions in the media that the project would carry both light and heavy crudes. Jeff Lewis, "TransCanada mainline conversion opens doors to offshore oil exports," *Financial Post*, April 2, 2013, http://business.financialpost.com/2013/04/02/transcanada-mainline-conversion-opens-doors-to-offshore-oil-exports/?_isa=4575-66cb; Lauren Krugel, "Will eastern oil pipelines lead to lower prices at the pump for Canadians?" *The Canadian Press*, April 19, 2013, <http://business.financialpost.com/2013/04/19/will-eastern-oil-pipelines-lead-to-lower-prices-at-the-pump-for-canadians/>.

⁹¹ TC President of energy and oil pipelines, Alex Pourbaix, has said that the Energy East pipeline would be capable of moving heavy oil sands crude as well as light crude in batches to various locations: "Will eastern oil pipelines lead to lower prices at the pump for Canadians?" *The Canadian Press*, April 19, 2013: <http://business.financialpost.com/2013/04/19/will-eastern-oil-pipelines-lead-to-lower-prices-at-the-pump-for-canadians/>. This is likely because production and supply of blended bitumen production from the Alberta tar sands are projected to rise steadily and substantially from 2014 to at least 2035, while supply of light crude will flatten out and then peak around 2025, declining gradually after that. National Energy Board, "Canada's Energy Future 2013: Energy Supply and Demand Projections to 2035," November 2013, p. 47. <http://www.neb-one.gc.ca/clf-nsi/rnrgynfntn/nrgyrprt/nrgyfr/2013/nrgftr2013-eng.pdf>.

⁹² *Ibid.*

⁹³ "TransCanada's Energy East tar sands pipeline faces major hurdles," September 25, 2013, http://switchboard.nrdc.org/blogs/eshope/transcanadas_energy_east_tar_s.html.

⁹⁴ Max Paris, "Energy East Pipeline to face Ontario scrutiny," *CBC News*, November 13, 2013, <http://www.cbc.ca/news/politics/energy-east-pipeline-to-face-ontario-scrutiny-1.2425544>.

⁹⁵ Shawn McCarthy, "Energy companies struggle with aboriginal needs on pipelines," *The Globe and Mail*, December 8, 2013, <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/energy-companies-struggle-with-aboriginal-needs-on-pipelines/article15818477/>.

1. Energy East as export pipeline to Europe

The Energy East project could have major potential implications for Europe. While Energy East would place large volumes of crude in eastern Canada, OPEC also identified Europe as a key potential market for Energy East's crude.⁹⁶

It is clear that the Energy East Pipeline Project's purpose is as an export pipeline. TransCanada's CEO Russ Girling has acknowledged the export purpose of Energy East, "If we're going to be an oil-exporting nation, we're going to have to get oil exported on the water."⁹⁷ This objective has also been stated by Irving Oil, whose refinery operations will be connected with Energy East. Irving Oil's CEO Paul Browning acknowledged that one of the key purposes of the pipeline is to export tar sands oil to Europe in part because its marine terminal was closer to eastern Canada (Spain in particular) than other possible export markets.⁹⁸

While a variety of potential markets have been mentioned in the media, it is notable that project proponents have specifically mentioned Europe,⁹⁹ and Spain, in particular,¹⁰⁰ as a priority destination for Energy East exports. Energy East could export tar sands crude in the form of SCO or diluted bitumen.¹⁰¹

Spain has a number of refineries that can process heavy crude including tar sands diluted bitumen. Refinery giant Repsol – a company with existing ties to one of TransCanada's key

⁹⁶ OPEC, *World Oil Outlook 2013*, p. 264,

http://www.opec.org/opec_web/static_files_project/media/downloads/publications/Section_II_WOO2013.pdf.

⁹⁷ Kelly Cryderman, "Keystone criticism misplaced, TransCanada CEO insists," *The Globe and Mail*, April 22, 2013, <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/keystone-criticism-misplaced-transcanada-ceo-insists/article11446046/>.

⁹⁸ "Irving Oil CEO Says Eastern Canada Has Export Edge Over Gulf Coast," *Reuters*, November 29, 2013, <http://www.reuters.com/article/2013/11/29/irving-exports-shipping-idUSL2N0JE10X20131129>; Kevin Bissett, "Plans to build new Irving Oil terminal lifts hopes in Saint John," *The Canadian Press*, August 1, 2013, <http://atlantic.ctvnews.ca/plans-to-build-new-irving-oil-terminal-lifts-hopes-in-saint-john-1.1393469#ixzz2dCmFtFsM>.

⁹⁹ Lauren Krugel, "TransCanada plans to go ahead with Energy East pipeline," *The Canadian Press*, August 1, 2013, <http://www2.macleans.ca/2013/08/01/transcanada-going-ahead-with-energy-east-line-between-alberta-and-new-brunswick/>; Richard Swan et al., "TransCanada says to build Energy East cross-Canada crude pipeline," *Platts*, August 1, 2013, <http://www.platts.com/latest-news/oil/newyork/transcanada-says-to-build-energies-east-cross-canada-21365710>; Jeff Lewis, "Export plan adds urgency to Canada-EU oil sands quality debate," *Financial Post*, August 21, 2013, http://business.financialpost.com/2013/08/21/export-plan-adds-urgency-to-canada-eu-oil-sands-quality-debate/?_isa=9fdd-09c3.

¹⁰⁰ Jeff Lewis, "TransCanada to proceed with Energy East pipeline project, deep water port in Atlantic Canada," *Financial Post*, August 1, 2013, <http://www.vancouversun.com/sports/TransCanada+proceed+with+Energy+East+pipeline+project+deep+water+port+Atlantic+Canada/8738585/story.html#ixzz2cjA1k9IG>.

¹⁰¹ Jeff Lewis, "TransCanada to proceed with Energy East pipeline project, deepwater port in Atlantic Canada," *Financial Post*, August 1, 2013, <http://www.vancouversun.com/sports/TransCanada+proceed+with+Energy+East+pipeline+project+deep+water+port+Atlantic+Canada/8738585/story.html#ixzz2cjA1k9IG>.

partners in Energy East: Irving Oil¹⁰² – owns several of these refineries. At least three of the refineries in Spain have been retrooled to process increased amounts of heavy crude including diluted bitumen.¹⁰³

While TransCanada, Irving Oil and their industry allies claim that Energy East is a multipurpose project involving both domestic supply and exports, the facts do not support a strong domestic supply argument. The three eastern Canadian refineries¹⁰⁴ that could receive some of Energy East's 1.1 million bpd capacity already receive or have signed agreements to receive crude from other sources including U.S. Bakken crude and eastern Canadian offshore crude. For example, the Enbridge Line 9 pipeline reversal project that would precede Energy East, would supply a third of Eastern Canada's 700,000 bpd of refinery capacity.¹⁰⁵ The remainder is supplied by water and rail. If the light crude now being supplied to those refineries by ship and rail from the United States continues to be competitively priced, it is reasonable that at least some of those supplies would continue.¹⁰⁶ Because of these existing arrangements, it is more likely that Canada's eastern refineries would be not source significant volumes from Energy East.

¹⁰² Repsol has a long-standing partnership with Irving Oil, a partner in the Energy East project, through Canaaport LNG, a liquid natural gas facility at the port of Saint John. Canaaport LNG, "About Us," http://www.canaaportlng.com/about_us.php.

¹⁰³ These three refineries are the Repsol refinery at Cartagena, the Repsol/Petronor refinery at Somorrostro (near Bilbao), and the BP refinery at Castellon. Foster Wheeler, "SYDEC Delayed Coking: Maximize profit from the bottom of the barrel," (undated), www.digitalrefining.com/data/printed_adverts/file/Delayed_Coking.pdf.

¹⁰⁴ TransCanada Energy East will have interconnections with three Eastern Canadian refineries in Montreal (Suncor: 137,000 bpd), Lévis near Quebec City (Ultramar/Valero: 265,000 bpd), and Saint John, NB (Irving Oil: 300,000 bpd). Deloitte and Touche LLP, *Energy East: The economic benefits of TransCanada's Canadian Mainline conversion project* (September 2013), 7. Available at <http://www.energyeastpipeline.com/wp-content/uploads/2013/09/Energy-East-Deloitte-Economic-Benefits-Report.pdf> (accessed December 2013). Suncor Energy Inc., "About Us - Refining," <http://www.suncor.com/en/about/232.aspx> (accessed January 7, 2014); Valero Energy Inc., "Jean Gaulin - Overview," <http://www.valero.com/ourbusiness/ourlocations/refineries/pages/quebeccity.aspx> (accessed January 7, 2014); Irving Oil Ltd, "Refining," http://irvingoil.com/operations_and_partners/operations/refining/ (accessed January 7, 2014).

¹⁰⁵ The combined distillation capacity of the three refineries that Energy East would serve is 702,000 bpd (see footnote 103). Enbridge's Line 9 has signed transportation agreements to supply 275,000 bpd, of which at least 225,000 bpd is contracted to two Eastern Canadian refineries with proposed connections to TransCanada Energy East. Enbridge Energy Inc., "Application for the Line 9B Reversal and Line 9 Capacity Expansion Project," p. 24, <https://www.neb-one.gc.ca/l1-eng/livelink.exe?func=l1&objId=890345&objAction=Open>. Source: Suncor Energy Inc., "Investor Information Published October 31, 2013," p. 8, http://www.suncor.com/pdf/Suncor_IR_Presentation_Q3_2013.pdf.

¹⁰⁶ Both the Valero and Irving Oil eastern Canada refineries are already taking substantial amounts of light crude from the United States, including tanker shipments of Eagle Ford light, tight oil from Texas, and rail shipments of Bakken crude from North Dakota. Dan Murtaugh, "Brent pressured by U.S. tripling crude to Canada: Energy markets," *Bloomberg*, May 10, 2013, <http://www.bloomberg.com/news/2013-05-10/brent-pressured-by-u-s-tripling-crude-to-canada-energy-markets.html>; Jorge Pradilla, "U.S. Gulf Coast Crude Oil Exports to Eastern Canada Increase," *FuelsNews*, November 5, 2013, <http://www.fuelsnews.com/u-s-gulf-coast-crude-oil-exports-eastern-canada-increase/>; Shawn McCarthy, "Tapping Quebec's oil opportunity," *The Globe and Mail*, May 22, 2013, <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/tapping-quebecs-oil-opportunity/article12078851/>; Jeffrey Jones, "Irving refinery increasingly using rail to transport crude," *The Globe and Mail*, July 9, 2013, <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/irving-refinery-increasingly-using-rail-to-transport-crude/article13102961/>.

c. Additional pathways which may lead to increased tar sands exports to Europe¹⁰⁷

1. Indian tar sands derived diesel (short to medium term)

India is a major exporter of diesel to Europe and will likely remain so over the short to medium term until rising domestic demand eliminates its refined product surplus. India Oil Corporation has expressed interest in using tar sands as a feedstock. If constructed, pipelines to either Canada's East or West Coast would provide an avenue for tar sands to be exported to Indian refineries. These refineries would then export increasing volumes of tar sands derived diesel in their shipments to Europe.

2. Gulf Coast tar sands crude exports (long term)

If the Canadian tar sands industry is able to realize its goal of increasing tar sands production by an additional 4.4 million bpd by 2030, it is likely that this additional production will exceed Gulf Coast refineries import capacity. The Canadian Association of Petroleum Producers estimates that the Gulf Coast only has 2.2 million bpd of foreign sources heavy crude capacity.¹⁰⁸ As much as half of this capacity may not be available for Canadian heavy crude imports, as it is owned by Mexican and Venezuelan national oil companies and is used to refine their heavy crude production. In a scenario with high production and significant tar sands transportation capacity expansion to the Gulf Coast, additional tar sands crude is likely to be exported from Gulf Coast ports to international refinery markets including Europe.

3. U.S. east coast pathway

Some tar sands crude may start flowing into the Atlantic Basin from the U.S. east coast in 2014 if a proposal by Buckeye Partners goes ahead. Buckeye Partners operates a terminal in Albany, New York, where crude arriving by train from North Dakota is transferred to barges that take the oil down the Hudson River to refineries along the U.S. and Canadian east coast. Buckeye recently purchased an oil storage terminal in Perth Amboy, New Jersey, on the New York Harbor, and announced plans to build another crude oil rail terminal there. The company told investors in a recent earnings call that it has plans to bring Canadian heavy crude from Alberta to one of these terminals and export it to a facility it operates in the Bahamas.¹⁰⁹ If this plan goes ahead, the Canadian heavy crude stored at Buckeye's Bahamas terminal can be re-exported

¹⁰⁷ These factors could possibly lead to increased tar sands exports to Europe but were not considered in the calculations in outlined in Appendix A and B.

¹⁰⁸ Canadian Association of Petroleum Producers, "Crude Oil Forecast, Markets, and Transportation," June 2013, p. 38, <http://www.capp.ca/getdoc.aspx?DocId=227308&DT=NTV>.

¹⁰⁹ Platts, November 01, 2013, "Buckeye sets plan in motion to attract Canadian crude to BORCO terminal." <http://www.platts.com/latest-news/oil/houston/buckeye-sets-plan-in-motion-to-attract-canadian-21769644>. It is already handling Venezuelan heavy crude at this facility and is increasing the number of heated storage tanks at the site to handle more heavy crude. U.S. crude export regulations allow the export of foreign crude oil if it has clearly not been blended with domestic crudes. Energy Information Administration, April 16, 2013. "Today in Energy: January 2013 crude oil export to China was a rare event." <http://www.eia.gov/todayinenergy/detail.cfm?id=10851>

anywhere in the world. As it will be situated in the Atlantic Basin, the European refinery market will be an attractive, low cost potential target.

III. The potential magnitude of tar sands exports to Europe from North America

As more tar sands oil—either as crude oil or as a refined product such as diesel—becomes available for export from the U.S. Gulf Coast or eastern Canada, Europe could begin to see more tar sands enter into the fuel supply.

In general, as more tar sands is processed in refineries on the Gulf Coast the volume of tar sands derived diesel flowing to Europe on existing export pathways will increase. Europe's demand for diesel has grown over the last decade while the demand for gasoline has been falling.¹¹⁰ The increased demand for diesel has led many European refineries to shift their focus from producing gasoline to producing diesel, which many of them were not originally designed to do.¹¹¹ Since diesel production in Europe has not kept pace with demand, a wave of imported diesel has been entering Europe, a substantial part of which hails from Gulf Coast refineries and thus may contain tar sands.

With respect to exports of tar sands crude, there are not currently exports from the Canadian east coast but the announcement of TransCanada's Energy East pipeline, which is widely acknowledged by industry to be an export pipeline, could certainly bring tar sands crudes to the East Coast. Processing heavy tar sands crudes requires complex refining processes and coking facilities which help to break down heavy crude, along with hydrocrackers if a refinery is going to refine significant quantities to produce higher value products including diesel. There are nearly 20 refineries in Europe with coking facilities.¹¹² Refineries adding coking operations have been on the rise and are expected to continue. While having coker capacity does not fully enable a refinery to process tar sands crudes, it is a sign that it could become capable in the future. According to an April 2013 CONCAWE report: “[t]hree of the five Coking unit projects are in Spain, where 79% of the additional EU Coking capacity is built.”¹¹³ The groundwork is already being laid by certain refiners, like Spain's Repsol, to be able to process Canadian tar sands crude or other heavy oils.

¹¹⁰ International Energy Agency, “Recent Developments in EU Refining and Product Supply,” EU Refining Forum, April 12, 2013, pg. 13, http://ec.europa.eu/energy/observatory/oil/doc/refining/20130505_eu_refining_forum-half-ia-20130412.pdf.

¹¹¹ Purvin & Gertz, Inc., prepared for Europia, “Overview of the European Downstream Oil Industry” (undated), p. 48. <http://www.europia.com/content/default.asp?PageID=412&DocID=20487>.

¹¹² Derived from Jochem Meijknecht, Aad Correlijé, and Bart van Holk, “A Cinderella Story? Restructuring of the European Refining Sector,” *Clingendael International Energy Programme*, April 2012, Annex B: Refineries in the EU-27, www.clingendaelenergy.com/inc/upload/files/A_cinderella_story.pdf; Repsol, “Coker Comparison,” http://repsol.com/creatividad/es_en/PYS/coque1/coque.html; Foster Wheeler, “SYDEC Delayed Coking: Maximize profit from the bottom of the barrel,” (undated), www.digitalrefining.com/data/printed_adverts/file/Delayed_Coking.pdf.

¹¹³ CONCAWE, “Oil refining in the EU in 2020, with perspectives to 2030,” *CONCAWE*, April 2013, p. 55, http://www.european-dredging.eu/pdf/CONCAWE_Report_on_Oil_refining_perspectives_in_EU_2030.pdf5.

a. Canadian tar sands available for export to Europe: reasonable, tentative ranges for 2020-2030

Based on a review of existing data with consideration of new oil market dynamics discussed above, it is possible to estimate the potential magnitudes of the tar sands exports that could reach Europe. The estimates below consider several key factors including current diesel import/export trends and the possibility that tar sands crude could be refined in Europe. However, it is beyond the scope of this report to evaluate oil pricing.

The following table provides estimates of volumes which currently and or could reach Europe in 2020 and 2030. These scenarios should be considered plausible estimates based on the assumptions below. A detailed description of the assumptions supporting these estimates can be found in Appendix A and B.

1. Summary: Potential estimates of tar sands oil and refined product to Europe

Table 1

	Potential exports of tar sands derived crude from Eastern Canada if Energy East goes ahead (bpd)	Tar sands derived diesel exports from the U.S. Gulf (bpd)	Total Tar sands crude and derived diesel (bpd) ¹¹⁴
2012	0	4,000	4,000
2020	454,000 – 606,000	120,500	574,500 – 726,500
2030	371,000 – 494,000	148,125	519,125 – 642,125

2. European heavy crude imports from Venezuela

In addition to Canadian tar sands, carbon intensive heavy crudes from other regions are also projected to reach Europe. ICF International projects that Europe will import approximately 112,000 bpd of heavy oil from Venezuela in 2020.¹¹⁵ Certain refiners, like Spain’s Repsol, will be able to process either Canadian tar sands crude or very heavy or extra heavy oil from the Orinoco belt in Venezuela, where Repsol owns part of one of the largest oil extraction operations in that country.¹¹⁶ Additionally, non-Canadian suppliers of heavy crudes - notably Mexico,

¹¹⁴ This figure includes both crude oil, a refinery feedstock, and refined diesel, a refinery output.

¹¹⁵ ICF expects Venezuela to export 237 PJ of crude to Europe in 2020. At 6.1 gigajoules a barrel, this converts to approximately 112,000 bpd. ICF International, “Impact Analysis of Options for Implementing Article 7a of Directive 98/70/EC – Revised 2020 baseline fuel mix and costs,” Slide 33; Department of Energy National Energy Technology Laboratory, Energy Calculator - Common Units and Conversions, <http://www.netl.doe.gov/energy-analyses/energy-calc.html>.

¹¹⁶ Repsol recently announced a \$4 billion investment in Venezuela’s Orinoco heavy oil belt, described as “the largest accumulation of heavy and extra-heavy oil in the world.” Pietro D. Pitt, “Repsol Plans to Invest \$4 Billion in Venezuela Through 2022,” *Bloomberg*, November 8, 2013, <http://www.bloomberg.com/news/2013-11-08/repsol-plans-to-invest-4-billion-in-venezuela-through-2022.html>.

Venezuela and Saudi Arabia - have sizable ownership interests in Gulf Coast heavy crude refineries. As with Canadian tar sands, diesel produced from these carbon intensive fuel stocks are also likely to reach Europe.

Appendix A: Tar sands derived diesel exports from the U.S. Gulf

Summary

- 2012: Approximately 4,000 bpd (tar sands derived diesel)
- 2020: Up to 120,500 bpd (tar sands derived diesel)
- 2030: Up to 148,125 bpd (tar sands derived diesel)

Key assumptions

- For 2012 and 2020 projections, we considered the Hart Energy analysis of Northeast US pathways and data from the U.S. Energy Information Administration.
- For 2020, Hart Energy estimated that tar sands crude processed in Gulf Coast refineries would reach 24.1% by 2020.¹¹⁷
- The percentage of diesel exports to Europe from the Gulf Coast derived from tar sands was equal to the percentage of tar sands as refinery inputs into Gulf Coast refineries.
- Because of factors outlined below, we estimate that U.S. Gulf Coast refineries will increase their exports to Europe by an additional 125,000 bpd by 2030, reaching approximately 625,000 bpd.

Summary of calculations

To calculate the total tar sands derived diesel that would reach Europe in 2020, we multiplied Hart Energy's estimate of 24.1 percent (tar sands crude processed in Gulf Coast refineries by 2020) x 500,000 (estimate of total diesel export to Europe from the U.S. Gulf Coast) = 120,500. To calculate the total tar sands derived diesel that would reach Europe in 2030, we multiplied Hart Energy's estimate of 23.7 percent (tar sands crude processed in Gulf Coast refineries) x 625,000 (estimate of total diesel exports to Europe from the U.S. Gulf Coast) = 148,125.

¹¹⁷ Hart Energy, "Evaluation of Potential Pathways for Tar Sands to the U.S. Northeast," Prepared for the Natural Resources Defense Council, June 2013, http://docs.nrdc.org/energy/files/ene_14011601a.pdf. The Hart report assumed a "Business As Usual scenario" in which pipeline/rail capacity is sufficient to move the volume of Canadian crude calculated to be processed in the Gulf Coast. This assumes availability of the Pegasus pipeline, the Enbridge Flanagan South, the Enbridge Energy Transfer Partners and the proposed Keystone XL northern segment.

Basis for diesel exports: 2012

- According to U.S. Energy Information Administration data, the total diesel exports to Europe for 2012 were 335,000 bpd.¹¹⁸ Applying the 1.2% factor that Hart presumed for tar sands content in 2012 to the 335,000 bpd renders about 4,000 bpd.

Basis for diesel export estimate: 2020

- We estimate that diesel exports from the Gulf Coast of the U.S. to Europe will average approximately 500,000 bpd by 2020. This estimate is below that already seen in recent months.¹¹⁹ Given Europe's growing reliance on international diesel imports, these estimates may prove conservative.¹²⁰

The United States supplied Europe with 637,000 bpd of diesel for the month of September, 2013, with India and Russia supplying the remaining balance of Europe's needs.¹²¹ The International Energy Agency anticipates the U.S. to continue to be a robust exporter of diesel.¹²² On the demand side, the IEA expects Europe's reliance on diesel imports to nearly double by 2020 due to refinery closures.¹²³

Basis for diesel export estimate: 2030

By 2030, Europe will likely become increasingly reliant on U.S. diesel imports. While European oil demand is forecast to decline, its diesel consumption is expected to remain robust as it takes up an increasing proportion of the region's refined product consumption.¹²⁴ Meanwhile, the IEA forecasts that European refinery capacity will decline faster than its consumption of refined products, putting increased pressure on external sources of diesel.¹²⁵

¹¹⁸ In 2012, European nations imported an average of 335,000 bpd of diesel from the United States. U.S. EIA, Exports by Destination, Distillate Fuel Oil, November 27, 2013, http://www.eia.gov/dnav/pet/pet_move_expc_a_EP00_EEX_mbb1_m.htm.

¹¹⁹ U.S. diesel exports to Europe reached 637,000 bpd in September 2013. See U.S. Energy Information Administration, Exports by Destination, Distillate Fuel Oil, November 27, 2013, http://www.eia.gov/dnav/pet/pet_move_expc_a_EP00_EEX_mbb1_m.htm.

¹²⁰ Christine Harvey, "Diesel Exports from U.S. Rising as Plant Maintenance Winds Down," Bloomberg, March 28, 2013, <http://www.bloomberg.com/news/2013-03-28/diesel-exports-from-u-s-rising-as-plant-maintenance-winds-down.html>.

¹²¹ U.S. Energy Information Administration, Exports by Destination, http://www.eia.gov/dnav/pet/pet_move_expc_a_EP00_EEX_mbb1pd_m.html; Konstantin Rozhnov & Rupert Rowling, "Diesel Flow to Europe to Cap Winter Price Surge," *Bloomberg*, October 9, 2013, <http://www.bloomberg.com/news/2013-10-09/diesel-flow-to-europe-to-cap-winter-price-surge.html>.

¹²² International Energy Agency, World Energy Outlook, November 18, 2013, p. 562.

¹²³ The EU refinery market is expected to contract due to declining access to refined product export markets, particularly for excess gasoline production, as well as competition with other refinery markets for fuel stock. International Energy Agency, World Energy Outlook, November 18, 2013, pp. 548-549.

¹²⁴ International Energy Agency, World Energy Outlook, November 18, 2013, p. 548; Europaia, "White Paper in EU Refining," p. 25, May 2010, <https://www.europia.eu/content/default.asp?PageID=412&DocID=25358>.

¹²⁵ International Energy Agency, World Energy Outlook, November 18, 2013, pp. 549-550.

Europe's existing diesel sources include the United States, Russia and India. Indian diesel exports to Europe averaged 125,000 bpd in 2012 and have reportedly increased since then.¹²⁶ While these exports will continue over the short to medium term, IEA forecasts that by 2030 India will become an importer of refined product as increasing domestic demand begins to exceed its refinery capacity.¹²⁷ The IEA forecasts that Russia will struggle to maintain its current level of diesel exports as it attempts to offset diminished refinery capacity by increasing diesel yields.

The IEA forecasts that surplus diesel production in the U.S. will increase from 2020 to 2030.¹²⁸ Moreover, IEA forecasts that India, which currently supplies over 125,000 bpd of diesel to Europe, will become a net importer by 2030.¹²⁹ Meanwhile, while total oil consumption is expected to decline in Europe, diesel demand is expected to remain robust through 2030.¹³⁰ Therefore, in this scenario, we assume U.S. Gulf Coast refineries will fill the potential loss of Asian crude oil sources and increase exports to Europe by an additional 125,000 bpd by 2030, reaching approximately 625,000 bpd.

¹²⁶ "Global diesel prices likely to weaken in 2014 with startup of Jubail refinery," *Hydrocarbon Processing*, April 23, 2013, <http://www.hydrocarbonprocessing.com/Article/3195875/Global-diesel-prices-likely-to-weaken-in-2014-with-startup-of-Jubail-refinery.html>; Konstantin Rozhnov & Rupert Rowling, "Diesel Flow to Europe to Cap Winter Price Surge," *Bloomberg*, October 9, 2013, <http://www.bloomberg.com/news/2013-10-09/diesel-flow-to-europe-to-cap-winter-price-surge.html>.

¹²⁷ International Energy Agency, *World Energy Outlook*, November 18, 2013, p. 555.

¹²⁸ International Energy Agency, *World Energy Outlook*, November 18, 2013, p. 558; U.S. diesel exports to Europe have increased from 66,000 bpd in 2007 to 335,000 bpd in 2012, reaching 637,000 bpd in September 2013. See U.S. Energy Information Administration, *Exports by Destination, Distillate Fuel Oil*, November 27, 2013, http://www.eia.gov/dnav/pet/pet_move_expc_a_EPD0_EEX_mbbl_m.htm.

¹²⁹ While India currently supplies Europe with over 125,000 bpd of diesel, IEA expects those exports to end by mid-2020 as increasing domestic consumption causes that country to become a net importer of diesel. "Global diesel prices likely to weaken in 2014 with startup of Jubail refinery," *Hydrocarbon Processing*, April 23, 2013, <http://www.hydrocarbonprocessing.com/Article/3195875/Global-diesel-prices-likely-to-weaken-in-2014-with-startup-of-Jubail-refinery.html>; IEA, *World Energy Outlook*, Nov. 18, 2013, pg. 556.

¹³⁰ The IEA forecasts that diesel will take a larger share of overall fuel consumption in Europe as demand for other fuels decline. IEA, *World Energy Outlook*, Nov. 18, 2013, pg. 548. According to CONCAWE, European diesel demand is expected to remain steady, declining only slightly from 200 million metric tons, or 4.11 million bpd, in 2012 to 197 million metric tons, or 4.04 million bpd in 2030. "Europia: Contribution to EU energy pathways to 2050", July 2011, p. 24. <https://www.europia.eu/content/default.asp?PageID=412&DocID=30204>. The slight decrease in diesel demand is forecast by the IEA to be compensated by a higher percentage of diesel imports, which are expected to grow as a percentage of total demand IEA, *World Market Report*, Nov. 18, 2013, pg. 549.

Appendix B: Potential exports of SCO and dilbit from Eastern Canada if proposed Energy East pipeline goes ahead

Summary

The following first estimates volumes of tar sands derived crude from the proposed Energy East pipeline – bypassing eastern Canadian refineries – for export. We then evaluated the potential for Europe’s refinery sector to accept tar sands derived crude for our final calculation.

Current: None – pipeline not built (in-service to Saint John possible by 2020)

2020: Between 454,000 bpd and 606,000 bpd tar sands derived crude to Europe

2030: Between 371,000 bpd and 494,000 bpd tar sands derived crude to Europe

Summary of calculations

2020: To calculate the total of tar sands crude that would be exported to Europe, we estimated 870,000 bpd (capacity of Energy East available for export) x 60% - 80% (estimate of Energy East export’s destined for Europe)¹³¹ x 87% (proportion of tar sands in Energy East pipeline) = between 454,000 bpd and 606,000 bpd.

2030: To calculate the total of tar sands crude that would be exported to Europe, we calculated 710,000 bpd (capacity of Energy East available for export) x 60% - 80% (proportion of exports directed to European market)¹³² x 87% (proportion of tar sands in Energy East pipeline) = between 371,000 bpd and 494,000 bpd.

Assumptions for 2020 and 2030 projections

- TransCanada Energy East’s total capacity is 1.1 million bpd
- In 2020, Eastern Canadian refineries could absorb up to 230,000 bpd of Energy East’s capacity, assuming the pipeline displaced all crude oil currently supplying the market by ship and rail. Based on a review of existing refinery capacity and crude production supplies, we conclude at least 870,000 bpd of Energy East’s capacity would be available for export in 2020.¹³³

¹³¹ NRDC estimate based on assumptions detailed below under the section *Europe’s Capacity to Take Tar Sands*.

¹³² Id.

¹³³ This is based on the fact that Eastern Canada’s refineries have a combined capacity of 702,000 bpd (see footnote 103). Eastern Canada will receive 472,000 bpd from existing pipeline and local oil production in 2020 and 312,000 bpd in 2030. This assumes approval of another pipeline project currently under regulatory review (Line 9) bringing another 225,000 bpd of committed crude to supply Eastern Canada’s refineries including 130,000 bpd to Suncor’s refinery and 95,000 bpd to the Ultramar/Valero refinery near Quebec City (see footnote 104). We also assume that production from Canada’s Atlantic fields will be processed in its Eastern refineries, including 247,000 bpd in 2020 and 87,000 bpd in 2030. Canadian Association of Petroleum Producers, “Crude Oil Forecast, Markets, and Transportation,” June 2013, p. 36, <http://www.capp.ca/getdoc.aspx?DocId=227308&DT=NTV>. This estimate will likely prove conservative as it assumes that no crude will be shipped to Eastern Canadian refineries by rail, despite the fact that they currently have 220,000 bpd of train loading capacity (including 140,000 bpd at Irving, 30,000 bpd at Quebec, and 50,000 bpd at Valero). Aaron Clark, “Canadian oil discounts narrow as trains oust pipes,”

- In 2030, Eastern Canadian refineries absorb 390,000 bpd of Energy East’s capacity as Eastern Canada’s offshore production declines. And in 2030, 710,000 bpd of Energy East’s capacity is available for export.¹³⁴
- We then assumed the proportion of tar sands crude that would flow in the pipeline to equal 87 percent.¹³⁵ This estimate is based on the share of Western Canadian production available for export.

Europe’s capacity to receive tar sands

Key assumption

- Current crude oil processing capacity at European refineries is 17.2 million bpd. Current heavy crude oil refining capacity is 2.2 million bpd.
- Up to 700,000 bpd of Europe’s heavy crude capacity can be utilized to refine diluted bitumen by 2020.¹³⁶
- By 2030, Europe’s refinery sector has the capacity to process up to 1.4 million bpd of diluted bitumen tar sands.¹³⁷

Bloomberg News, December 9, 2012, http://business.financialpost.com/2012/09/20/canadian-oil-discounts-narrow-as-trains-oust-pipes/?_lsa=d888-2c46. 36, <http://www.capp.ca/getdoc.aspx?DocId=227308&DT=NTV>.

¹³⁴ Between 2020 and 2030, the tar sands industry plans to increase production by 2.6 million bpd. Canadian Association of Petroleum Producers, “Crude Oil Forecast, Markets, and Transportation,” June 2013, <http://www.capp.ca/getdoc.aspx?DocId=227308&DT=NTV>, pg. 37. Additional production will result in a resumption of crude by rail to Canada’s East Coast refineries, resulting in full utilization of existing rail infrastructure, freeing additional capacity of TransCanada Energy East for export.

¹³⁵ Western Canada’s refinery capacity is projected to process 175,000 bpd of light crude oil, 215,000 bpd of synthetic and 285,000 bpd of heavy. Canadian Association of Petroleum Producers, “Crude Oil Forecast, Markets, and Transportation,” June 2013, pp 10-11, <http://www.capp.ca/getdoc.aspx?DocId=227308&DT=NTV>. Subtracting these figures from Western Canada’s production forecasts in 2020 and 2030 shows that in both years, light conventional crude is expected to account for 13% of Western Canada’s production, with tar sands crude (dilbit and SCO) taking up 87% of production. In 2020, Western Canada is projected to export 650,000 bpd of light and 4.3 million bpd of heavy, diluted bitumen and synthetic crude oil. In 2030, Western Canada is projected to export 825,000 bpd of light and 6.25 million bpd of heavy, diluted bitumen and synthetic crude oil. Canadian Association of Petroleum Producers, “Crude Oil Forecast, Markets, and Transportation,” June 2013, pp 10-11, 37, <http://www.capp.ca/getdoc.aspx?DocId=227308&DT=NTV>.

¹³⁶ European refineries are already investing in additional coking capacity. Between 2008 and 2018, the European coking sector is expected to increase by 70%. IEA, *Recent Developments in EU Refining and Product Supply*, April 12, 2013, p. 46 Many refineries with coking capacity, such as Repsol’s Cartagena and Bilbao refineries, are already configured to maximize access to heavy crudes. Repsol, “Leaders in integrate refining in Europe,” http://www.repsol.com/es_en/corporacion/conocer-repsol/nuestra-actividad/downstream/refino/.

¹³⁷ European heavy crude processing capacity will increase as European refineries replace declining production of light crudes from traditional sources such as the North Sea with cheaper, heavier crudes from the Canadian tar sands as they become available in the Atlantic Basin. In a scenario in which Energy East is operational by 2020, it is likely that the supply of cheap, heavy Canadian tar sands will cause continued expansion of coker capacity and spur Europe’s complex refineries to make the reconfigurations necessary to take advantage of that feedstock. While the 17.2 million bpd European refinery sector is predominately configured to process light crude, the sector has over 2.2 million bpd in complex coker refineries. International Energy Agency, *World Energy Outlook*, November 18, 2013, p. 545; Jochem Meijknecht, Aad Correlijé, and Bart van Holk, “A Cinderella Story? Restructuring of the European Refining Sector,” *Clingendael International Energy Programme*, April 2012, Annex B: Refineries in the EU-27, www.clingendaelenergy.com/inc/upload/files/A_cinderella_story.pdf. IEA estimates that the coking capacity of Europe’s refinery sector will increase from 465,000 bpd to 572,000 bpd by 2018. The IEA noted that an 118,000

- We assumed that Europe is the market for between 60% to 80% of Energy East tar sands exports based on the following considerations.
 - Europe is the closest market for crude from Energy East outside North America. Exporting crude to the Indian and Chinese refinery markets from Energy East face higher transportation costs than the European market.¹³⁸
 - The U.S. East Coast is a small refinery market with very limited heavy crude processing capacity which is already saturated with pipeline and rail imports.¹³⁹
 - The U.S. Gulf Coast, a potential destination for Energy East crude, is projected to be inundated with over 1.6 million bpd of heavy Canadian tar sands in addition to Mexican and Venezuelan heavy crude imports.¹⁴⁰ In addition, prior to the influx of heavy crude in 2020 and 2030, Gulf Coast refineries are already at full capacity due to an influx of light crude from new oil shale fields in West Texas, South Texas and North Dakota.¹⁴¹
 - Europe's traditional sources of crude are projected to decline by 2.1 million bpd by the mid-2020s as North Sea production and Russian imports decline.¹⁴²

Naturally, there are factors of uncertainty regarding global energy consumption which could impact European imports of crude oil from Energy East, including opposition to the project, European energy policy, the maintenance of the U.S. ban on exports of domestic crude oil, and the possibility of increased production of other heavy crude sources such as those produced in Venezuela.

bpd increase in coking capacity between 2008 and 2013 constituted a 34% increase (indicating that pre-2008 coking capacity was approximately 347,000 bpd). The IEA forecast a further 23% increase in coking capacity by 2018, to total 572,000 bpd. IEA, Recent developments in EU Refining and Product Supply, April 12, 2013, p. 46. This capacity growth is sufficient to process over 1.4 million bpd of diluted bitumen or a comparable crude by 2018. Diluted bitumen produces less than 40% of residue oil during the refining process, enabling a refinery to process approximately 250% the capacity of its coker units. Kevin Turini et. al., Processing Heavy Crudes in Existing Refineries, Spring 2011, pg. 3, <http://www.aiche-fpd.org/listing/112.pdf>.

¹³⁸ “Irving Oil CEO Says Eastern Canada Has Export Edge Over Gulf Coast,” *Reuters*, November 29, 2013, <http://www.reuters.com/article/2013/11/29/irving-exports-shipping-idUSL2N0JE10X20131129>; Kevin Bissett, “Plans to build new Irving Oil terminal lifts hopes in Saint John,” *The Canadian Press*, August 1, 2013, <http://atlantic.ctvnews.ca/plans-to-build-new-irving-oil-terminal-lifts-hopes-in-saint-john-1.1393469#ixzz2dCmFtFsM>.

¹³⁹ Canadian Association of Petroleum Producers, “Crude Oil Forecast, Markets & Transportation,” June 2013, pp. 13, <http://www.capp.ca/getdoc.aspx?DocId=227308&DT=NTV>.

¹⁴⁰ Hart Energy, “Evaluation of Potential Pathways for Tar Sands to the U.S. Northeast,” Prepared for the Natural Resources Defense Council, June 2013. http://docs.nrdc.org/energy/files/ene_14011601a.pdf.

¹⁴¹ EIA, Refinery Utilization and Operation Capacity, Nov. 27, 2013, http://www.eia.gov/dnav/pet/pet_pnp_unc_dcu_r30_m.htm.

¹⁴² IEA, World Oil Outlook, Nov. 18, 2013, pg. 550.