

What's in Your Tank?

Northeast and Mid-Atlantic States Need to Reject Tar Sands and Support Clean Fuels

© David Dodge/Canadian Parks and Wilderness Society



SUNCOR TAR SANDS UPGRADER ALONG ATHABASCA RIVER IN ALBERTA



WIND FARM

© Jennifer Grant/The Pembina Institute



TAR SANDS MINE IN ALBERTA, CANADA



ELECTRIC VEHICLE CHARGING

FOR MORE INFORMATION, PLEASE CONTACT:

Danielle Droitsch
ddroitsch@nrdc.org
<http://switchboard.nrdc.org/blogs/ddroitsch>

Luke Tonachel
ltonachel@nrdc.org
<http://switchboard.nrdc.org/blogs/ltonachel>

Elizabeth Shope
eshope@nrdc.org
<http://switchboard.nrdc.org/blogs/eshope>



Oil industry plans could cause a dramatic increase in the use of tar sands–derived gasoline in the Northeast and Mid-Atlantic states, a shift that would move the region backwards in its efforts to fight climate change.¹ Roughly 85 percent of the Northeast and Mid-Atlantic fuel supply comes from refineries on the Gulf Coast and in the Mid-Atlantic, Northeast, and eastern Canada.² As of 2012, the region was virtually tar sands free, with petroleum-based transportation and heating fuels derived from that source at less than 1 percent. However, Gulf Coast refineries are taking an increasing volume of tar sands crude as more pipelines are built or retrofitted to carry it to the Gulf, such as the new Gulf Coast Pipeline Project from Cushing, OK to Nederland, TX. While most of the tar sands-derived product from the proposed Keystone XL pipeline would be exported, some of it could end up being sent from the Gulf Coast to the Northeast.³ If the pipeline is approved, even a small percentage of the pipeline’s volume could cause a dramatic increase in the volume of tar sands flowing to the Northeast, a major threat to the carbon intensity of the region’s fuels. Additional threats may be posed by refineries in the Northeast, Mid-Atlantic, and eastern Canada, some of which may be considering options including retrofitting in order to process more tar sands.⁴

By 2020, if these carbon intensive projects move forward, as much as 18 percent of the region’s petroleum-based transportation and heating fuel supply could be derived from the high-carbon feedstock. At that penetration, the switch to tar sands fuels would increase greenhouse gas emissions by approximately 10 million metric tons, an amount that would offset most of the carbon pollution reductions that the region is seeking under its landmark Regional Greenhouse Gas Initiative.⁵ Even without Keystone XL, the petroleum-based transportation and heating fuel supply will contain more tar sands if steps are not taken to keep out this high-carbon fuel. In the short term, between 2012 and 2015, the volume of tar sands–derived fuel supplying the Northeast is projected to grow more than sixfold.⁶

Citizens in Northeast and Mid-Atlantic states strongly support efforts to fight global warming, which means rejecting carbon intensive fuels like tar sands and embracing cleaner transportation alternatives. For example, fueling our cars and trucks with lower-carbon fuels such as electricity and creating more public transportation will preserve our health, protect our environment, and strengthen our economy. State leaders, with the support of citizens and local communities, need to take action now to implement policies that will clean up transportation. The first step is tracking tar sands fuel and the carbon intensity of the gasoline and diesel that power cars and trucks. But above all, it is imperative for state leaders to enact policies that prevent the influx of carbon intensive tar sands fuels.

TAR SANDS FUELS CAUSE SIGNIFICANTLY MORE GREENHOUSE GAS EMISSIONS THAN CONVENTIONAL FUELS

Fueling up with gasoline made from unconventional tar sands oil causes more carbon pollution than does conventionally sourced gasoline. In comparison with conventional oil, which is processed after being pumped from wells, tar sands must be mined or steamed out of the ground and then undergo refining processes that are more carbon-intensive than what is needed for refining conventional crude. As a result, on a “well to tank” basis—which includes crude oil extraction and upgrading, transport, refining, and distribution—producing gasoline or diesel from tar sands generates on average 81 percent more greenhouse gas emissions than the U.S. average for gasoline in 2005.⁷ When also including the emissions resulting from burning the fuel in vehicles—that is, using a “well to wheels” perspective—gasoline made from tar sands feedstocks contributes 17 percent more greenhouse gas emissions than does conventionally sourced fuel.⁸

STATE AND LOCAL COMMUNITIES HAVE ALREADY MADE SIGNIFICANT PROGRESS IN COMBATING CARBON POLLUTION

Increases in carbon emissions are a step in the wrong direction and contradict state energy policies. All Northeast and Mid-Atlantic states have developed state action plans or have adopted statutory requirements to reduce carbon pollution.⁹ To address transportation emissions, several

states have adopted clean car and zero-emission vehicle performance standards. States have also committed taxpayer funds to address global warming by purchasing clean fleet vehicles, providing clean vehicle purchase incentives, and funding clean fuel infrastructure.¹⁰ Many municipalities have also adopted climate action plans to decrease carbon pollution. Increasing carbon emissions from tar sands would counteract these and other clean energy measures, potentially rendering them—and taxpayer investments—moot.

Burlington, VT Resolution Adopted December 2012

40	Page	2
41		
42	Resolution Relating to	ENCOURAGING CONSERVATION OF CLEANER ENERGY SOURCES AND REDUCING EMISSIONS FROM TAR SANDS OIL AFFILIATED COMPANIES
43		
44		
45		
46		2020 (1.5% annual reduction) and long-term goals to reduce emissions by 80% by
47		2050 (2% annual reduction); and
48		WHEREAS, 18 large businesses and one major U.S. city (Bellingham, WA) have
49		announced actions to reduce the environmental and social impacts that come from
50		transportation; and
51		WHEREAS, the Burlington-based company, Seventh Generation, has asked its
52		providers to eliminate fuels from tar sands refineries whenever possible; and
53		WHEREAS, other international non-governmental organizations like Fair Trade
54		the end of investments in companies via pension funds who profit from tar sands
55		Royal Dutch Shell plc; and
56		WHEREAS, Burlington has pension funds for municipal workers and teachers
57		Schools; and
58		WHEREAS, the heat energy that is presently being released into the atmosphere
59		McNeil Generating Plant could be used to heat the buildings in the city of Burlington;
60		NOW, THEREFORE, BE IT RESOLVED that the City Council expresses its opposition to the
61		transport of tar sands oil, and its deep concern about the risks of such transport for
62		safety, property values, and our natural resources; and
63		BE IT FURTHER RESOLVED that the City of Burlington encourage the State of Vermont and
64		other northeast states to support policies phasing out fuel purchases as quickly as possible from vendors
65		whose refinery sources of origin use any form of tar sands, and support policies such as a Clean Fuels
66		Standard to help keep such fuels out of the region's fuel supply; and
67		BE IT FURTHER RESOLVED that the City of Burlington call upon the Vermont State
68		Legislature and the Obama Administration to ensure thorough environmental impact reviews of any tar
69		sands-related pipeline proposals, including the health and safety impacts of potential tar sands oil spills,
70		along with clear guidelines for tracking the origins and chemical composition of pipeline contents and
71		feedstocks; and
72		BE IT FURTHER RESOLVED that the City Council Transportation, Energy and Utilities
73		Committee work with city staff to identify ways in which it can progressively shift city operations and
74		consumption away from fossil fueled transportation through increased vehicle efficiency, use of
75		

NOW, THEREFORE, BE IT RESOLVED

that the City Council expresses its opposition to the transportation of tar sands oil, and its deep concern about the risks of such transport for public health and safety, property values, and our natural resources; and

BE IT FURTHER RESOLVED that the City of Burlington encourage the State of Vermont and other northeast states to support policies phasing out fuel purchases as quickly as possible from vendors whose refinery sources of origin use any form of tar sands, and support policies such as a Clean Fuels Standard to help keep such fuels out of the region's fuel supply

TAR SANDS DEVELOPMENT IN WESTERN CANADA IS A DESTRUCTIVE BUSINESS WITH MAJOR ENVIRONMENTAL IMPACTS

The tar sands underlie an area of Alberta, Canada, that is roughly the size of Florida.¹¹ Removal of tar sands oil from the ground destroys large swaths of Canada's Boreal forest, which serves as a massive carbon storage area. In addition, significant quantities of carbon-polluting energy are used to extract and upgrade the heavy oil.¹² Tar sands mining operations produce huge volumes of toxic waste called tailings, which include contaminants such as naphthenic acids, polycyclic aromatic hydrocarbons, phenols, arsenic, mercury, and other trace metals.¹³ To date, tar sands mining has resulted in the production of toxic waste lakes (tailings ponds) that currently cover 68 square miles, an area the size of Washington, D.C.¹⁴ A recent Government of Canada study reaffirms that the toxic materials are reaching groundwater.¹⁵ Government assessments estimate that some of these tailings ponds seep a total of nearly 3 million gallons of toxic waste into groundwater and surface water every day.¹⁶ Downstream, First Nation communities are experiencing elevated rates of rare cancers and finding numerous fish with tumors and lesions.¹⁷

Because of the properties of tar sands oil, its transport poses unique risks that aging conventional oil pipeline systems, such as the Portland-Montreal pipeline, are not equipped to handle.¹⁸ As witnessed in the July 2010 spill into Michigan's Kalamazoo River and the March 2013 spill into the community of Mayflower, Arkansas, tar sands spills can be devastating to communities and extremely difficult and expensive to clean up. To date, the Kalamazoo cleanup has cost more than \$1 billion, and after more than three years, the river is still contaminated with submerged tar sands oil.¹⁹



SECTION OF ENBRIDGE PIPE THAT RUPTURED IN 2010, SPILLING MORE THAN 1 MILLION GALLONS OF TAR SANDS INTO THE KALAMAZOO RIVER

© NTSB

© Kelly Radmanovich



WHITEFISH COLLECTED FROM LAKE ATHABASCA, DOWN-STREAM FROM THE TAR SANDS—AN EXAMPLE OF THE MANY UNHEALTHY-LOOKING FISH FOUND IN THIS AREA

TAR SANDS FUELS ENTERING THE NORTHEAST AND MID-ATLANTIC STATES THREATEN TO UNDERMINE EFFORTS TO COMBAT CLIMATE CHANGE

An analysis conducted by Hart Energy for NRDC estimates that in 2020, absent policies to discourage the use of high-carbon fuels, fuels derived from tar sands could make up about 11 to 14 percent of the Northeast and Mid-Atlantic

market, compared with less than 1 percent in 2012.²⁰ Under a more aggressive expansion scenario that assumes an increase of tar sands processing by refineries in the Northeast, Mid-Atlantic, and Canada that supply the region, along with an increase in tar sands feedstock in the Gulf Coast similar to what is assumed in the less aggressive scenario, Hart Energy estimates that tar sands could make up as much as 18 percent of the Northeast and Mid-Atlantic petroleum-based transportation and heating fuel supply by 2020.

TAR SANDS PATHWAYS TO THE U.S. NORTHEAST AND MID-ATLANTIC REGION

By 2020, fuel derived from Alberta's tar sands could make up 11-18% of the Northeast and Mid-Atlantic supply



* Arrows do not represent specific pipelines but rather general flows from region to region. Specific transportation mechanisms in 2020 could include several Enbridge pipelines, the proposed Keystone XL Pipeline, the existing Keystone Pipeline, the Gulf Coast Pipeline, the Seaway Pipeline, the proposed Energy East Pipeline, the Portland-Montreal Pipeline, the Colonial Pipeline, and more.

Tar Sands-Derived Fuels Could Enter the Northeast and Mid-Atlantic via the U.S. Gulf Coast

Gulf Coast refineries currently supply about 40 percent of the Northeast and Mid-Atlantic market's fuels.²¹ Unless policies are put in place to discourage tar sands consumption in the region, a portion of tar sands crude that reaches the Gulf will surely end up as high-carbon fuel in the Northeast and Mid-Atlantic region. There are multiple pathways by which tar sands-derived fuels can enter markets in the Northeast and Mid-Atlantic states. The main pathway is the Colonial Pipeline, which collects nearly 100 million gallons of gasoline and diesel each day from refineries in Texas and Louisiana and delivers the fuels to terminals and connecting pipelines in Virginia, Pennsylvania, Delaware, New Jersey, and New York for distribution throughout the region.²² Based on Hart Energy projections, the Gulf Coast refineries will supply 60 to 76 percent of the tar sands-derived products that the Northeast and Mid-Atlantic market receives in 2020.²³

Tar Sands Could Be Processed Regionally and in Canada for Use in the Northeast and Mid-Atlantic

Roughly 45 percent of the petroleum-based transportation and heating fuel consumed in the Northeast and Mid-Atlantic is produced by refiners within the region and in Ontario, Quebec, and elsewhere in eastern Canada. Currently, these refineries are predominantly configured to handle light, sweet (low-sulfur) crudes such as the oil coming out of the Bakken formation.²⁴ However, some of these refiners can also process tar sands crudes. For example, PBF Energy's refineries in Delaware City, Delaware, and Paulsboro, New

Jersey, are refining heavy, high-sulfur tar sands crudes. Other facilities can accept a partially refined form of tar sands, called synthetic crude oil, for further refining.

Several infrastructure expansions to handle more tar sands are also in the works. PBF Energy plans to increase its rail unloading capability to 110,000 barrels per day at its Delaware City refinery, from which it can ship crude via barge to Paulsboro, and has entered into agreements to lease railcars meant to transport tar sands bitumen.²⁵ The oil industry and some Canadian officials want to repurpose existing natural gas pipelines or west-flowing oil pipelines to bring tar sands east both for export and to feed eastern refineries.²⁶

Without Swift Action, Tar Sands Could Become a Major Part of the Northeast and Mid-Atlantic Fuel Supply, Moving the Region Backwards on Climate

Table 1 is a summary of Hart Energy's analysis of pathways for tar sands fuels to reach the Northeast and Mid-Atlantic states. The table includes data from 2012 and makes projections about future supply and demand in 2015 and 2020. The Hart Energy projections for 2015 and 2020 include scenarios in which the Keystone XL tar sands pipeline is permitted and built.²⁷ For 2020, the table also includes a scenario in which the Keystone XL pipeline is not approved, and a more aggressive scenario in which Keystone XL approval occurs, as do market connections (pipeline or rail) and refinery modifications that allow Irving Oil's refinery in St. John, New Brunswick, to process more diluted bitumen and other refineries in the Northeast, Mid-Atlantic, and Canada to process more synthetic crude oil.²⁸

Table 1: Petroleum Product Demand and Supply to Northeast and Mid-Atlantic Market Region (thousand barrels per day)²⁹

Scenario	Regional Transportation and Heating Fuel Demand	Gulf Refinery Supplies to Region	Supplies from Regional and Canadian Refineries	Other Country Imports	Gulf Refinery Supplies to Region Derived from Tar Sands	Supplies from Regional and Canadian Refineries Derived from Tar Sands	Total Supplies to Region Derived from Tar Sands	Portion of Demand Met with Tar Sands Fuels
2012 (actual)	2,785	1,154	1,238	393	14	8	22	0.8%
2015	2,775	1,192	1,265	318	68	75	143	5.2%
2020 without Keystone XL approved	2,700	1,203	1,197	300	212	99	311	11.5%
2020 with Keystone XL approved	2,700	1,203	1,197	300	290	94	384	14.2%
2020 with Keystone XL approved and refinery modifications	2,700	1,203	1,197	300	290	196	486	18.0%

As the Hart Energy analysis demonstrates, unless states take action, the Northeast and Mid-Atlantic states could grow their dependence on tar sands fuels significantly. Because tar sands fuels are more carbon intensive to produce than conventional fuels, accepting tar sands fuels will impede states' efforts to meet long-term global warming reduction targets through programs such as RGGI and clean vehicle programs. States should start now to address the threat of tar sands.

THE FIRST STEP: TRACKING FUEL CARBON IN THE NORTHEAST AND MID-ATLANTIC STATES

The first step to solving this problem is measuring it. State leaders need to start tracking the carbon profile of their fuels. Specifically, they should determine fuels' carbon intensity—that is, the amount of carbon emitted per unit of fuel energy output. This information can be compiled by accessing public data and requiring that fuel importers and in-region producers report the origin of the fuels they sell.

By tracking carbon intensity, policymakers will have a framework on which to formulate and enact policies that prevent greater use of carbon-intensive fuels, and to create tools to make sure those policies are effective.

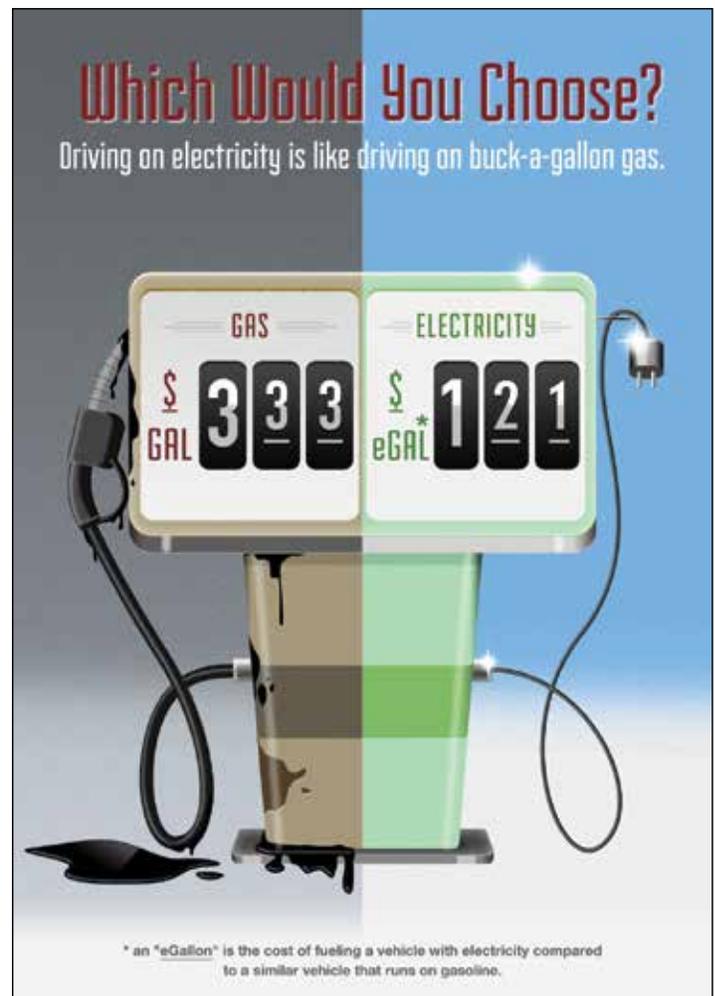
CLEANER CHOICES: CLEAN FUELS AND CLEAN TRANSPORTATION CHOICES CUT CARBON POLLUTION AND MAKE CITIZENS MORE SELF-SUFFICIENT

Clean transportation fuels such as electricity, hydrogen, sustainably produced biofuels, and low-carbon biogas will bring both environmental and economic benefits. Reducing oil demand with efficiency, creating more public transit, making communities more bike- and pedestrian-friendly, and shifting to cleaner fuels will put money back in citizens' pockets. For example, the cost of driving an electric vehicle can be equivalent to filling up with about \$1-per-gallon gasoline.³⁰ A more diverse fuel supply can also blunt petroleum price spikes because consumers could switch to other options and lessen the demand for oil.

Clean fuels also avoid the pollution costs of oil. Oil is the largest U.S. source of carbon dioxide from fossil fuel combustion.³¹ Catastrophic events such as Hurricane Irene and Hurricane Sandy—the types of events we will see with increasing frequency and severity as climate change worsens—have already wrought devastating economic

impacts on the Northeast and Mid-Atlantic regions. In the Northeast and Mid-Atlantic alone, Hurricane Irene caused more than \$4 billion in damage and 44 deaths, with additional damage and deaths in other parts of the United States, Canada, and the Caribbean.³² Hurricane Sandy cost the region more than \$65 billion and took more than 100 lives.³³ Enabling the oil industry to introduce more carbon-intensive oil like tar sands threatens to make the oil sector's global warming impact even larger.

Today, clean fuels can reduce emissions by 20 percent or more compared to gasoline, depending on how they are produced.³⁴ In Northeast and Mid-Atlantic states, a grid-charged electric vehicle contributes only about 40 percent of the carbon pollution emitted by a typical gasoline car.³⁵ Importantly, electric cars will become cleaner as the grid integrates more renewable power generation and meets tighter emissions standards.³⁶



CITIZENS, TOWNS, AND STATE LEADERS CAN TAKE ACTION TO SUPPORT CLEAN TRANSPORTATION

Citizens across the Northeast are raising their voices in support of clean transportation policies and against carbon-intensive tar sands fuels. Roughly two dozen cities and towns in Massachusetts, Vermont, and Maine have passed resolutions that reject tar sands fuel and urge their states to support bringing clean fuels to the region.³⁷

State leaders should act today to categorize and track the sources and carbon intensities of the gasoline and diesel that power cars and trucks in their state. At a minimum, state leaders also need to adopt measures to ensure the carbon intensity of the fuel supply does not increase; more ambitious policies would require the carbon intensity of the fuel supply to decrease over time while oil consumption is also reduced.

The Northeast and Mid-Atlantic states can realize the benefits of clean transportation if state leaders first act to stem the flow of tar sands. However, a failure to act will result in more carbon pollution as regional trends toward greater dependence on dirty fuels like tar sands continue unabated. Clean fuels and transportation choices give state policymakers an important opportunity to protect the environment and to protect the region's citizens from everlasting dependence on oil.

STATE LEADERS SHOULD BEGIN BY CATEGORIZING AND TRACKING THE SOURCES AND CARBON INTENSITIES OF THE GASOLINE AND DIESEL THAT POWER CARS AND TRUCKS IN THEIR STATE.

Endnotes

- 1 The Northeast and Mid-Atlantic region states being considered in this report are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Washington, D.C.
- 2 Hart Energy LLC, *Evaluation of Potential Pathways for Tar Sands to the U.S. Northeast*, June 2013, prepared for the Natural Resources Defense Council (NRDC), http://docs.nrdc.org/energy/files/ene_14011601a.pdf.
- 3 The Keystone XL Draft SEIS Market Analysis indicates that “almost half of PADD 3 refined products go to the domestic market,” implying that over half of PADD 3 (Gulf Coast) refined products are exported. U.S. Department of State, Keystone XL Draft Supplemental Environmental Impact Statement, Section 1.4: “Market Analysis,” March 2013, p. 1.4-15, <http://keystonepipeline-xl.state.gov/documents/organization/205654.pdf>.
- 4 Hart Energy LLC, *supra* note 2. Pipelines that are or will soon be carrying tar sands to the U.S. Gulf Coast include the Pegasus Pipeline, the Seaway Pipeline, and the Gulf Coast Pipeline.
- 5 NRDC calculations based on RGGI, Inc., “Summary of RGGI Model Rule Changes: February 2013,” www.rggi.org/docs/ProgramReview/FinalProgramReviewMaterials/Model_Rule_Summary.pdf. The RGGI program is projected to reduce emissions by 2.5 percent per year from 2015 through 2020 starting from an emissions limit under the program of 82.6 million metric tons CO₂-equivalent (MMTCO₂e) in 2014. Total reduction targets from Jan. 2015 through Dec. 2020 are 11.6 MMTCO₂e. Hart Energy estimates that in 2020, there could be a supply of 486 thousand barrels per day of tar sands-derived fuels, or 464 thousand barrels per day more than in 2012. Based on the U.S. Department of State Keystone XL Draft Supplemental EIS (see note 7 below), we assume a gasoline yield of 77 percent per barrel of oil, 91.2 gCO₂e per MJ of conventional gasoline and an increase of 17 percent in CO₂e emissions per MJ of gasoline derived from tar sands compared to conventional gasoline (106.3 gCO₂e/MJ). If the 464 thousand barrels per day were conventional gasoline, it would result in emissions of 61.2 MMTCO₂e/year [(.464 million barrels of oil/day)(365 days/year)(.77 barrel of gasoline/barrel of oil)(5144 MJ/bbl of gasoline)(91.2 gCO₂e/MJ)(MMT/10⁶ g) = 61.2 MMTCO₂e/year]. If the same volume is tar sands-derived, using 106.3 gCO₂e/MJ, emissions are 71.3 MMTCO₂e/year, an increase of 10.1 MMTCO₂e in 2020. This is a conservative calculation, not accounting for emissions from other fuels and co-products.
- 6 In 2012, approximately 22,000 barrels per day of tar sands-derived fuel was reaching the Northeast and Mid-Atlantic. Unchecked, by as soon as 2015, these volumes will grow to 143,000 barrels per day, making up more than 5 percent of the fuel mix. Hart Energy, *supra* note 2, Tables 5 and 8, pp. 6, 13.
- 7 U.S. Department of State, Keystone XL Draft Supplemental Environmental Impact Statement, Appendix W: “Life-Cycle Greenhouse Gas Emissions,” March 2013, pp. 43–44, keystonepipeline-xl.state.gov/documents/organization/205663.pdf. The 2005 U.S. average serves as the baseline for the U.S. Renewable Fuels Standard.
- 8 *Ibid.* In a full life-cycle analysis of liquid fuel carbon pollution, combustion in the vehicle (measured at the tailpipe) is the largest source of emissions. Considering the fuel production process alone, gasoline and diesel fuels made from tar sands contribute 81 percent more emissions than fuel from conventional oil, but when the vehicle-use phase is considered as well, the large combustion emissions reduce the percentage difference between products made from tar sands and those from conventional oil to 17 percent.
- 9 Northeast States Center for a Clean Air Future, *Introducing a Low Carbon Fuel Standard in the Northeast: Technical and Policy Considerations*, July 2009, pp. 2-8 to 2-9, www.nescaum.org/documents/lcfs-report-final-200909-rev-final.pdf.
- 10 U.S. Department of Energy, Alternative Fuels Data Center, “All Laws and Incentives, Sorted by Type,” www.afdc.energy.gov/laws/matrix/tech.
- 11 The tar sands underlie an area of 54,132 square miles. Alberta Energy, “Facts and Statistics,” www.energy.alberta.ca/OilSands/791.asp. The state of Florida occupies 53,624 square miles. United States Census Bureau, “State & County QuickFacts: Florida,” quickfacts.census.gov/qfd/states/12000.html.
- 12 Jennifer Grant, Eli Angen and Simon Dyer, “Forecasting the impacts of oilsands expansion,” The Pembina Institute, June 2013, <http://www.pembina.org/pub/2455>.
- 13 Pierre Gosselin and Steve E. Hrudehy, et al., *Environmental and Health Impacts of Canada’s Oil Sands Industry*, The Royal Society of Canada, December 2010, [rsc-src.ca/sites/default/files/pdf/RSC%20Oil%20Sands%20Panel%20Main%20Report%20Oct%202012.pdf](http://www.rsc-src.ca/sites/default/files/pdf/RSC%20Oil%20Sands%20Panel%20Main%20Report%20Oct%202012.pdf), p. 124.
- 14 Jennifer Grant and Erin Flanagan, *Losing Ground: Why the Problem of Oilsands Tailings Waste Keeps Growing*, The Pembina Institute, July 2013, p. 3, www.pembina.org/pub/2470. Washington, D.C. is 68 square miles. National Atlas, “Profile of the People and Land of the United States,” nationalatlas.gov/articles/mapping/a_general.html.
- 15 M.M. Savard et al., *A Local Test Study Distinguishes Natural from Anthropogenic Groundwater Contaminants near an Athabasca Oil Sands Mining Operation*, Geological Survey of Canada, Open File 7195, 2012, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/ess_pubs/292/292074/of_7195.pdf](http://ftp2.cits.nrcan.gc.ca/pub/geott/ess_pubs/292/292074/of_7195.pdf).
- 16 Environmental Defence, “11 Million Litres a Day: The Tar Sands’ Leaking Legacy,” *Environmental Defence* website, December 2008, environmentaldefence.ca/reports/11-million-litres-a-day-tar-sands-leaking-legacy. Eleven million liters is equivalent to 2.9 million gallons.
- 17 Alberta Cancer Board Division of Population Health and Information Surveillance, *Cancer Incidence in Fort Chipewyan, Alberta, 1995-2006*, Prepared for Alberta Health Services et al., February 2009, <http://www.albertahealthservices.ca/rls/ne-rls-2009-02-06-fort-chipevyan-study.pdf>. Gina Solomon, “The Other Oil Disaster: Cancer and Canada’s Tar Sands,” *Switchboard* website, NRDC, May 3, 2010, switchboard.nrdc.org/blogs/gsolomon/the_other_oil_disaster_cancer.html. Letter to Prime Minister Stephen Harper from fishers of Fort Chipewyan and Fort McKay, Leadership, Health Professionals, Scientists, and others, “Re: Fish Health Monitoring Program for the lower Athabasca River, Athabasca Delta and Lake Athabasca,” September 16, 2010, athabascafish.files.wordpress.com/2010/09/pm-letter-athabasca-fish-health-monitoring-program.pdf. Andrew Nikiforuk, “A Smoking Gun on Athabasca River: Deformed Fish,” *The Tyee*, September 17, 2010, theyee.ca/News/2010/09/17/AthabascaDeformedFish/.
- 18 Because diluted bitumen from tar sands is so viscous, its transport by pipeline requires high pressures, which create high temperatures. A study of some Southern California pipelines found that those operating in the range of 130°F to 159°F were nearly 24 times more likely to leak due to external corrosion and six times more likely to leak from any cause, compared with pipelines operating under 70°F. California State Fire Marshal, *Hazardous Liquid Pipeline Risk Assessment*, 1993, pp. 68-72, osfm.fire.ca.gov/pipeline/pdf/publication/pipelineriskassessment.pdf. The northern segment of the Keystone XL tar sands pipeline, if approved, would operate at 130°F to 150°F. U.S. Department of State, Keystone XL Draft Supplemental Environmental Impact Statement, 4.13: “Potential Releases,” March 2013, p. 22, keystonepipeline-xl.state.gov/documents/organization/205621.pdf.

19 Enbridge Energy, Limited Partnership, MN PUC Application June 2013, Docket No. PL-9/CN-13-153, revised August 16, 2013, Section 7853.0270, p. 13, www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPop&documentId=%7bF1B13575-3D71-4CAA-A86A-05CE1EBBCA38%7d&documentTitle=20138-90363-03.

20 Hart Energy LLC, *supra* note 2. The geographic scope of the Hart Energy analysis is the Northeast and Mid-Atlantic states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Washington, D.C.

21 Hart Energy LLC, *supra* note 2.

22 Colonial Pipeline Co., customer meeting presentation, February 10, 2005, QA, Measurement & Inventory Team, Huiet Joseph, team leader, www.colpipe.com/specs/proposed/pdfs/2005%20QAMI%20Customer%20Meeting.pdf.

23 Hart Energy LLC, *supra* note 2.

24 The Bakken formation is a shale formation underlying parts of North Dakota, South Dakota, and Montana. The USGS estimates expected ultimate recovery will be around 7.4 billion barrels of oil, though estimates from USGS and others vary. USGS, "Assessment of Undiscovered Oil Resources in the Bakken and Three Forks Formations, Williston Basin Province, Montana, North Dakota, and South Dakota, 2013," April 2013, <http://pubs.usgs.gov/fs/2013/3013/fs2013-3013.pdf>.

25 "Company," PBF Energy website, www.pbfenergy.com/company.

26 Such proposals include the Enbridge Line 9 and Portland-Montreal Pipeline reversals, and TransCanada's Energy East Pipeline, which would include conversion of a natural gas pipeline and new pipeline construction.

27 Hart Energy's projections could underestimate the amount of tar sands fuels entering the Northeast and Mid-Atlantic market. For example, Hart Energy assumes that the tar sands fuel reaching the region from the Gulf via the Colonial Pipeline will be in proportion to the tar sands reaching all Gulf Coast refineries. In reality, the Gulf Coast refineries specifically supplying the Colonial Pipeline could be processing a higher proportion of tar sands than other refineries in the Gulf; therefore, the Northeast and Mid-Atlantic could be receiving more tar sands than Hart assumes.

28 While many energy industry companies, including Hart Energy, assume construction of the Keystone XL tar sands pipeline as part of a "business as usual" scenario, NRDC does not view this as a foregone conclusion or a wise choice for the country; hence the scenario without Keystone XL.

29 Numbers derived from Hart Energy, *supra* note 2.

30 Levi Tillemann, "eGallon and Electric Vehicle Sales: The Big Picture," U.S. Department of Energy website, www.energy.gov/egallon.

31 Energy Information Administration, *Annual Energy Outlook 2013*, Table 18.

32 Associated Press, "Hurricane Irene One Year Later: Storm Cost \$15.8 [Billion] in Damage from Florida to New York to the Caribbean," *New York Daily News*, August 27, 2012, www.nydailynews.com/new-york/hurricane-irene-year-storm-cost-15-8-damage-florida-new-york-caribbean-article-1.1145302.

33 CNN Library, "Hurricane Sandy Fast Facts," July 13, 2013, www.cnn.com/2013/07/13/world/americas/hurricane-sandy-fast-facts.

34 Northeast States for Coordinated Air Use Management (NESCAUM), "Economic Analysis of a Program to Promote Clean Transportation Fuels in the Northeast/Mid-Atlantic Region," p. 20, August 2011, www.nescaum.org/documents/nescaum-cfs-economic-analysis-final.pdf.

35 *Ibid.*

36 The states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont participate in the Regional Greenhouse Gas Initiative, which requires annual carbon pollution reductions from power plants of 2.5 percent per year from 2015 through 2020.

37 A list of Northeast towns that have passed such resolutions is available from NRDC on request.



Natural Resources Defense Council

40 West 20th Street
New York, NY 10011
212 727-2700
Fax 212 727-1773

Beijing

Chicago

Los Angeles

Bozeman

San Francisco

Washington, D.C.

www.nrdc.org

www.nrdc.org/energy/dirtyfuels_tar.asp
www.facebook.com/nrdc.org
www.twitter.com/StopDirtyFuels