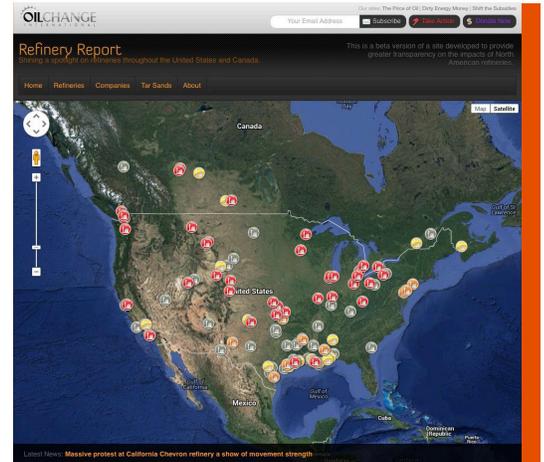


REFINERY REPORT

TAR SANDS REFINING
IN THE UNITED STATES
AND CANADA, 2010-2012

www.refineryreport.org

INTRODUCTION



www.RefineryReport.org is a new website designed to shine a light on North America's oil refineries. Although these refineries are among the biggest polluters in the region, too little is known about what goes in and what comes out of them.

The Refinery Report project will develop and publish data on North America's refineries beginning with the amount of crude oil refined from the world's dirtiest and most destructive source of oil: the Canadian tar sands.¹

The website currently shows data estimating the quantity of tar sands crude processed at U.S. refineries in the years 2010, 2011, and 2012. These estimates were made by cross referencing multiple data sources and we believe them to be the best publically available estimates of tar sands refining at American refineries.²

Data on Canadian refineries is much more difficult to source. We have identified which Canadian refineries process tar sands crude but are currently unable to quantify crude flows. However we will continue working to improve the transparency of these refineries in the future.

By browsing the map on www.refineryreport.org, you can clearly see which North American refineries process tar sands crude. Further details can be obtained by clicking on the live icon representing each refinery. In some areas there are several refineries clustered together in close proximity. Please zoom in on the map to reveal all the refineries in these areas.

1. For more information on Canada's tar sands, see: www.oilsandsrealitycheck.org

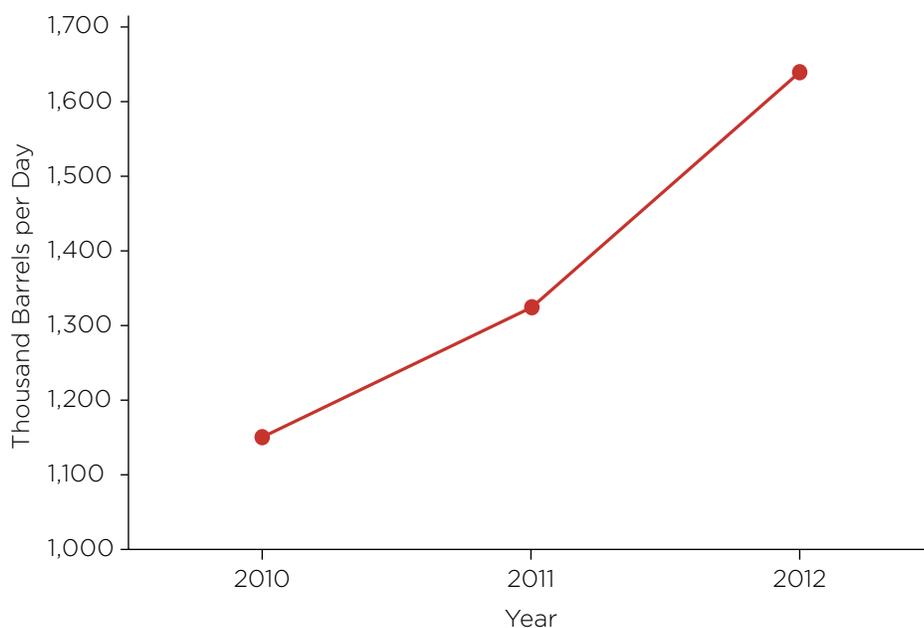
2. For an explanation of the methodology used, please see: <http://refineryreport.org/about.php>

ANALYSIS: TAR SANDS CRUDE IN U.S. REFINERIES 2010-2012.

The amount of tar sands crude refined in the U.S. grew by over 40 percent between 2010 and 2012, from 1.15 million barrels per day (bpd) in 2010 to 1.65 million bpd in 2012 (see Figure 1). The number of U.S. refineries processing tar sands increased from 57 to 66.

Of the 66 refineries that processed tar sands crude in 2012, 62 were producers of transportation fuels such as gasoline, diesel, and jet fuel. The other four were small refineries that specialize in producing non-transportation fuel products such as asphalt or petrochemicals. These four refined less than 1,000 bpd of tar sands crude each.

Figure 1: Volume of Tar Sands Crude Refined in the U.S., 2010-2012



AMERICA'S BIGGEST TAR SANDS REFINERIES

The Flint Hills refinery in Pine Bend, Minnesota, refines more tar sands crude than any other refinery in the United States, over 200,000 bpd. Tar sands crude made up 77 percent of the refinery's feedstock in 2012. Exxon and BP own the next biggest tar sands refineries in Whiting, Indiana and Joliet, Illinois respectively (see Table 1). The only refinery in the U.S. that relied on tar sands crude for 100 percent of its throughput was the Calumet Montana refinery in Great Falls, Montana. It is a small refinery with a maximum capacity of 10,000 bpd.

Table 1: Top 10 U.S. Tar Sands Refineries in the U.S.

Rank	Company	Location	Region ³	Tar Sands Refined in 2012 (bpd)	Growth in Tar Sands Refined, 2010-2012
1	Flint Hill Resources	Pine Bend, MN	Midwest	206,513	14.4%
2	ExxonMobil	Joliet, IL	Midwest	163,589	14.0%
3	BP	Whiting, IN	Midwest	159,062	27.8%
4	WRB ⁴	Wood River, IL	Midwest	158,978	150.7%
5	PBF Energy	Toledo, OH	Midwest	80,221	56.7%
6	CITGO	Lemont, IL	Midwest	77,576	30.3%
7	Husky	Lima, OH	Midwest	57,432	N/A ⁵
8	Marathon	Detroit, MI	Midwest	44,234	41.2%
9	Cenex Harvest States	Laurel, MT	Rocky Mountain	37,980	37.3%
10	Marathon	Garyville, LA	Gulf Coast	37,879	263.3%

3. Region is assigned based on U.S. Energy Information Administration classification of Petroleum Administration for Defense Districts (PADD). Midwest is PADD 2. See <http://www.eia.gov/todayinenergy/detail.cfm?id=4890>.

4. WRB is a joint venture between Phillips66 and Cenovus Energy.

5. The Husky Lima refinery did not process any tar sands crude in 2010.

AMERICA'S BIGGEST TAR SANDS REFINING COMPANIES

Despite having only one refinery that regularly refines tar sands crude, Flint Hills Resources – a subsidiary of Koch Industries, privately owned by billionaire right wing activists Charles and David Koch – is the biggest refiner of tar sands crude in the United States. Together with Flint Hills, the top ten tar sands refining companies processed over 75 percent of all the tar sands refined in the U.S. in 2012 (see Table 2).

Exxon and BP make up the top three in the list after Flint Hills, both of them operating major tar sands refineries in the Chicago area among others. Phillips66, the recently separated refining arm of now-independent oil company ConocoPhillips, is the fourth largest tar sands refiner in the U.S. It refines the bulk of its tar sands crude at the WRB refinery in Wood River Illinois (see Table 1), which it owns jointly with Cenovus Energy, a Canadian tar sands production company.

Marathon Petroleum, which has substantial heavy oil capacity at its Garyville, Louisiana and Detroit, Michigan refineries, is fifth. Most of the remainder of the top-ten tar sands refineries are mid-sized independent refining companies with a concentration of capacity in the Midwest and Rocky Mountain regions. One exception to this is CITGO, which is owned by the Venezuelan national oil company PDVSA. PDVSA owns refineries on the Gulf Coast that mainly refine Venezuelan heavy oil, but its refinery in Illinois has much better access to the tar sands than it does to Venezuelan oil.

Another integrated oil company in the top-ten list is the Canadian tar sands producer Husky Energy. Its main tar sands refinery is in Toledo, Ohio, owned jointly with BP. Husky also owns a refinery in Lima, Ohio that refines small quantities of tar sands. The company is currently seeking approval from local regulators to install new equipment that would enable this refinery to increase its tar sands refining capacity.⁶

It is interesting to note that America's largest refiner, Valero, is not in the top-ten list and refined as little as 9,000 bpd of tar sands in 2012. This is likely because Valero's refineries are concentrated on the Gulf and West coasts, which both lack substantive access to tar sands crude. Valero has been a vocal supporter of the Keystone XL pipeline and invested heavily in tar sands crude refining equipment at its Port Arthur, Texas and St. Charles, Louisiana refineries. Frustrated by the delay in permitting for the pipeline, Valero recently announced plans to invest in insulated tank cars and tank car unloading capacity at St. Charles specifically

6. Reuters, August 7, 2013, "Husky Energy may revamp Ohio refinery for some Canadian heavy crude." <http://www.reuters.com/article/2013/08/07/husky-refinery-ohio-idUSL1N0G81SM20130807>

to get tar sands crude to the refinery by rail in 2014.⁷ The company also announced plans to transport tar sands crude by rail to its Benicia, California refinery, although this plan has been put on hold following a local government request for environmental review.⁸

Finally, it should be noted that 133,000 bpd of tar sands crude that entered the U.S. in 2012 is not traceable to specific refineries. This crude was imported by trading companies and directed to tank farms after entering the country, rather than going directly to refineries. It is possible Valero, or any of the other companies, refined some of this crude.

Table 2: Top 10 Tar Sands Refining Companies in the U.S.

Rank	Company	Tar Sands Refined in 2012 (bpd)	Percentage of total tar sands refined in U.S. 2012
1	Flint Hills Resources	206,513	12.5%
2	ExxonMobil	193,729 ⁹	11.75%
3	BP	186,794 ¹⁰	11.3%
4	Phillips66	175,063 ¹¹	10.6%
5	Marathon Petroleum	145,403	8.8%
6	PBF Energy	85,479	5.2%
7	CITGO	77,601 ¹²	4.7%
8	Husky Energy	71,518 ¹³	4.3%
9	Cenex Harvest States	51,958	3.15%
10	HollyFrontier	47,160	2.9%

7. Bloomberg News, November 7, 2013, "Valero St. Charles Seeks to Double Size of Planned Rail Project." <http://www.bloomberg.com/news/2013-11-07/valero-st-charles-seeks-to-double-size-of-planned-rail-project.html>

8. The Wall Street Journal Blog, September 12, 2013. "Even a Railway Line Can't Dodge the Keystone XL Controversy" <http://blogs.wsj.com/corporate-intelligence/2013/09/12/even-a-railway-line-cant-dodge-the-keystone-xl-controversy/>

9. Includes Exxon's 50% stake in the Chalmette refinery in Louisiana.

10. Includes BP's 50% stake in the BP-Husky refinery in Toledo, Ohio.

11. Includes Phillips66's 50% stake in WRB refining, which owns refineries in Wood River, Illinois and Borger, Texas.

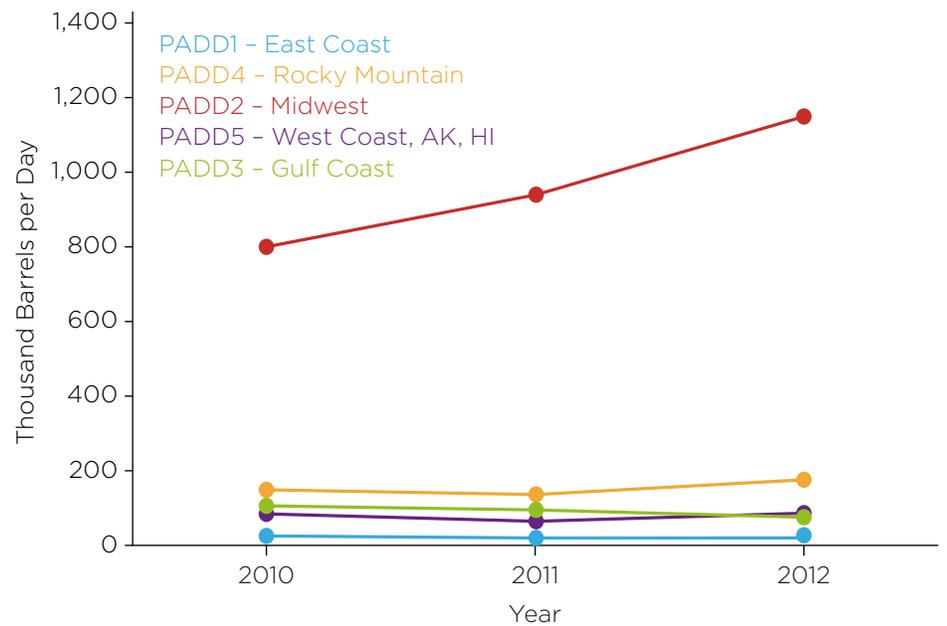
12. Includes CITGO's 50% stake in the Chalmette refinery in Louisiana.

13. Includes Husky's 50% stake in the BP-Husky refinery in Toledo, Ohio.

TAR SANDS REFINING BY REGION

As Figure 2 clearly shows, the Midwest region is currently the center of tar sands refining in the U.S. – over 70 percent of all tar sands crude refined in the country in 2012 was processed at Midwest refineries. Furthermore, tar sands crude makes up over one-third of all crude oil refined in the Midwest, the highest share of any region. This reflects the prolific pipeline network connecting Alberta to the Midwest and billions of dollars spent on cokers and other specialized tar sands refining equipment by the region’s refiners in recent years. However, there are still six refineries in the region that are tar sands free.

Figure 2: Volume of Tar Sands Refined in the U.S. by Region, 2010–2012



The Rocky Mountain region¹⁴ is the next most important tar sands refining market. Tar sands refining has grown by more than 20 percent over two years to account for 10.5 percent of the U.S. total in 2012. Tar sands crude represents a growing share of the Rocky Mountain’s limited refining capacity, reaching more than 30 percent of the region’s overall refinery feedstock in 2012. Five tar sands free refineries remain in the region.

14. PADD 4

Table 3: Regional Breakdown of U.S. Tar Sands Refining

Region	Tar Sands Refined in 2012 (bpd)	Change in Tar Sands Refined, 2010-2012	Percent of Total Tar Sands Refined in U.S. in 2012	Tar Sands Share of Total Crude Oil Refined in 2012
Midwest	1,160,013	44.9%	70.4%	33.9%
Rocky Mountain	173,087	20.7%	10.5%	30.2%
West Coast, AK, HI	84,295	3.3%	5.1%	3.3%
Gulf Coast	78,843	-15.4%	4.8%	1.0%
East Coast	18,476	-8.6%	1.1%	3.3%
U.S. Overall	1,648,148¹⁵	43.5%	-	10.7%

Despite being the home of over half of America’s refining capacity, the Gulf Coast region¹⁶ accounted for less than five percent of tar sands crude refined in the U.S. in 2012. Tar sands crude supplied one percent of the region’s refinery feedstock during the year.

While pipeline capacity to bring Canadian crude to the Gulf Coast was limited to Exxon’s 96,000 bpd Pegasus Pipeline¹⁷ over the entire period, the amount of tar sands refined in the Gulf Coast actually declined 15 percent between 2010 and 2012. This may be due to the rise in tar sands refining capacity in the Midwest and Rockies regions pulling tar sands crude away from the Gulf Coast during the period. However, this trend is expected to reverse in 2014.

With a large number of refineries already equipped to refine heavy tar sands crude, the Gulf Coast region is the number one target for expanding the market for tar sands crude. The expansion of the Seaway Pipeline, which runs from the Cushing, Oklahoma pipeline hub to the Texas Gulf Coast, and the completion of the Keystone Gulf Coast pipeline, which follows a similar route, will increase the flow of tar sands crude reaching the region beginning in early 2014. However, without the Keystone XL pipeline linking Alberta to Cushing, the amount of tar sands crude reaching Cushing will be limited. It remains to be seen to what extent rail or other pipeline expansions may bridge this gap.

15. Figures do not add due to 133,433 b/d of tar sands crude imported into the U.S. that could not be traced to a specific refinery.

16. PADD 3

17. This pipeline ruptured and spilt around 5000 barrels of tar sands crude in Mayflower, Arkansas in March 2013. It remains closed at this time.

So far, the East and West Coast regions¹⁸ have seen relatively little tar sands crude refining. Five of the East Coast's eight refineries received small amounts of tar sands crude in 2012. The region accounted for just over one percent of total tar sands crude refined in the U.S. in 2012, with around three percent of all oil refined on the East Coast derived from tar sands.

Tar sands crude has had similarly limited reach on the West Coast, where just over three percent of total crude refined in the region in 2012 came from the tar sands. The West Coast refined slightly over 5 percent of all tar sands crude imported into the U.S. in 2012. West Coast refineries could handle more tar sands crude as many of them have the necessary equipment due to a history of heavy oil production in California, which is now in decline. However, a lack of pipeline access together with California's Low Carbon Fuel Standard regulations limit how much tar sands crude enters the region. Some refiners, such as Valero, are planning rail terminals to bring in more tar sands crude, but it remains to be seen how successful these efforts will be.

CANADIAN REFINERIES

It is much more difficult to gauge the quantity of tar sands crude flowing into Canadian refineries. Unlike the U.S. Energy Information Administration (EIA), Canada's National Energy Board (NEB) does not track these flows. Additionally, as tar sands crude does not cross international borders to reach Canadian refineries the data is not present in customs or trade statistics (despite some tar sands crude passing through the United States on the Enbridge pipeline network to reach Sarnia, Ontario). However, we have determined which Canadian refineries use tar sands crude by searching company information and industry news sources that discuss these refineries.

Nine of Canada's 16 refineries regularly refine tar sands crude. Due to their proximity to tar sands production in Alberta, all the refineries in the Edmonton area are major refiners of tar sands crude. The next most important region for tar sands refining in Canada is Sarnia, Ontario, where all three refineries are regular receivers of tar sands crude delivered via the Enbridge pipeline network. The nearby Imperial Oil refinery in Nanticoke is also a major refiner of tar sands crude.

18. PADD 1 and PADD 5, respectively

Outside of these two areas, the Chevron refinery in Burnaby, near Vancouver, British Columbia and the CCRL refinery in Regina, Saskatchewan are also regular refiners of tar sands crude.

Refineries in eastern Canada lack pipeline access to the tar sands, but some may reach these refineries by rail in the near future. The Irving refinery in St. John, New Brunswick recently announced that it is building a rail terminal capable of handling 40,000 bpd of tar sands crude, which could be operational in 2014.¹⁹ The Suncor refinery in Montreal may also be preparing to receive tar sands crude via the reversal of the Enbridge Line 9 pipeline.²⁰

Further into the future, pipeline proposals such as TransCanada's Energy East project could bring more tar sands crude to the region; although much of this will likely be exported to the world market. However, as with other proposed tar sands pipelines through Canada, this pipeline will have to overcome substantial opposition from citizens and politicians in the Canadian provinces that it would pass through, particularly in Ontario and Quebec.

19. Hydrocarbon Processing, December 2, 2013 "Irving Oil to boost crude-by-rail output from Alberta to East Coast refineries." <http://www.hydrocarbonprocessing.com/Article/3284856/Irving-Oil-to-boost-crude-by-rail-output-from-Alberta-to-East-Coast-refineries.html?ArticleId=3284856>

20. The Globe & Mail, November 3, 2013. "Suncor's crude could be headed to Montreal" <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/suncors-crude-could-be-headed-to-montreal/article15234599/>