
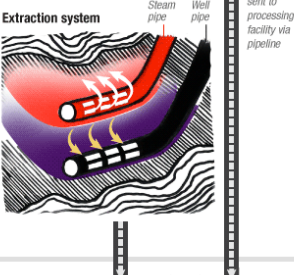
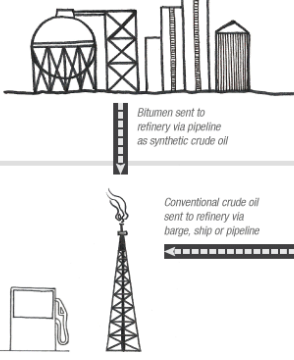




# Infographic: How Tar Sands Oil Is Produced

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The oil product extracted from Canada's tar sands isn't like conventional crude. Known as bitumen, it's sticky and so thick, it can't flow down a pipeline without extensive processing. There are two methods for getting bitumen out of the ground and turning it into usable products. Both are complex, energy-intensive and expensive processes – but high oil prices are finally making tar sands profitable.

STAGE	TAR SANDS	OIL DRILLING
<p><b>MINING AND EXTRACTION</b></p>	<p><b>Open-Pit Mining</b> About 255 square miles of land in Alberta, Canada, are <b>surface mined</b>. Once trees and top layers of soil are cleared away, big mining shovels scoop oil sands — a sticky mix of sand, water and bitumen — into trucks.</p> <p>The trucks deliver the material to an <b>on-site processing facility</b>, where it's mixed with hot water and shaken up. This separates the tar sand into three main layers: sand, water and bitumen.</p> <p>The <b>bitumen is skimmed off the top and thinned with diluting chemicals</b>, such as natural gas or light crude oil, so it can be sent via pipeline to an upgrading facility. Most of the water is recycled and used again in future processing; <b>the sand is hauled back to the mine.</b></p> <p><b>Steam Extraction</b> When oil sands deposits are <b>more than 225 feet underground</b>, two wells are drilled. One is used to <b>inject steam</b> into the tar sands deposit to heat the sand and make the bitumen flow more easily. The second well pipe <b>collects the flowing bitumen and brings it to the surface</b>. About 80 percent of Canada's tar sands reserves are deep enough to require this steam extraction method.</p>	<p><b>Crude Oil Drilling</b></p> 
<p><b>PROCESSING</b></p>	<p>Bitumen from the mines is usually processed at an upgrading facility into <b>synthetic crude oil</b>. On average it takes about two tons of mined tar sands to produce one barrel of crude oil.</p> <p>The bitumen extracted from the ground using steam gets diluted with liquid natural gas and other chemicals.</p>	
<p><b>REFINING</b></p>	<p>The bitumen arrives at an oil refinery via pipelines.</p> <p>Regular crude oil arrives at a refinery by barge, ship or pipeline.</p> <p>The oil is processed into products like <b>gasoline, jet fuel, plastics, asphalt, and other consumer and industrial products</b>.</p>	<p>Bitumen sent to refinery via pipeline as synthetic crude oil</p> <p>Conventional crude oil sent to refinery via barge, ship or pipeline</p> 
<p><b>CLEANUP</b></p>	<p><b>Tar Sands</b> Raw bitumen can be <b>denser than water</b>, which can make it harder to clean up when it spills into waterways.</p> <p>In the 2010 Kalamazoo River spill, workers dredged up river sediment and aerated it to make the oil rise to the surface. They then captured the oil using standard cleanup methods.</p>	<p><b>Oil Drilling</b> Oil produced by conventional oil drilling is generally <b>less dense than water</b>, so it floats. When it spills into water, it's corralled with booms, and cleaned up with vacuum trucks and absorbent pads.</p>

Source: Energy Information Administration, Government of Alberta/Alberta Energy  
 Credit: Alyson Hurt, Ayodha Ouditt and Andrew Prince / NPR

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