



## from oil sands ore to consumer energy

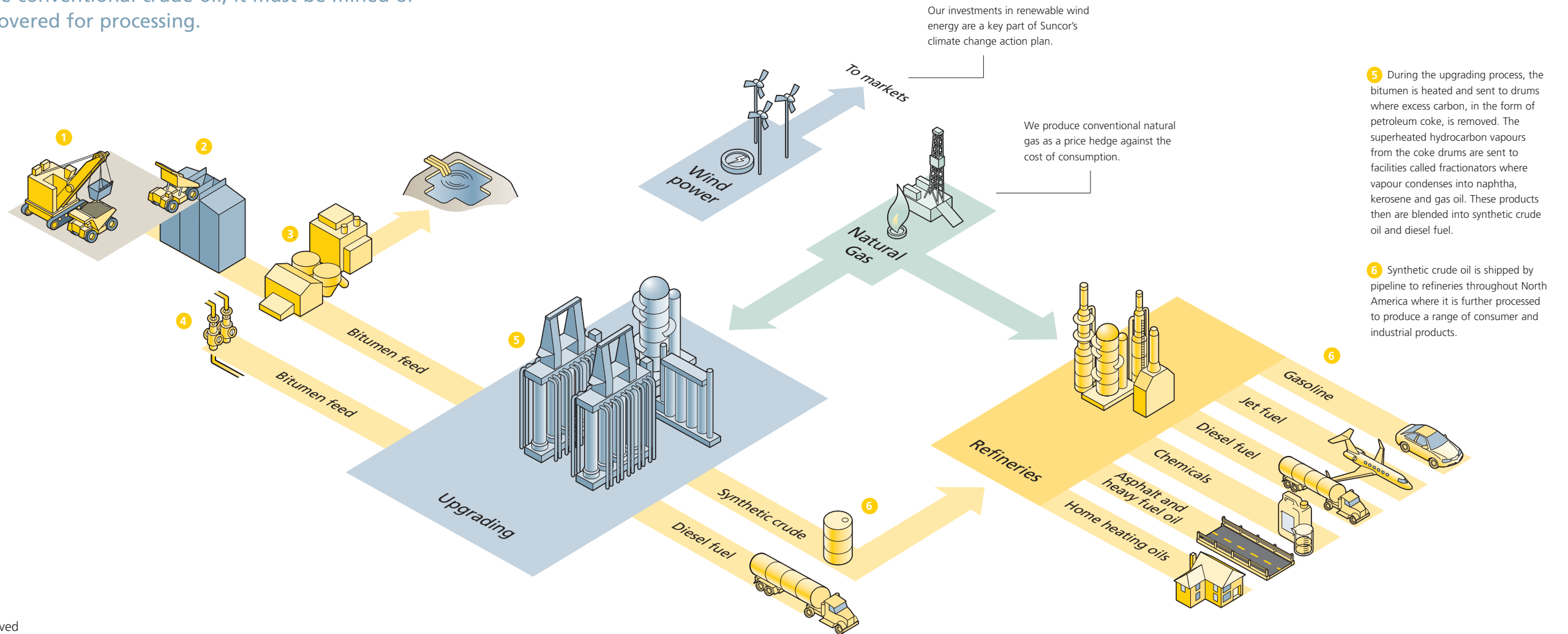
Oil sands is a mixture of bitumen (a tar-like, heavy oil), sand, water and clay. Because it does not flow like conventional crude oil, it must be mined or heated before it can be recovered for processing.

**1** In the mining process, every day about 500,000 tonnes of oil sands are mined using shovels with buckets that hold 100 tonnes. The ore is transported for processing in some of the world's largest trucks, carrying close to 400 tonnes per load. The remaining material (topsoil, muskeg, sand, clay and gravel – also called overburden) is stockpiled and used in reclamation of the mined land.

**2** Crushers and sizers break up the ore for delivery to the extraction plant.

**3** At the extraction plant, the raw bitumen is separated from the sand, water and clay to prepare for upgrading. The tailings (water, clay, sand and residual bitumen) are pumped to holding ponds where they are treated and prepared for reclamation.

**4** The in-situ process uses steam assisted gravity drainage technology to inject steam into the oil sands deposit and collect the bitumen released by the heat. The recovered bitumen is sent by pipeline to the upgrading facility. This process does not require extraction as separation happens in the ground.



**5** During the upgrading process, the bitumen is heated and sent to drums where excess carbon, in the form of petroleum coke, is removed. The superheated hydrocarbon vapours from the coke drums are sent to facilities called fractionators where vapour condenses into naphtha, kerosene and gas oil. These products then are blended into synthetic crude oil and diesel fuel.

**6** Synthetic crude oil is shipped by pipeline to refineries throughout North America where it is further processed to produce a range of consumer and industrial products.