

BITUMEN UN-STRANDED

Turning the Oil Sands Barrel UPSIDEDOWN

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As the 21st century unfolds, could decarbonization lead to a lucrative future for bitumen?

The last century saw strong growth in the road, marine, and air transportation sectors. This led to solid growth in oil production. In the 1950s, global oil production was [10 million barrels per day](#)¹. The end of the last century saw 70 million barrels per day, and by 2019 (pre-COVID-19), [100 million barrels per day](#)². Will this turn out to be too much oil, leading to stranded reserves?

Unlike other resources, crude oil consists of components appealing to different markets. Gasoline demand comes mainly from light-duty vehicles, metaphorically referred to as the ‘top of the barrel’. Jet fuel demand appeals to aviation markets. Diesel fuel demand is soaked up primarily in heavy-duty applications³. Material near the barrel bottom is too heavy for use as fuels, so it is converted into valuable streams. ‘Conversion’ units proved to be lucrative investments as they convert otherwise low-value material into high-value gasoline, jet, and diesel fuels.

Finally, there is the “bottom” of the barrel, the residue. This low-value residue is used for asphalt and other durable products.

Historically, refiners preferred oil barrels containing a ‘top’ of the barrel that extended deep into the barrel. That is where the native gasoline, jet, diesel precursors, and conversion unit feeds reside. As a result, parts of the oil barrel have different values. Over the last century, the top of the barrel had the highest value and values dropped moving down the barrel. The deeper the high-value components extend down the barrel, the better, as there would be less of the bottom of the barrel material **‘to get rid of.’**

This oil barrel value spectrum is important because once a barrel of oil is extracted from the earth’s crust, products from the entire barrel must be sold. This is true even if low value components must be sold at prices below the aggregate oil barrel price. This spectrum of values down the barrel continued through the last century. Will that continue to be true as a decarbonizing 21st century unfolds?

The first part of the 21st century saw breathtaking advances in battery technologies. In the second decade, the world saw exponential growth in electric vehicle (EV) sales. Cumulatively, by 2020 there were over 10 million EVs busily driving around not burning petroleum-based fuels. By 2025 cumulative [EVs will reach 40 million worldwide](#). This is the point where cumulative EVs will begin to impact oil prices by creating a chronic and growing supply-demand

¹ [book_wote_energy_oil.xls \(earth-policy.org\) - http://www.earth-policy.org/datacenter/pdf/book_wote_energy_oil.pdf](http://www.earth-policy.org/datacenter/pdf/book_wote_energy_oil.pdf),

² [Short-Term Energy Outlook - U.S. Energy Information Administration - https://www.eia.gov/outlooks/steo/report/global_oil.php](https://www.eia.gov/outlooks/steo/report/global_oil.php)

³ For convenience, this list of products derived from crude oil is short. Many other, albeit lower volume, products are also derived from crude oil such as liquified petroleum gas products (LPG), precursors for plastics, chemicals and others. However, in the aggregate, these products dwarf the volume of fuel products manufactured from crude oil.

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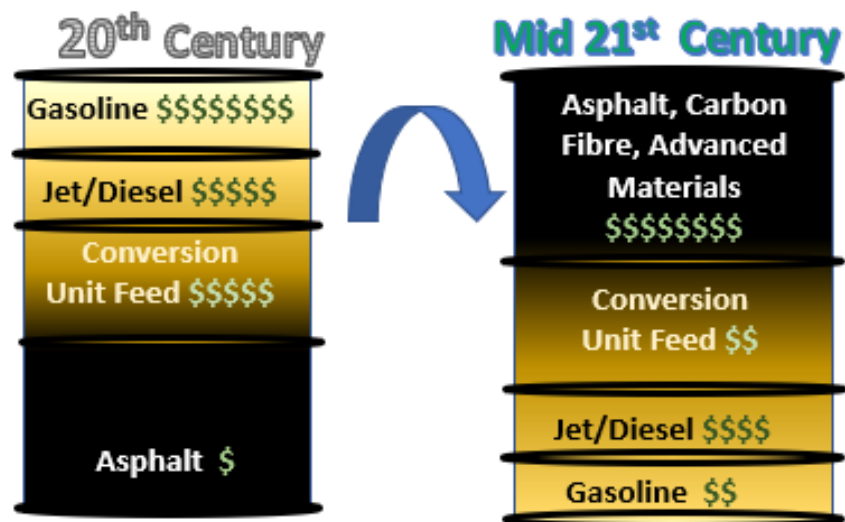
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imbalance. This impact will be low initially but will grow as EVs attain longer range, their prices decrease, and charging stations become ubiquitous. Growth in the electrification of transport, spurred on by government policies supporting their decarbonization goals, will lead to oil price drops due to liquid fuels' oversupply. This brings us back to the oil barrel.

Recall that once a barrel of oil is extracted, all components in that barrel must be sold. Crude oils rich in fuel precursors could be disadvantaged **because** of their high fuel content. Crude oils rich in the bottom of the barrel might be advantaged. Why? **Because EVs need road asphalt**. Processing light crudes, albeit at lower rates due to low fuel margins and ample supply, will lead to asphalt shortages.

Demand for motorized transportation in the developing world is growing, so we expect asphalt demand to increase as the 21st century unfolds. Therefore, asphalt prices, the bottom of the barrel, may rise while top of the barrel prices drop.

One way for refiners to take advantage of this trend is to choose oil barrels rich in asphalt and lean in fuels. Astute refiners processing oil barrels deep in quality asphalt means they would have less low value fuel volumes to sell into an oversupplied fuels market



The profit, later in the 21st century, will be at the bottom of the barrel.

A research program to find nonfuel uses for bitumen conducted by Alberta Innovate's [Bitumen Beyond Combustion](#) (BBC) reinforces this trend. Asphalt plus advanced high carbon materials such as carbon fibre could turn bitumen into a 'crude oil of choice'. Especially as the oil sands sector continues to advance its own decarbonizing performance.

Decarbonization could turn the 20th-century oil barrel economics upside down. If, or when, that happens, bitumen resources may not be stranded after all.