



# Gas From Shale Drilling to Face Strong Headwinds Next Decade

Thomas N. Russo

**T**he US Energy Information Administration said in October that US crude oil production had climbed to 11.3 million barrels a day. That also means production of associated gas from shale wells is increasing as well.

That would put the United States on a par with Russia, which surpassed Saudi Arabia to become the world's largest producer of crude oil last year. With news like this, it's fairly easy for shale oil producers to get caught up in day-to-day challenges associated with production and its challenges, like moving crude, associated gas, and natural gas liquids to market. Developers often don't focus on large-scale changes that have drastically affected the oil industry.

However, historically certain events (**Table 1**) have radically changed the oil industry. I believe that a growing "green wave" may change global power and transportation and adversely affect shale oil's future in the next 10–15 years. With breakthroughs in technology, changes may come even sooner.

There's no single factor that will radically change the economics of shale oil.

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I'm assuming that shale oil, known for its experimentation, will continue to deal with challenges in the entire supply chain, including flaring, water use in fracking, and methane leaks. Also, the public, policymakers, and politicians don't often distinguish between oil and gas. To them, shale oil means both oil and gas plays.

### WHAT'S DRIVING THE GREEN WAVE

A so-called green wave is showing up at the state level.

In November 2018, voters rejected clean-energy ballot initiatives in several states. These initiatives include Arizona's 50-percent renewable-energy mandate, Washington's fee on carbon emissions, Colorado's limits on oil and gas drilling, and Nevada's retail choice initiative. However, voters passed Nevada's 50-percent renewable-energy portfolio. While these clean-energy initiatives are generally not successful, we have not seen the last of them.

Even the "no" votes were relatively close. Washington's attempt at being the first state to implement a carbon tax (Initiative 1631) would have set a carbon price of \$15 per metric ton on fossil-fuel emissions. However, only 56.3 percent of voters opposed Initiative 1631, while 43.7 percent voted in favor of the initiative. Similarly, Colorado's attempt to limit oil and gas drilling (Proposition 112) was also somewhat narrowly rejected by voters. Proposition 112 would have required oil and gas drilling to be further distanced from homes, businesses, and waterways. Colorado voters rejected the proposition 57 percent to 43 percent.

**Table 1.** Major Events That Affected the Oil Industry

- In 1855, kerosene was the solution to humanity's craving for cheap artificial light.
- In 1878, Thomas Edison invented the first electric light bulb, causing a major recession in the oil industry.
- In 1908, Henry Ford's mass-produced automobile started a demand for gasoline and initiated an oil boom.

### WHAT MAKES UP THE “GREEN WAVE”?

There are five factors that make up the “green wave”:

1. Trends on switching to cleaner power and transportation fuels (see **Figures 1** and **2**)
2. Government actions worldwide to electrify the transportation sector
3. How oil and gas accidents can catalyze grid-scale battery storage
4. Energy and automaker investments in electric-vehicle and supporting infrastructure
5. The role petrochemicals will play

Even with fossil fuels, the trend has been toward less-polluting fuels when it comes to heating and transportation. Low-sulfur diesel has replaced high-sulfur fuel oils for heating and road transportation. A former New York City mayor mandated that large commercial buildings switch from highly polluting no. 4 and 5 heating oil to ultralow sulfur diesel (ULSD, or no. 2 heating oil), natural gas, or steam

to reduce particulate matter in the air New Yorkers breathe.

More recently, the International Maritime Organization will require ships worldwide to switch from 3.5-percent-sulfur bunker fuel to 0.5 percent in January 1, 2020, or be retrofitted with scrubbers to reduce sulfur emissions. Ships consume about 2.3 million barrels per day of production of 100 million barrels per day.

Natural gas, not oil or coal, has become the “go-to” fuel for power generation. Even when oil-fired generation is dispatched in the organized electricity markets in New England, New York, and Mid-Atlantic states, the standard is usually ULSD and not highly polluting no. 5 fuel oil.

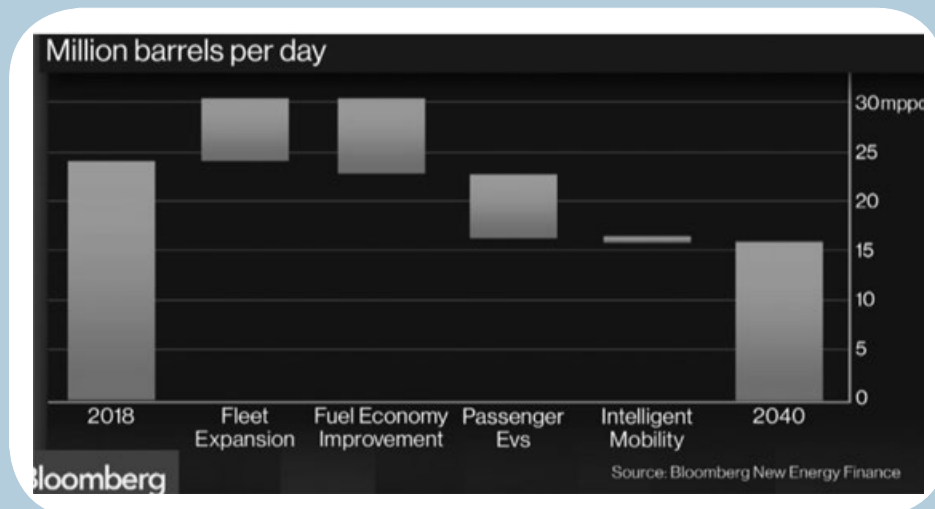
Liquefied natural gas (LNG) exports are replacing dirtier oil and coal power plants globally, especially in China, where the government has mandated fuel switching in the heating and electric power sectors. Beijing was the number-two LNG importer in 2017, replacing South Korea. In 2018, it might become the number-one LNG importer, replacing Japan.

### China Is Serious About EVs

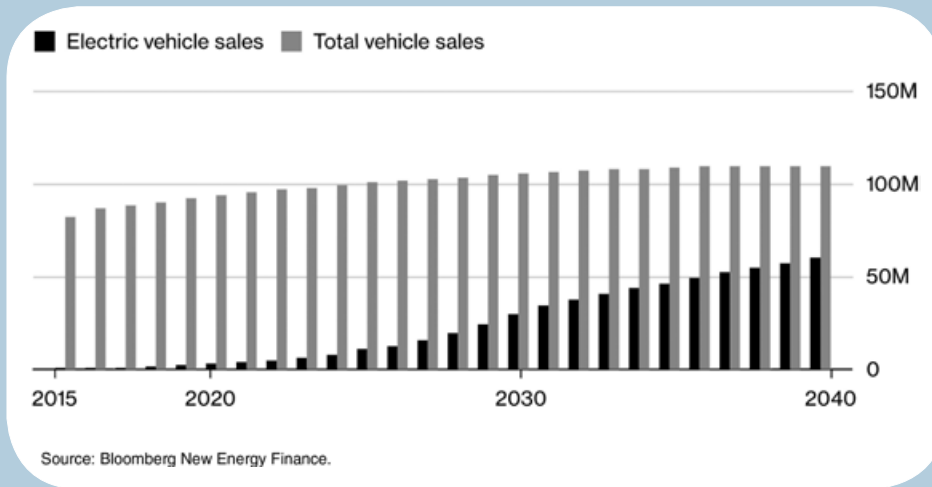
China is also taking an active role in greening its transportation sector.

The country is pushing electric cars as a preferred mode of transportation and wants to sell 2 million electric vehicles (EVs) by 2020. Beijing's goal is an internal-combustion-engine-to-EV ratio of 1:1 by 2030. Also, every five weeks, Chinese cities add 9,500 of the zero-emissions transporters—the equivalent of London's entire working fleet of electric buses.

**Figure 1.** Change in Oil Demand from Cars, 2020–40



**Figure 2.** Projected Sales of Electric Vehicles and Internal Combustion Engine Vehicles



**Accidents Also Slacken Demand**

Oil and natural gas accidents can accelerate the shift away from oil and gas.

For example, the methane leak at the Aliso Canyon natural gas storage facility expedited the move to utility-scale electric battery builds in California even though they were very expensive. As a result, utility-scale electric battery storage has established a beachhead in the United States. Most experts predict that electric-battery-storage growth will follow in the footsteps of solar and wind energy (i.e., lower costs to the point that they are cheaper than coal, nuclear, and some gas-fired power plants).

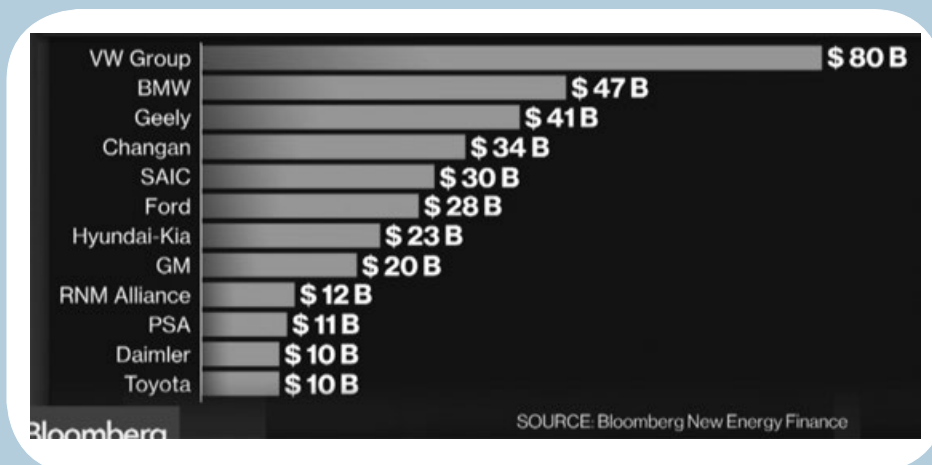
Accidents also give ammunition to many “Keep It in the Ground” environmental activists who oppose hydraulic fracking, oil pipelines like the Dakota Access (DAPL) and the Keystone XL pipeline, and many natural gas pipelines. An oil leak on DAPL shortly after the pipeline began operation did nothing to alleviate public concerns. Even today, the Keystone XL oil pipeline is not fully operational, although President Trump approved the project.

**Big Oil and Automakers Stepping In**

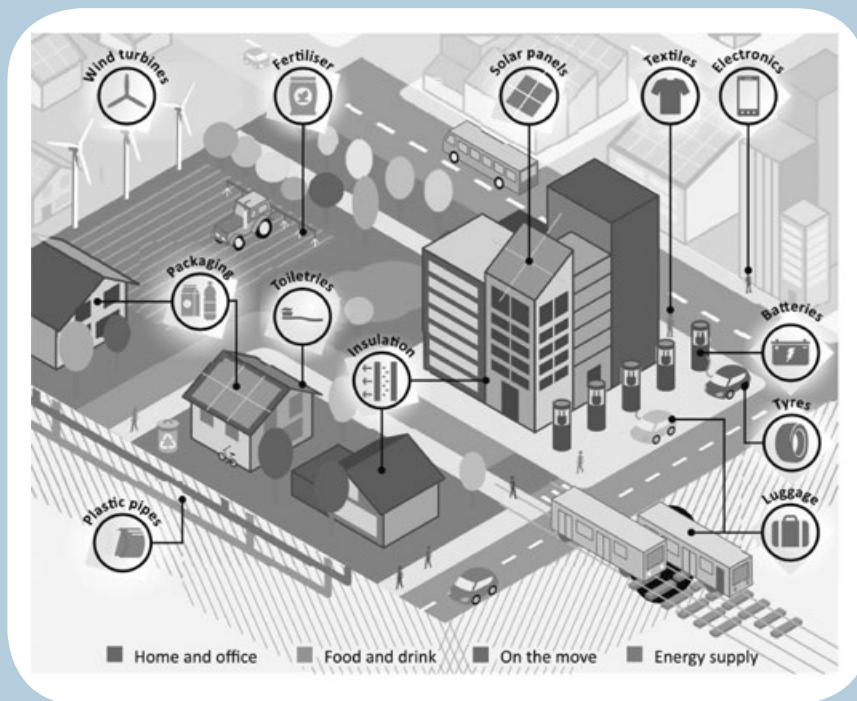
Big Oil wants to become Big Energy.

Large integrated oil companies have taken note of the aforementioned developments and are be-

**Figure 3.** Automaker Commitments to EVs Between 2018 and 2025



**Figure 4.** Widespread Use of Natural Gas Liquids and Petrochemicals



ginning to hedge their reliance on oil, gasoline, and diesel as a principal source of revenue. For example, Royal Dutch Shell made a big bet on natural gas and LNG by buying the BG Group in early 2016. Shale oil producers are also investing in natural gas and natural gas liquids (NGLs) processing and pipelines to improve their margins.

The oil majors are also beginning to invest in EV charging stations in a move that makes the majors key competitors with electric utilities. Shell bought NewMotion, a Dutch operator of one of Europe's largest EV-charging networks. France's Total is developing next-generation EV technology through its Saft battery business, acquired for \$1.1 billion in 2016. Finally, BP has invested in mobile electric vehicle charging company Free-Wire and StoreDot. While these investments pale in comparison to these companies' overall investments in oil exploration and production, they are not to be dismissed.

While Tesla may have the attention of the public when it comes to EVs, global automakers are far from ceding the EV market to the company. Volkswagen recently announced that it wants to offer an entry-level electric car for less than €20,000 (\$22,700) and will convert three German factories to build electric cars. Other au-

tomakers are also beginning to commit funds to EVs (see **Figure 3**).

### **PETROCHEMICALS MAY GIVE SHALE GAS A REPRIEVE**

Based on the above, shale gas producers may be under pressure from the greening of the power and transportation sectors. However, petrochemicals or NGLs, which are common in products we take for granted, may limit the impacts to the oil and gas industry.

An often-overlooked benefit of NGLs is that they are found in many products typically used in all countries (e.g., tires, fertilizer, and detergents). One of the most important NGLs is ethane, which is a feedstock for plastic. Ethane and other NGLs are also key components used to manufacture solar panels, wind turbines, and EV components (**Figure 4**).

Thus, even if the green wave does enable the electrification of the transportation sector and reduces the use of fossil fuels in the power sector, it will be very difficult to completely eliminate oil and gas production entirely unless NGL replacements are found for renewables and EVs. In addition, annual US exports of NGLs from 2007 to 2017 have increased almost 20-fold, from 25,584 barrels exported in 2007 to 512,4495 barrels exported in 2017. 