

## The economics of shale oil

# Saudi America

**The benefits of shale oil are bigger than many Americans realise. Policy has yet to catch up**

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DENNIS LITHGOW is an oil man, but sees himself as a manufacturer. His factory is a vast expanse of brushland in west Texas. His assembly line is hundreds of brightly painted oil pumps spaced out like a city grid, interspersed



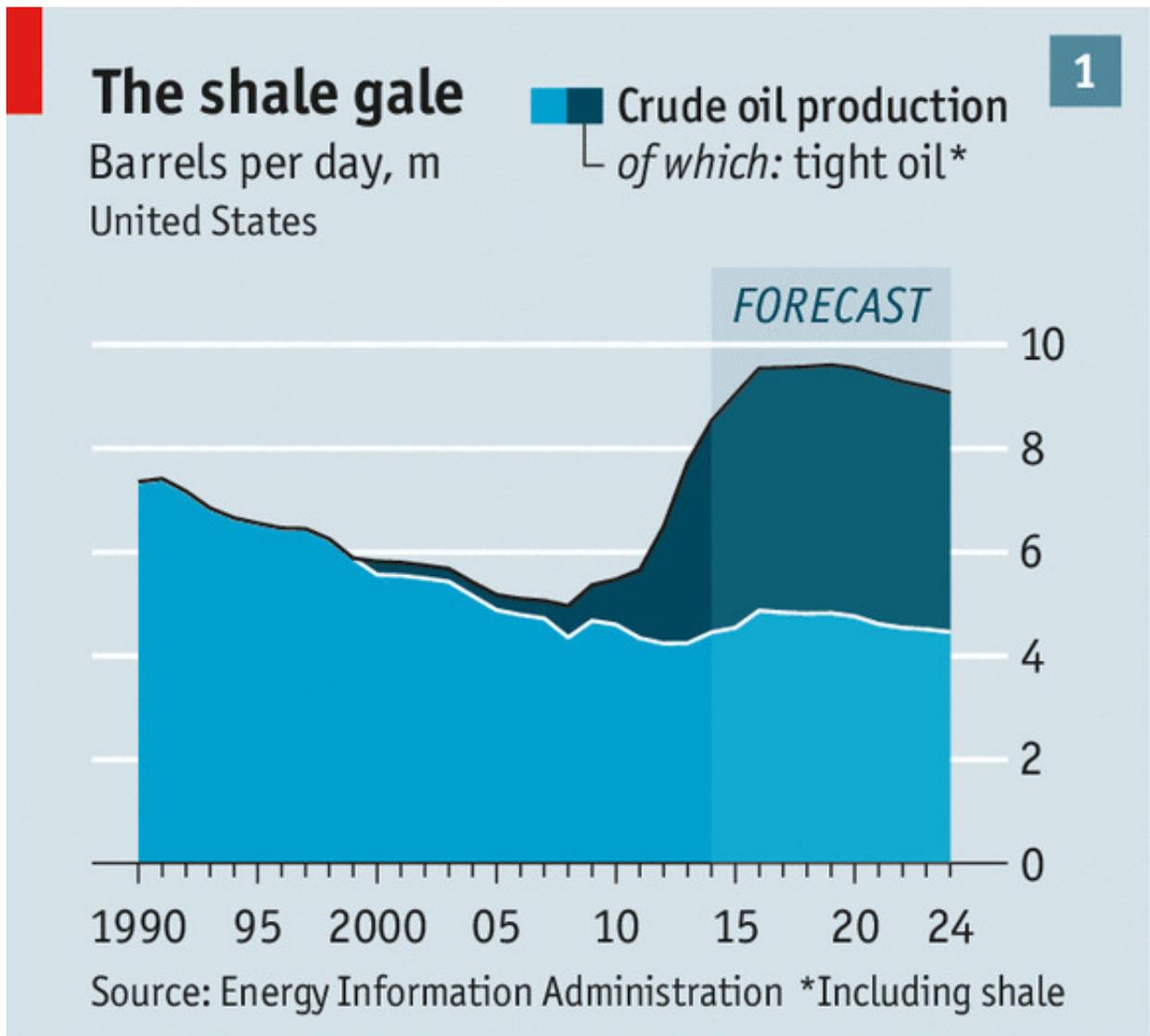
Frackin' the Bakken

with identical clusters of tanks for storage and separation. Through the windscreen of his truck he points out two massive drilling rigs on the horizon and a third about to be erected. Less than 90 days after they punch through the earth, oil will start to flow.

What if they're dry? "We don't drill dry holes here," says Mr Lithgow, an executive for Pioneer Natural Resources, a Texan oil firm. In the conventional oil business, the riskiest thing is finding the stuff. The "tight oil" business, by contrast, is about deposits people have known about for decades but previously could not extract economically.

Pioneer's ranch sits at the centre of the Permian Basin, a prehistoric sea that, along with Eagle Ford in south Texas and North Dakota's Bakken, are the biggest sources of tight oil, a broad category for the dense rocks, such as shale, that usually sit beneath the reservoirs that contain conventional oil. Since 2008 tight-oil production in America has soared from 600,000 to 3.5m barrels per day (see chart 1). Thanks to tight oil and natural gas from shale, fossil fuels are contributing ever more to economic growth: 0.3 points last year alone, according to J.P. Morgan, and 0.1 to 0.2 a year to the end of 2020, according to the Peterson Institute, a think-tank. Upscale furniture stores and luxury-car dealerships have sprung up in Midland since the boom began. Mr Lithgow has truck drivers who earn \$80,000 a year. Local oil-service firms have been known to hire fast-food workers on the spot. In all, the unconventional-energy boom

will  
create  
up to  
1.7m  
new  
jobs  
by  
2020,



predicts McKinsey, a consultancy.

And that is only part of the story. Another benefit of tight oil is that it is much more responsive to world prices. Some economists think this could turn America into a swing producer, helping to moderate the booms and busts of the global market.

Pioneer is rapidly boosting production. But Scott Sheffield, the company's boss, worries that in a few years he will run out of customers; America has prohibited the export of crude oil since the 1970s. At \$100 a barrel, the price of West Texas Intermediate (the most popular benchmark for American oil) is comfortably above the break-even cost of tight oil. But the prospect of a glut has futures pricing it at \$20 less in 2018. "There will be a lot less oil-drilling when you take \$20 out of everybody's margin," says Mr Sheffield.

Until the early 1970s, America was the world's largest oil producer and the Texas Railroad Commission stabilised world prices by dictating how much the state's producers could pump. When Arab states slapped an oil embargo on Israel's Western allies after the six-day war in

1967, Texas cushioned the blow by allowing a massive production boost.

But rising consumption and declining production eroded the state's spare capacity, and in March 1972 Texas called for flat-out production. "This is a damn historic occasion and a sad occasion," the Texas Railroad Commission's chairman declared. When Arab producers imposed another embargo the next year, prices rocketed. America had lost the role of world price arbiter to OPEC, a cartel dominated by despotic regimes. American politicians tried desperately to curb consumption (for example, by lowering speed limits) and to conserve supplies (by banning crude-oil exports in 1975).

American production declined steadily from a peak of 9.6m barrels a day in 1970 to under 5m in 2008. About then, independent producers began adapting the new technologies of hydraulic fracturing ("fracking") and horizontal drilling, first used to tap shale gas, to oil. Total American production has since risen to 7.4m barrels a day, and the Energy Information Administration, a federal monitor, reckons it will return to its 1970 record by 2019. The International Energy Agency is more bullish; it reckons that by 2020 America will have displaced Saudi Arabia as the world's biggest producer, pumping 11.6m barrels a day.

Besides directly creating new jobs and income, the fossil-fuels boom could help growth by reducing America's vulnerability to oil-price swings, in two ways. First, as production rises and imports shrink, more of the cash that leaves consumers' pockets when the oil price rises will return to American rather than foreign producers. David Woo of Bank of America/Merrill Lynch notes that America's petroleum deficit has narrowed to 1.7% of GDP while Europe's has widened to nearly 4%, which seems to have made both the dollar and the economy less sensitive to oil prices.

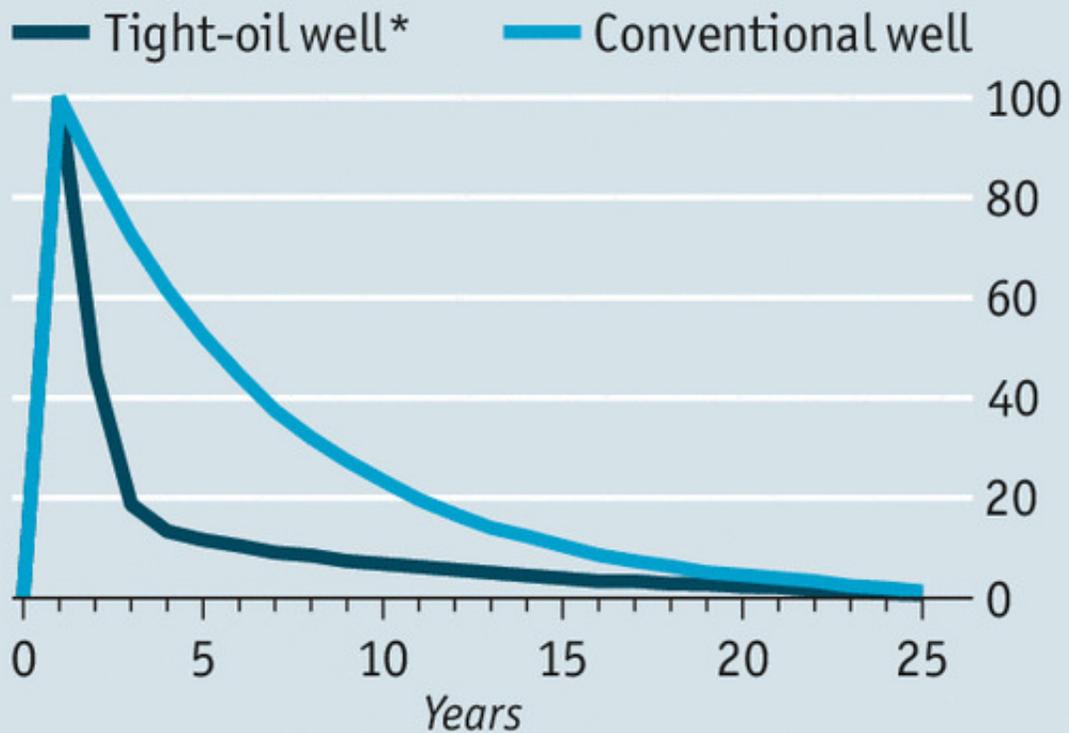
The second channel lies in the economics of shale. Oil flows relatively easily through the porous rocks that make up a conventional reservoir, so a conventional well can tap a large area. As a result, the volume of oil pumped each day declines slowly, on average at 6% per year. By contrast, oil flows much more sluggishly through impermeable tight rock. A well will tap a much smaller area and production declines quite rapidly, typically by 30% a year for the first few years (see chart 2). Maintaining a field's production levels means constant drilling. The International Energy Agency reckons maintaining production at 1m barrels per day in the Bakken requires 2,500 new wells a year; a large conventional field in southern Iraq needs just 60.

This all means that when oil prices rise, producers can quickly drill more holes and ramp up supply. When prices fall, they simply stop drilling, and production soon declines. In early 2009, after prices collapsed with the global financial crisis, Pioneer shut down all its drilling in the Permian Basin. Within six months, output in the affected areas dropped by 13%.

## Quick hit v slow burn

Typical production curves of different kinds of oil well

Peak production=100%



Source: International Energy Agency \*Including shale

McNally of Rapidan Group, an industry consultant, predicts that America could be “force-marched” back to the stabilising role it played in the 1960s, this time responding to the market’s invisible hand rather than government diktat. Will that work in practice? It may already have done so. Since 2008, the Peterson Institute notes, turmoil in Sudan, sanctions on Iran and declining North Sea output have taken a lot of oil off the market. Without America, which accounted for half of the growth in global output over that period, Persian Gulf producers might not have been able to make up for the loss. Prices could have risen sharply, hurting consumers everywhere. Yet they did not.

Oil firms try not to over-react to short-term price fluctuations, of course. Capital, equipment and labour all cost money, so they try to ramp up production only in response to what they think will be long-term shifts in the oil price.

The ban on crude-oil exports hurts producers and makes it harder for America to become a

swing supplier. Light, sweet (ie, low-sulphur) West Texas Intermediate already trades at a discount of \$8 to Brent, its global peer. That is due mostly to transport and storage bottlenecks in America, but increasingly the



Frackin' the Bakken

export ban makes a difference. In recent decades American refiners have reconfigured themselves to handle the heavier, sour oil imported from Mexico, Venezuela and Canada's tar sands, leaving them with less capacity for refining tight oil, which is light and sweet.

The oil price at which shale producers break even ranges from \$60 in the Bakken to \$80 in Eagle Ford, reckons Michael Cohen of Barclays, a bank. If exports yielded an extra \$1 to \$1.30 a barrel, he estimates that might raise total output by as much as 200,000 barrels per day.

If the ban were lifted, crude-oil exports could start more or less straight away. The necessary pipes and tankers are mostly there already. But the political debate is only in its infancy. By law the president can allow exports he considers in the national interest. Barack Obama has yet to express a view on the ban. Legislators from non-oil-producing states are wary. "For me the litmus test is how middle-class families will be affected," says Ron Wyden, the Democratic chairman of the Senate energy and natural resources committee.

The main beneficiaries of the ban are the refiners. They buy light, sweet American crude for less than the global price, turn it into petrol and then sell that at the global price. Exports of refined petroleum products are not banned, and have, unsurprisingly, soared.

Defenders of the ban (including, naturally, some refiners) claim that if America exported more oil, Saudi Arabia would reduce its own output. Prices to American consumers would not fall, they say, and might even rise. Historical evidence says otherwise, however. When Congress allowed Alaska to export crude oil in 1995, its west-coast customers did not pay any more for petrol, diesel or jet fuel.

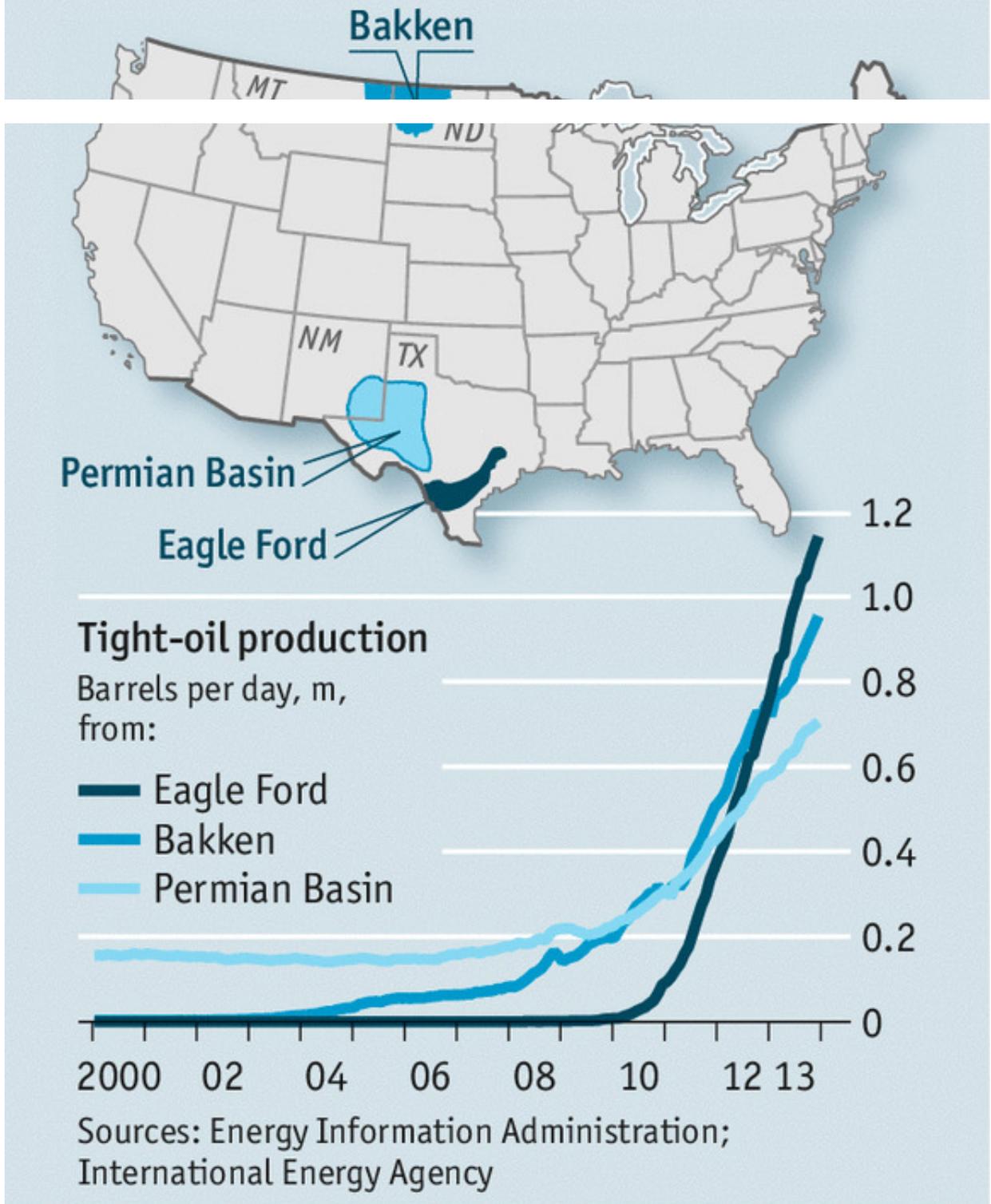
Oil producers would obviously benefit from lifting the ban. So might other Americans, in less obvious ways. A global oil market that fully included America would be more stable, more diversified and less dependent on OPEC or Russia. The geopolitical dividends could be hefty. As Pioneer's Mr Sheffield notes, "It's hard to believe we're asking the Japanese to stop taking Iranian crude, but we won't ship them any crude ourselves."

**Correction:** We said above that higher export prices could raise output by as much as 200,000 barrels per

year.  
We  
meant  
per  
day.  
Sorry.  
This  
has  
been

# Where frackers frack

Biggest tight oil production basins



corrected.

From the print edition: United States

