

WHY WE'LL "ALWAYS" NEED FOSSIL FUELS

Presentation to Dallas Association for
Business Economics
Dallas, Texas

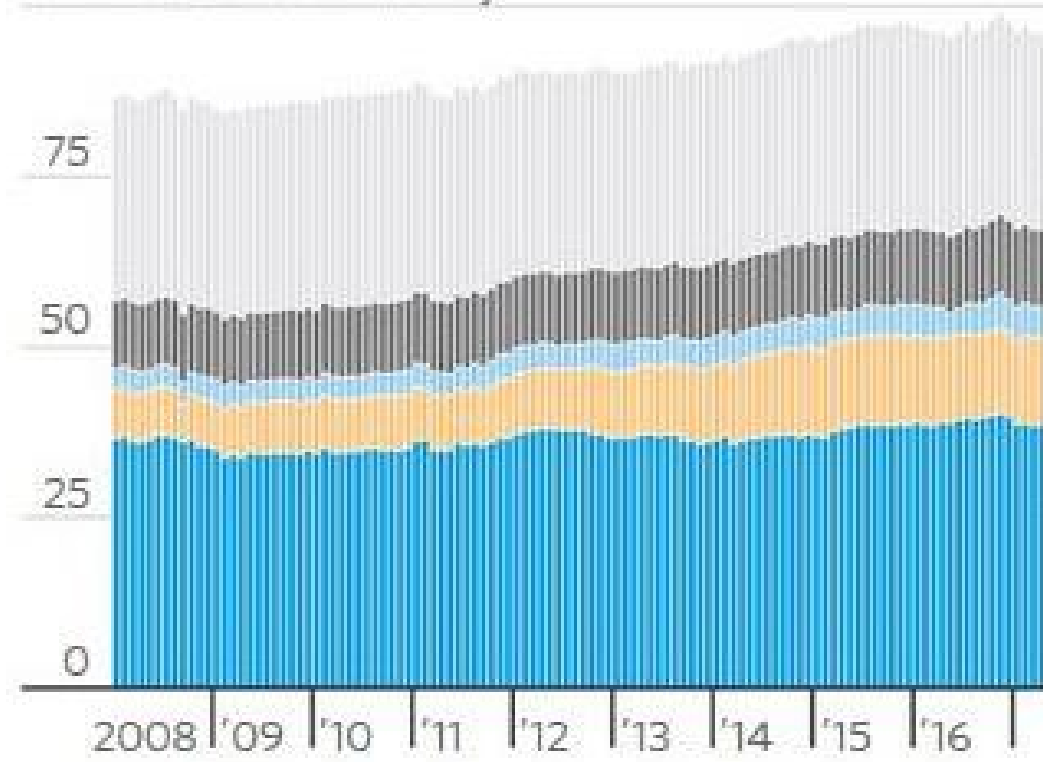
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Cox School of Business
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Dallas, Texas

April 20, 2018

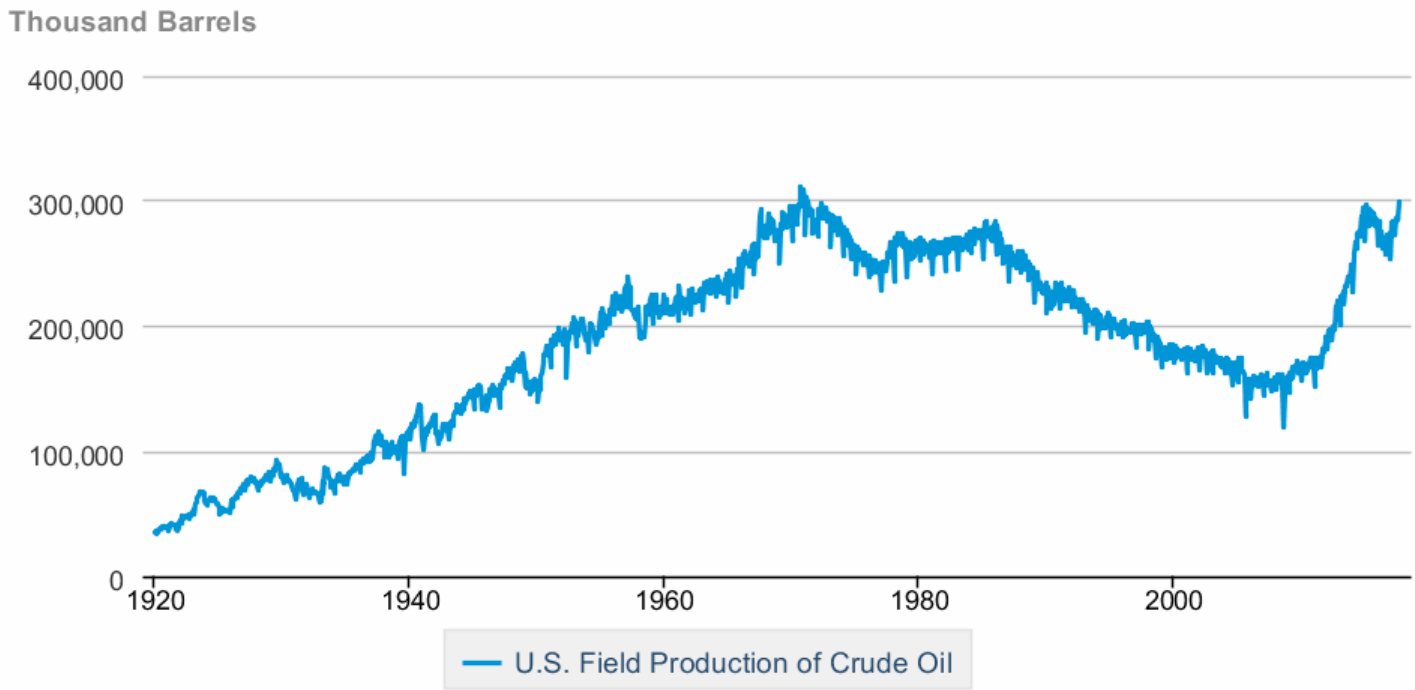
World oil production

OPEC U.S. Canada
Russia Other

100 million barrels a day



U.S. Field Production of Crude Oil



Source: U.S. Energy Information Administration

US CRUDE OIL PRODUCTION



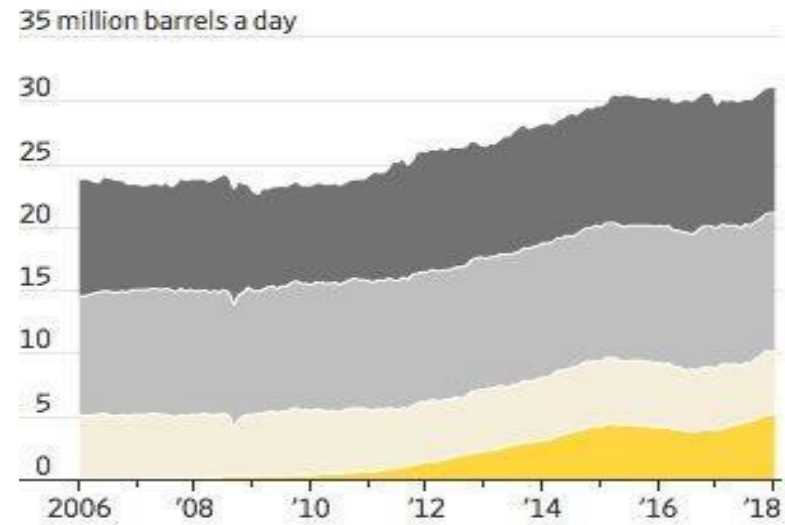
SOURCE: TRADINGECONOMICS.COM | U.S. ENERGY INFORMATION ADMINISTRATION

Growth Spurt

U.S. shale production is rising at a record pace.

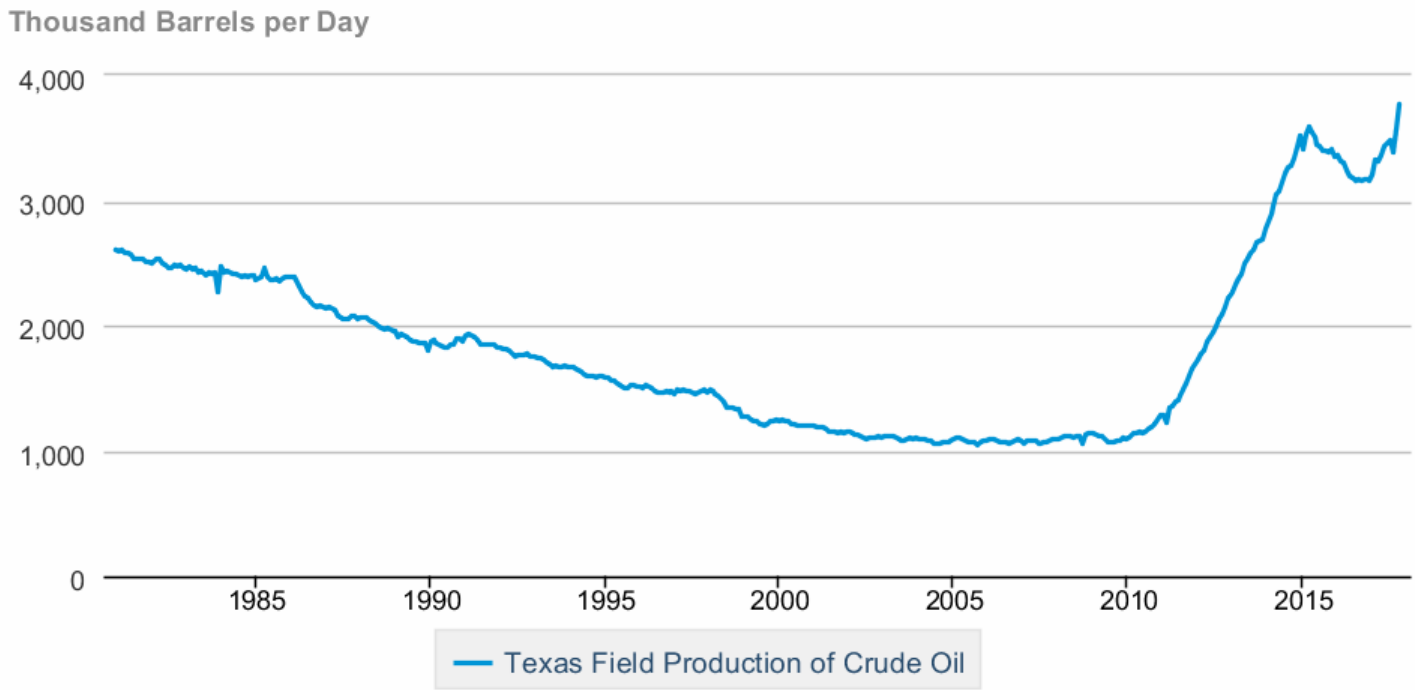
Monthly oil production

■ Saudi Arabia ■ Russia
■ U.S. conventional ■ U.S. shale



Source: International Energy Agency

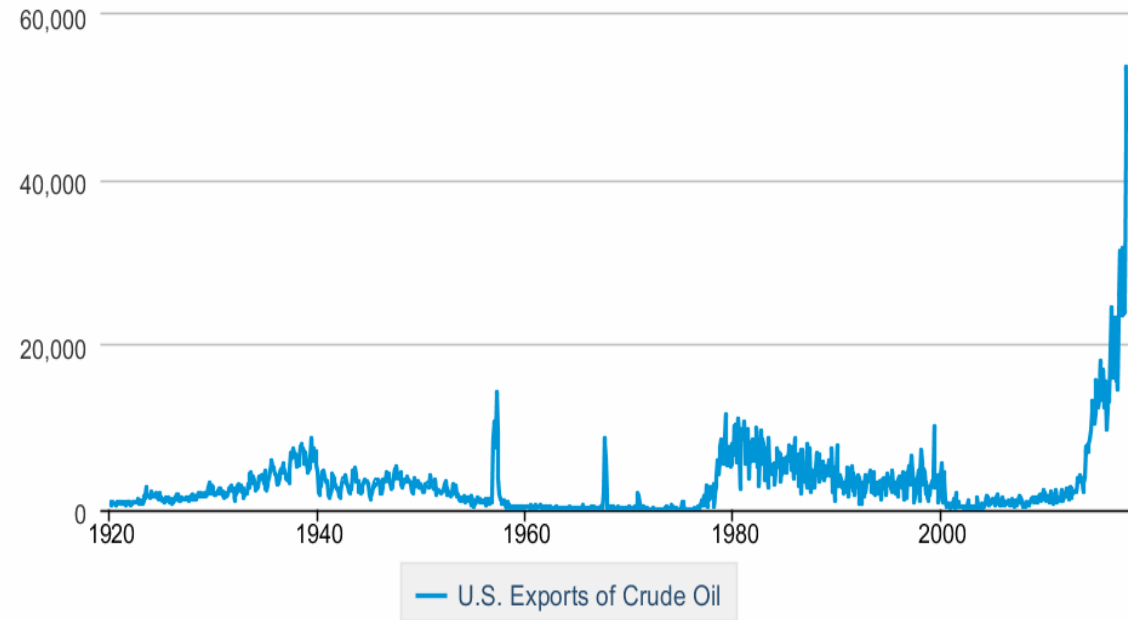
Texas Field Production of Crude Oil



Source: U.S. Energy Information Administration

U.S. Exports of Crude Oil (monthly)

Thousand Barrels



OPEC, Here We Come

U.S. net oil imports

14 million barrels a day



Source: U.S. Energy Information Administration

By *Spencer Jakab*

Feb. 13, 2018 11:38 a.m. ET

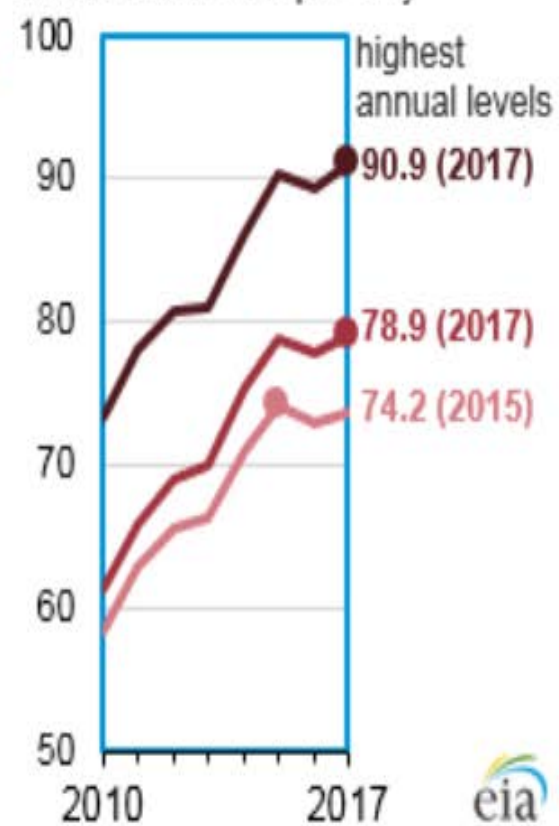
31 COMMENTS

U.S. annual natural gas production (1940-2017)

billion cubic feet per day



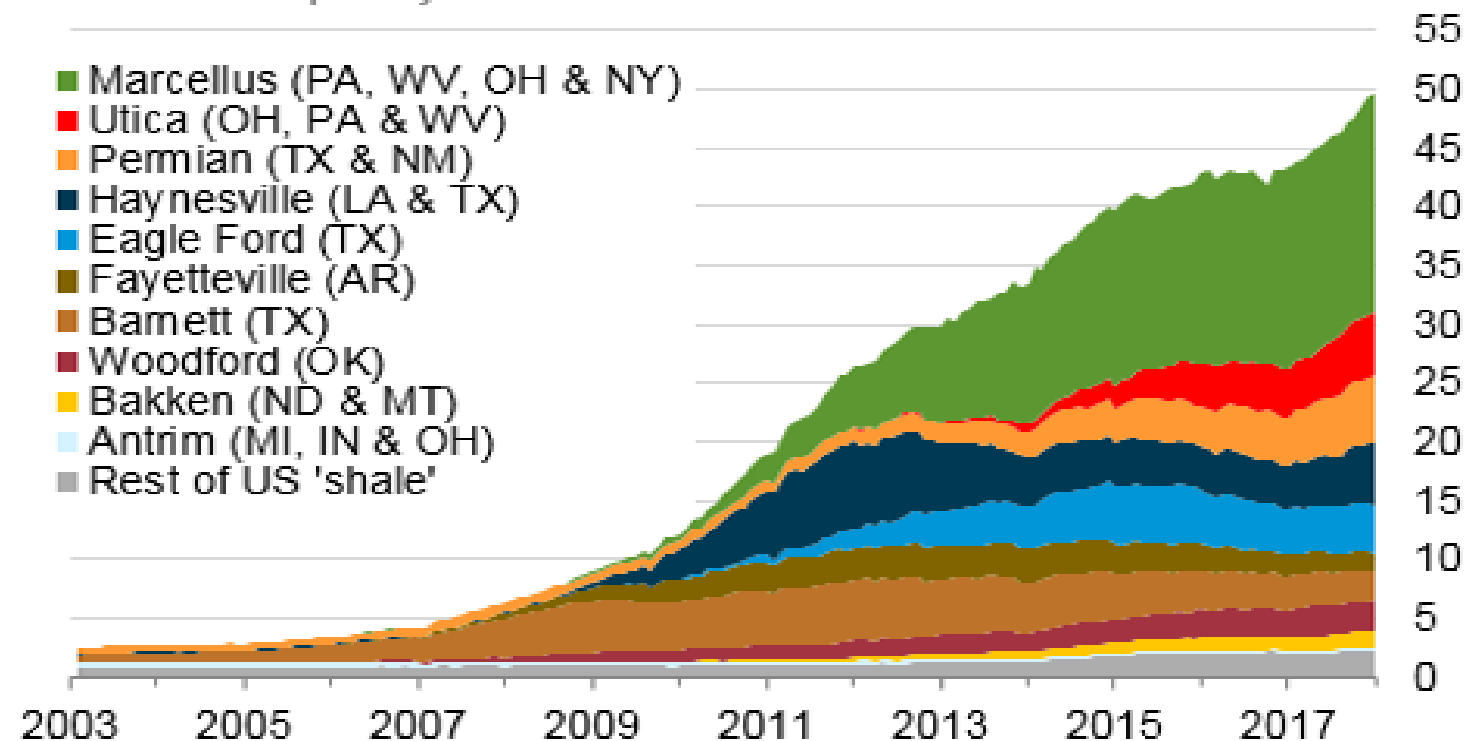
billion cubic feet per day



Source: U.S. Energy Information Administration, [Monthly Crude Oil, Lease Condensate, and Natural Gas Production Report](#)

Monthly dry shale gas production

billion cubic feet per day

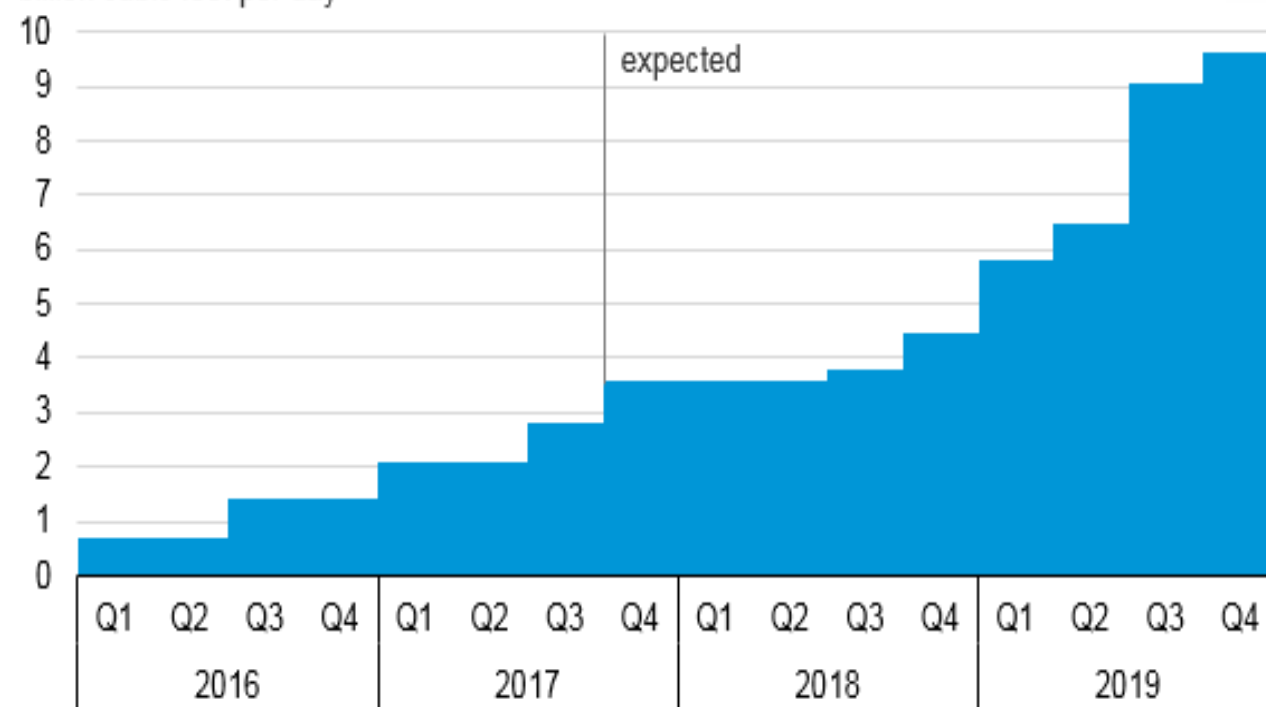


Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through January 2018 and represent EIA's official shale gas estimates, but are not survey data. State abbreviations indicate primary state(s).



U.S. liquefied natural gas export capacity (2016-2019)

billion cubic feet per day



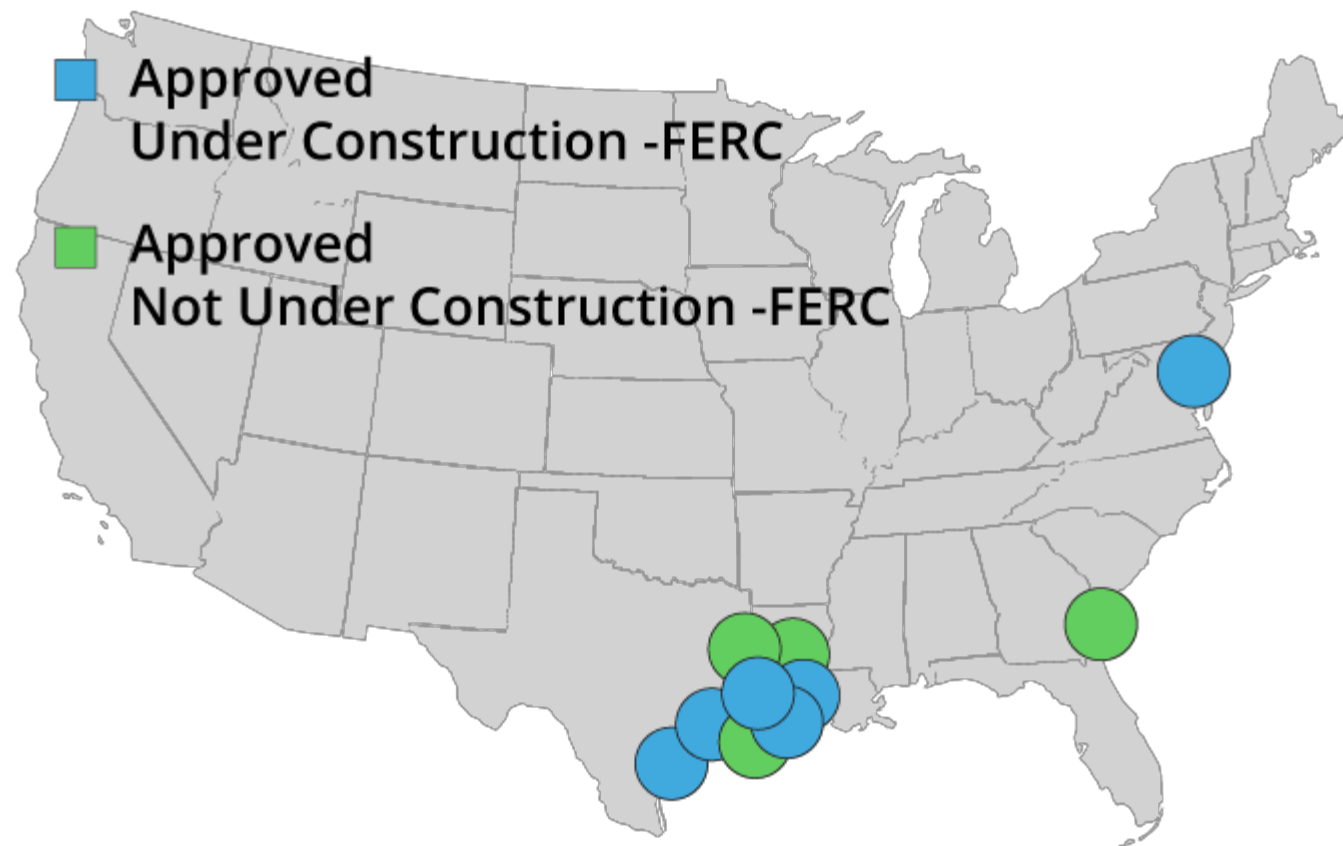
TANKERS LOADING LNG AT SABINE PASS

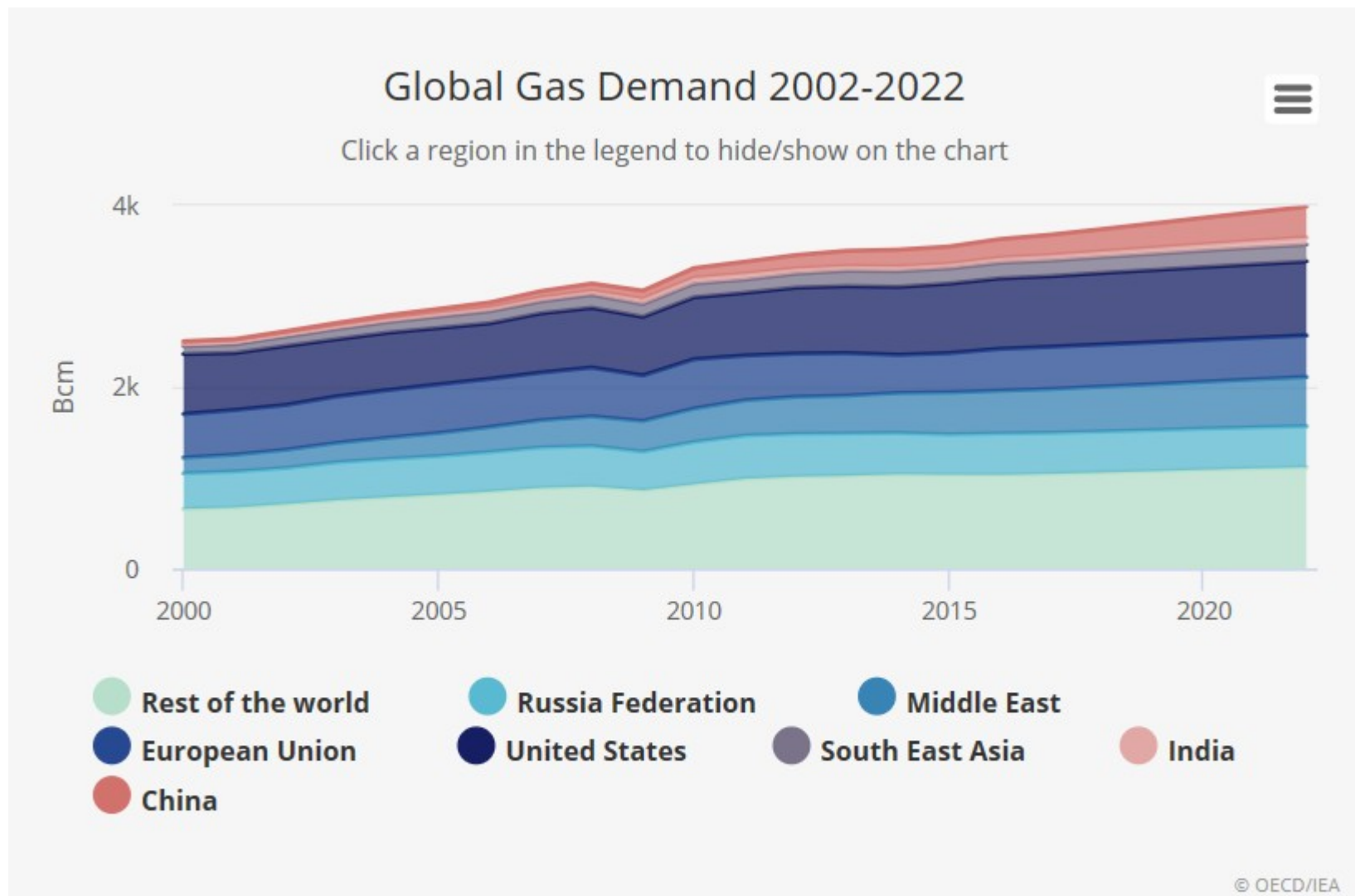


US SHALE GAS ARRIVES IN SCOTLAND



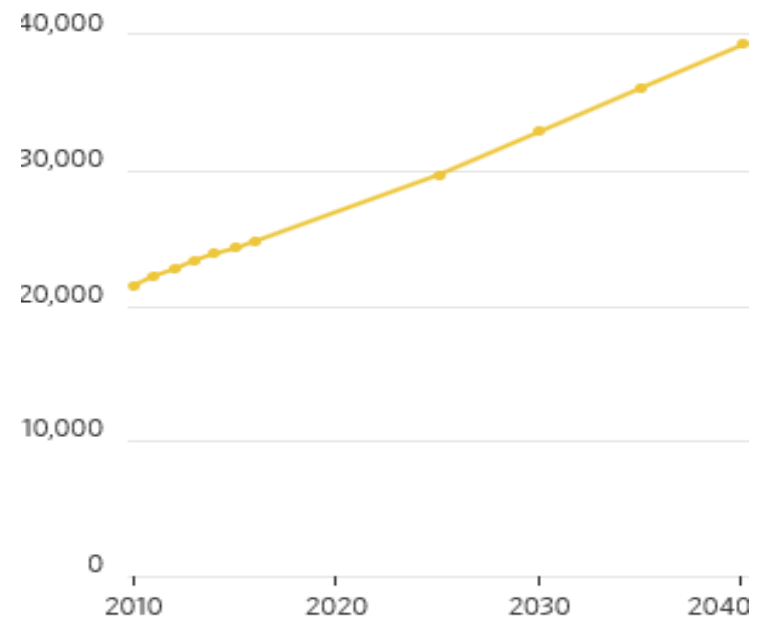
Approved Export Terminals for LNG





Source: *Market Report Series: Gas 2017*

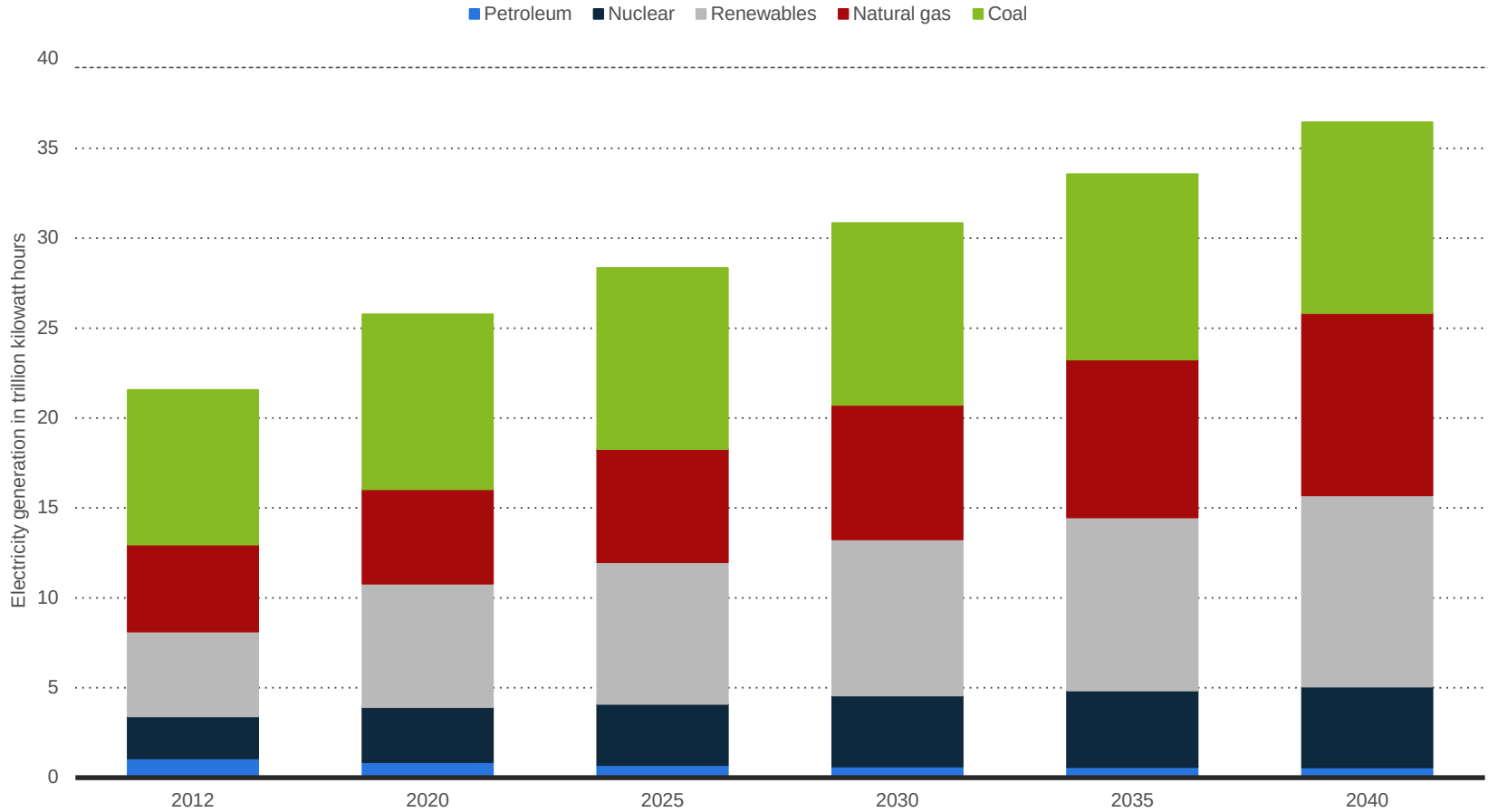
ELECTRICITY GENERATION IN TERAWATT HOURS



Source: International Energy Agency

Projected world electricity generation from 2012 to 2040, by energy source (in trillion kilowatt hours)

(EIA Predicts only 10 TWh total from renewables in 2040, or 27%)



Note: Worldwide

Further information regarding this statistic can be found on [page 8](#).

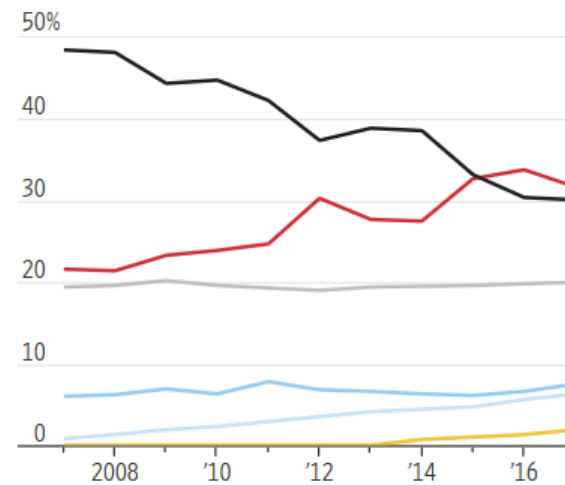
Source: EIA [ID 238610](#)

Gas on Top

Natural gas has recently overtaken coal as the top fuel for power generation.

Percentage of U.S. electricity generated, by fuel type

■ Coal ■ Nat. Gas ■ Nuclear ■ Hydro
■ Wind ■ Solar



Note: Totals may not equal 100% as smaller types aren't included.

Source: Energy Information Administration

**The
Economist**

AUGUST 12TH-18TH 2017

Fire and fury over North Korea

The Fed's runners and riders

Was Google right to sack him?

Competitive punning: game of groans

Roadkill



Fig.1 The Internal Combustion Engine



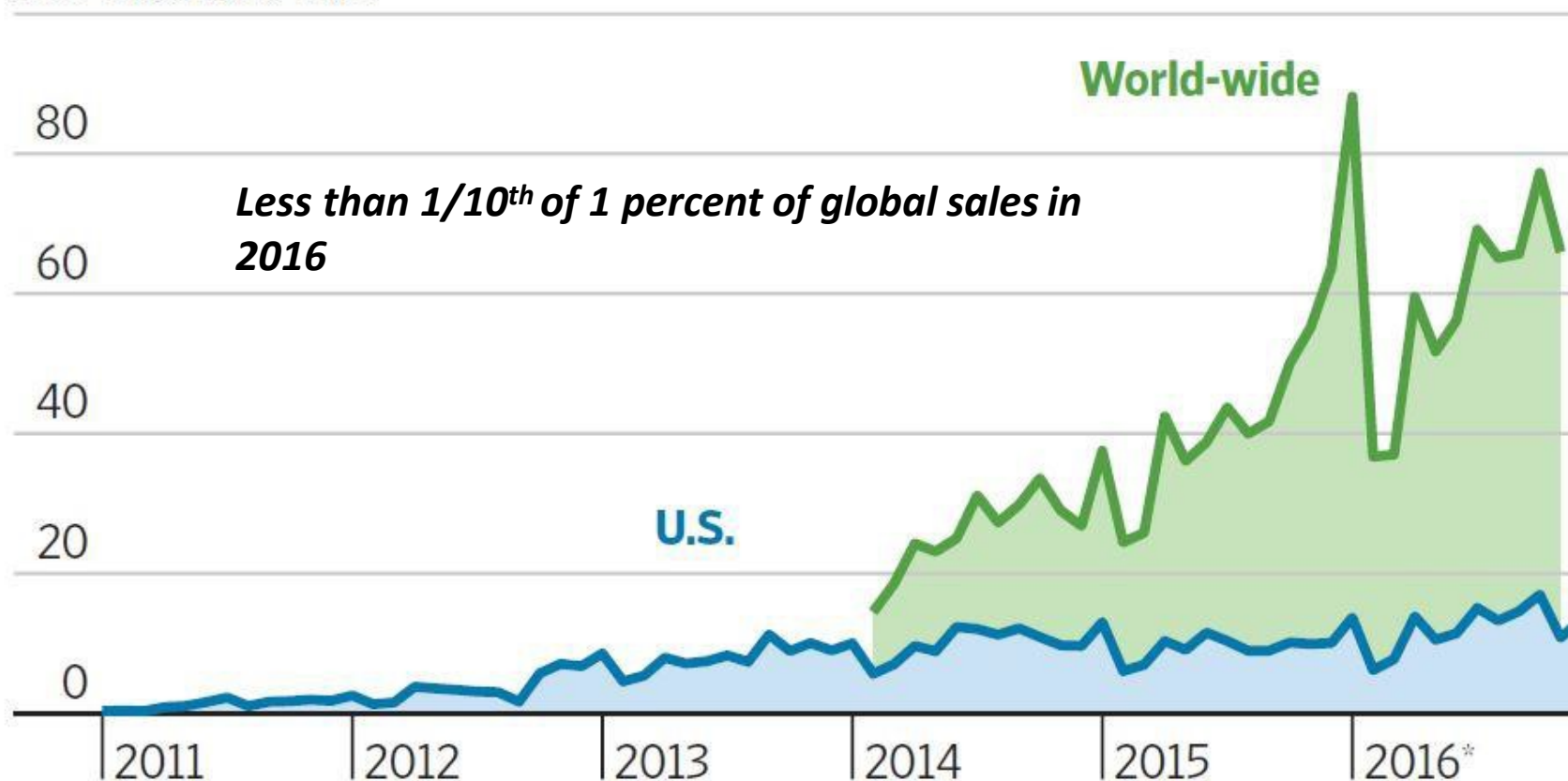
IS THE FUTURE OF TRANSPORTATION ALL ELECTRIC?



Accelerating

Electric-vehicle monthly sales globally and in the U.S.

100 thousand cars



*As of October (world) and November (U.S.)

Source: Inside EVs

THE WALL STREET JOURNAL.

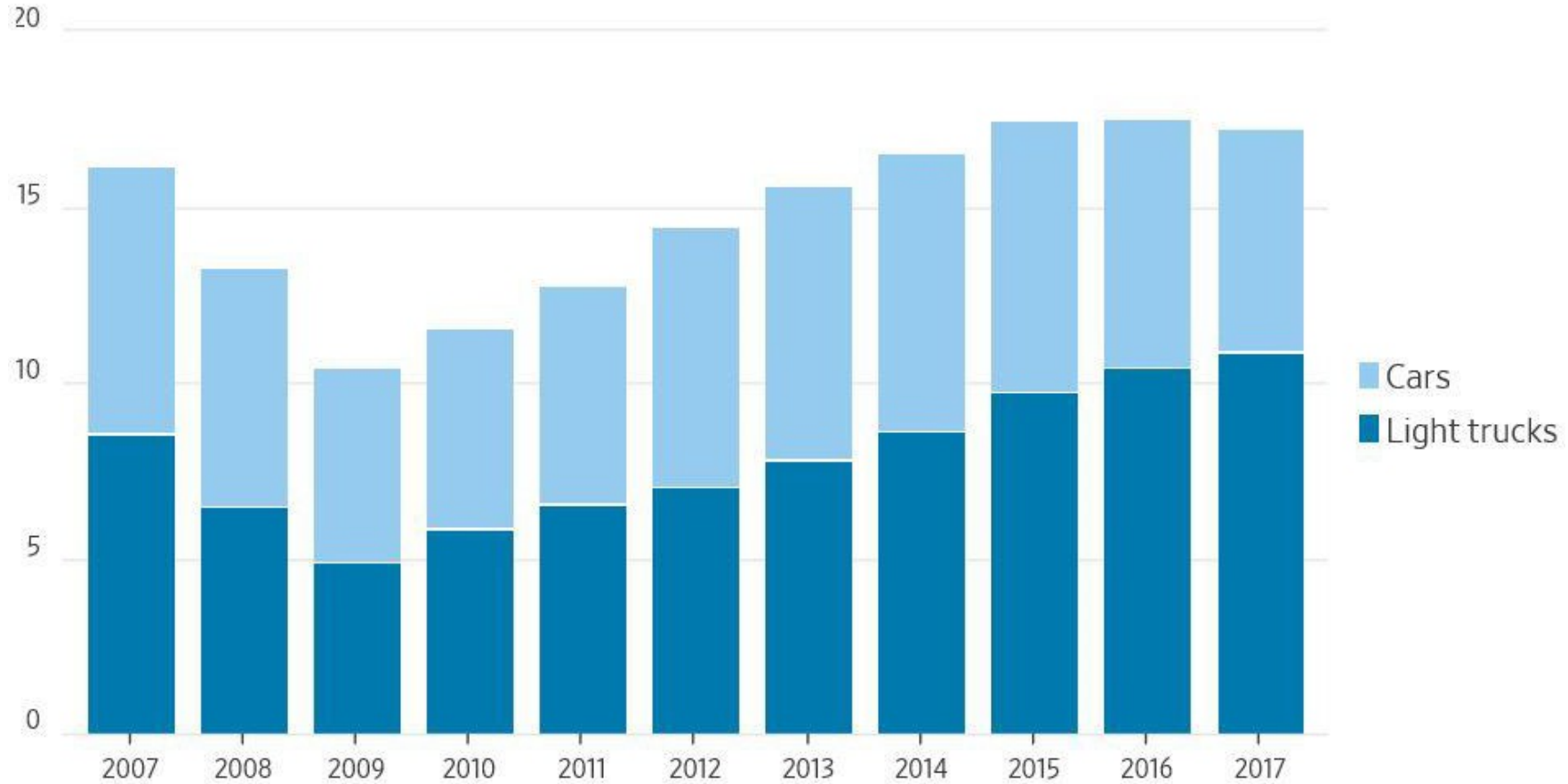
A Return to SUVs

Americans are buying more gas-guzzling pickups and SUVs at the expense of fuel-sipping sedans.

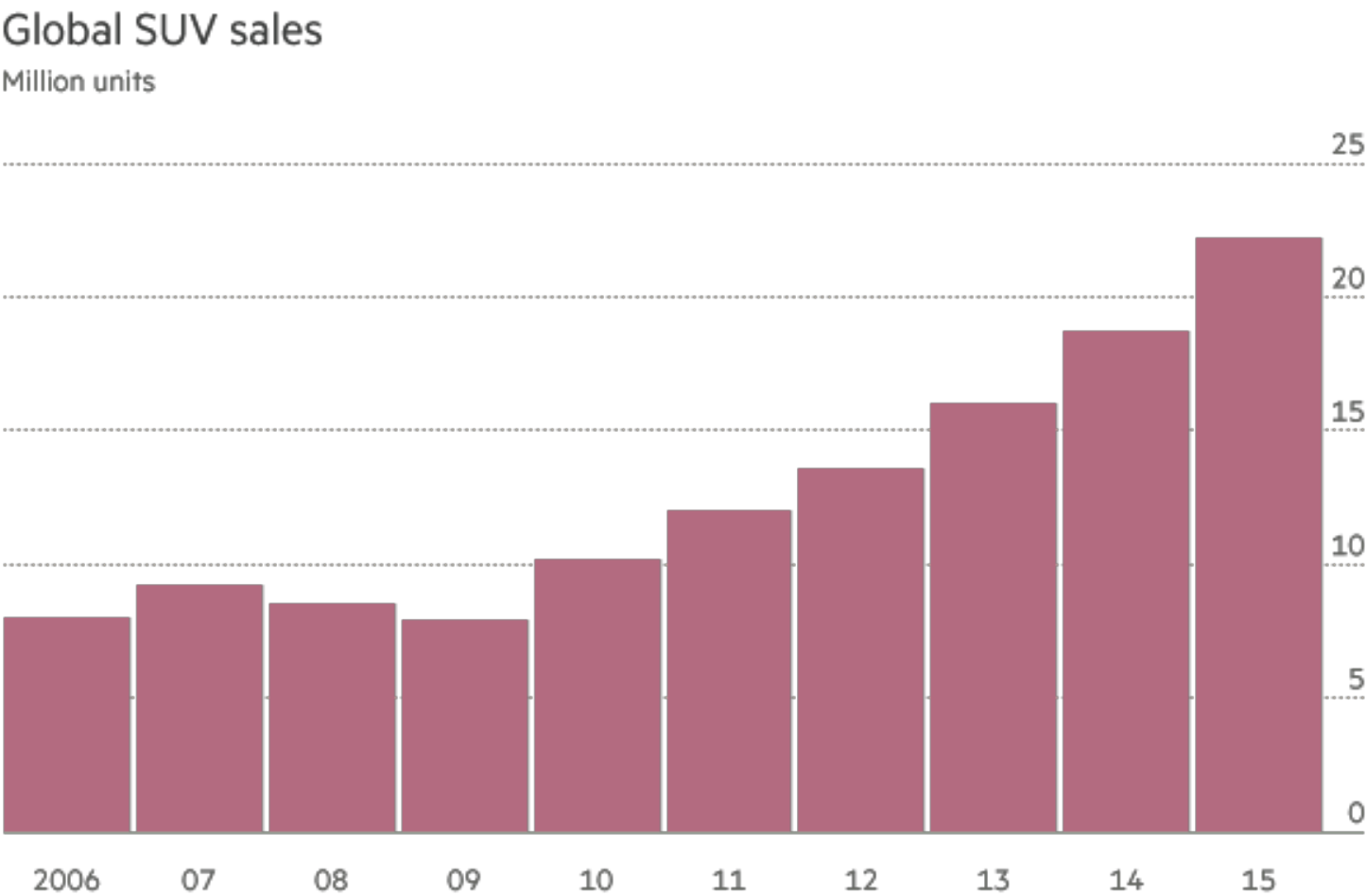
U.S. annual vehicle sales*

*Excludes commercial vehicles

Source: Autodata



ONE IN THREE PERSONAL VEHICLE SALES WORLDWIDE WERE SUVs AND OTHER “NON-SEDANS” IN 2017

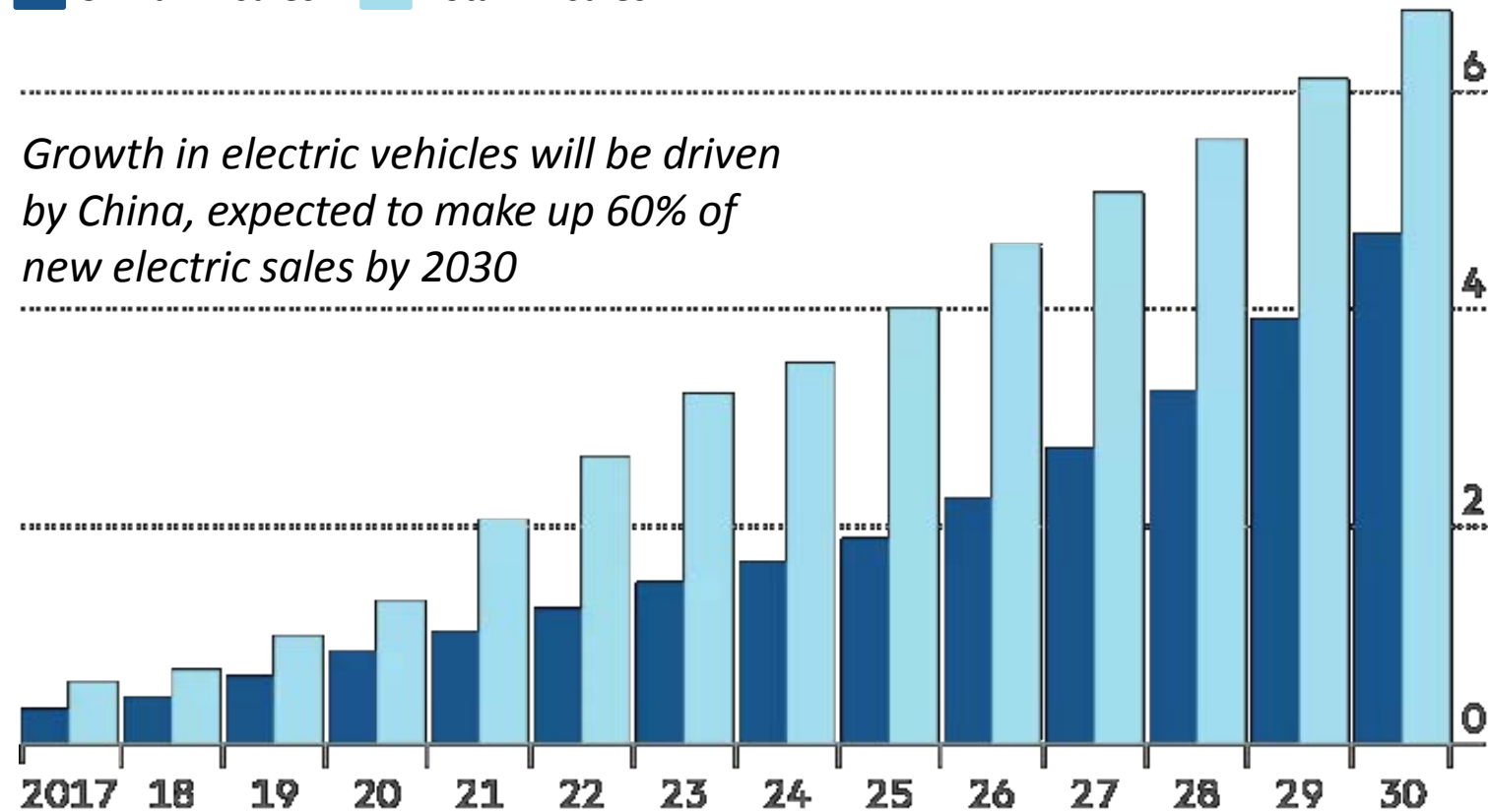


Source: IHS

Global electric vehicle sales forecast

Million units

China EV sales Total EV sales



Source: Goldman Sachs

FT

3.9 PERCENT OF GLOBAL CAR FLEET IS PROJECTED TO BE ELECTRIC OR HYBRID IN 2035

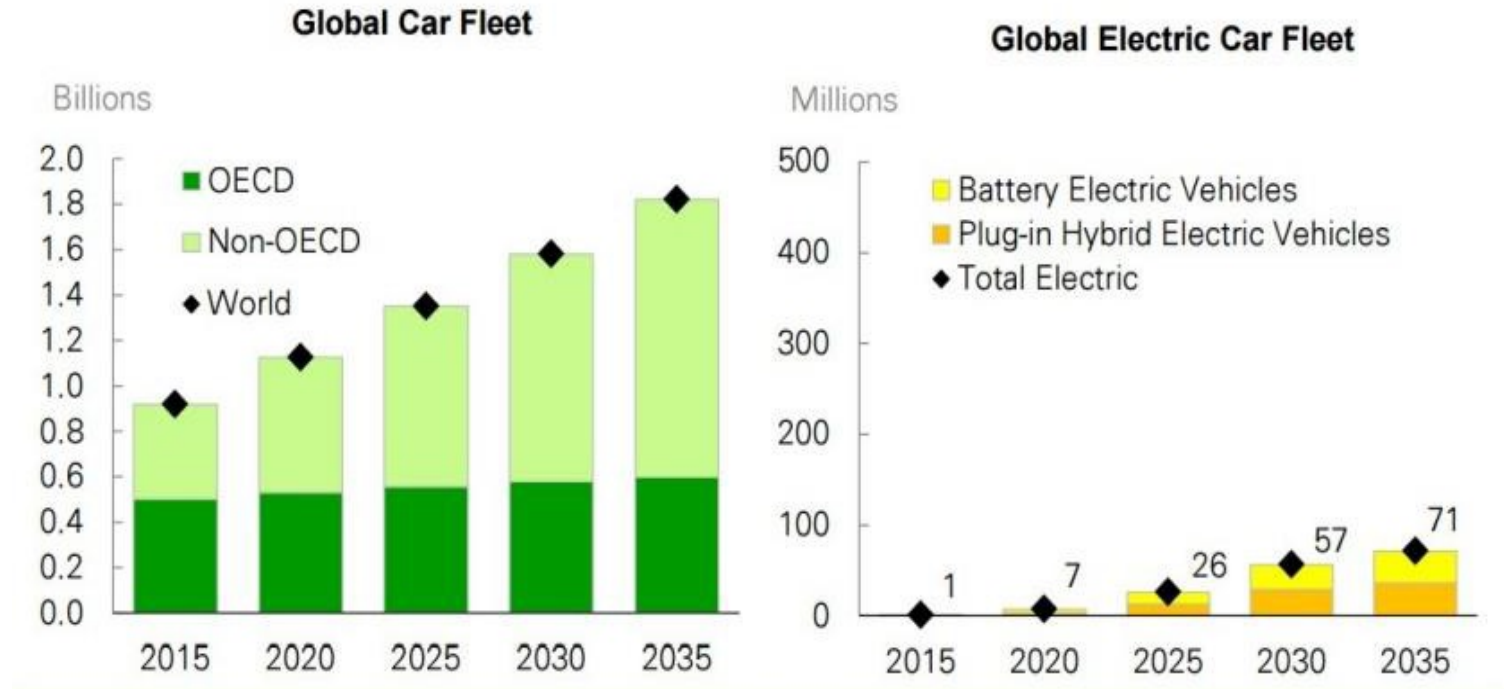
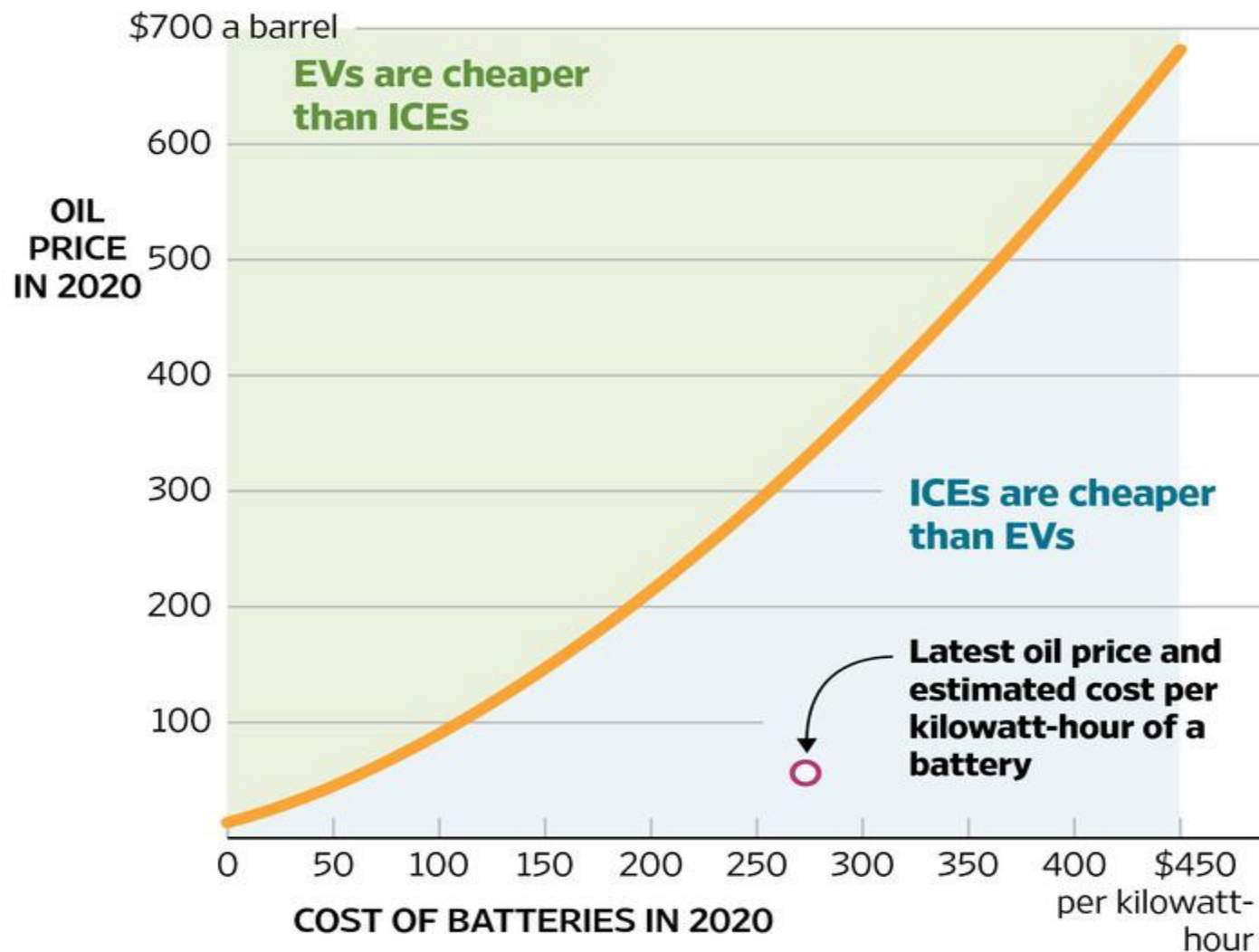


Chart 3

© BP PLC 2016

The Future Is Not Yet Electric

For electric vehicles (EVs) to displace internal combustion engines (ICEs), it will require some combination of higher oil prices and cheaper battery storage.

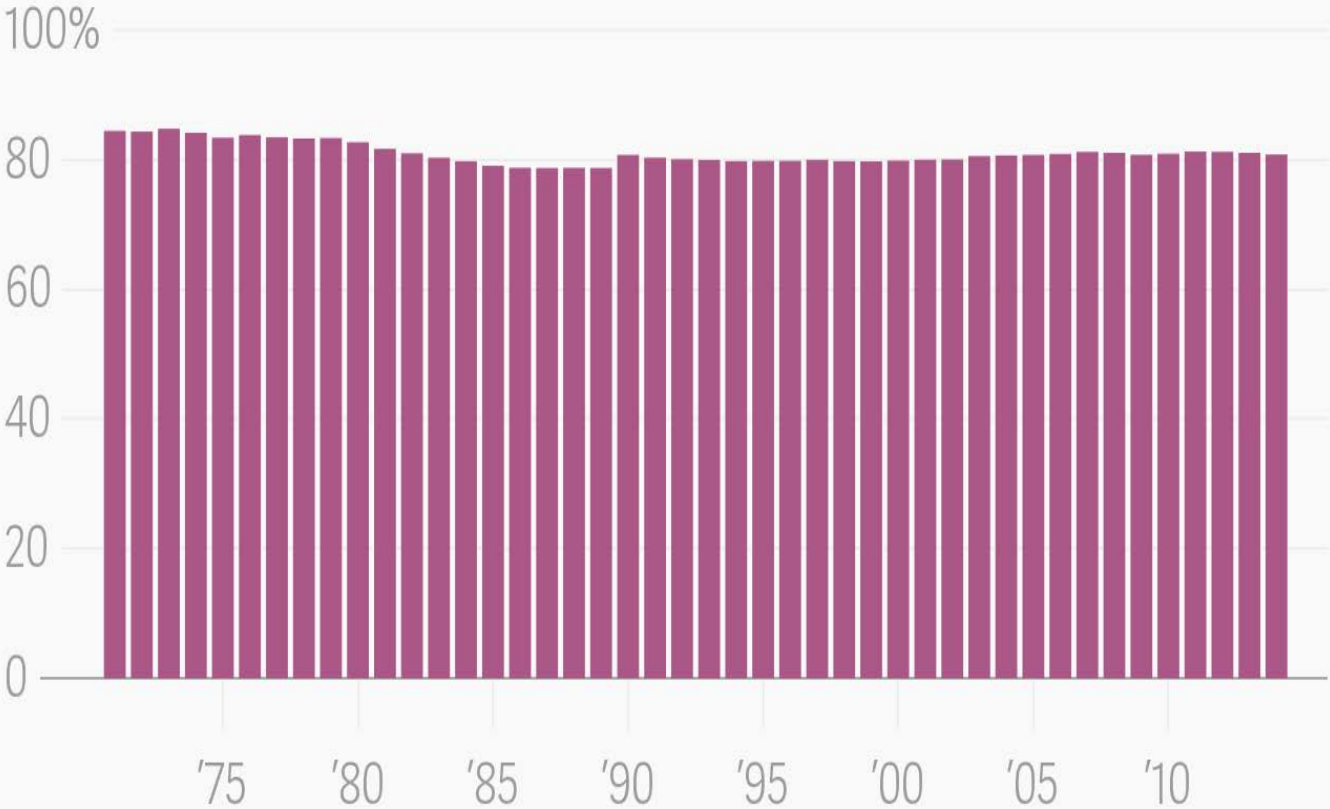


Sources: Thomas Covert, Michael Greenstone, and Christopher R. Knittel

THE WALL STREET JOURNAL.

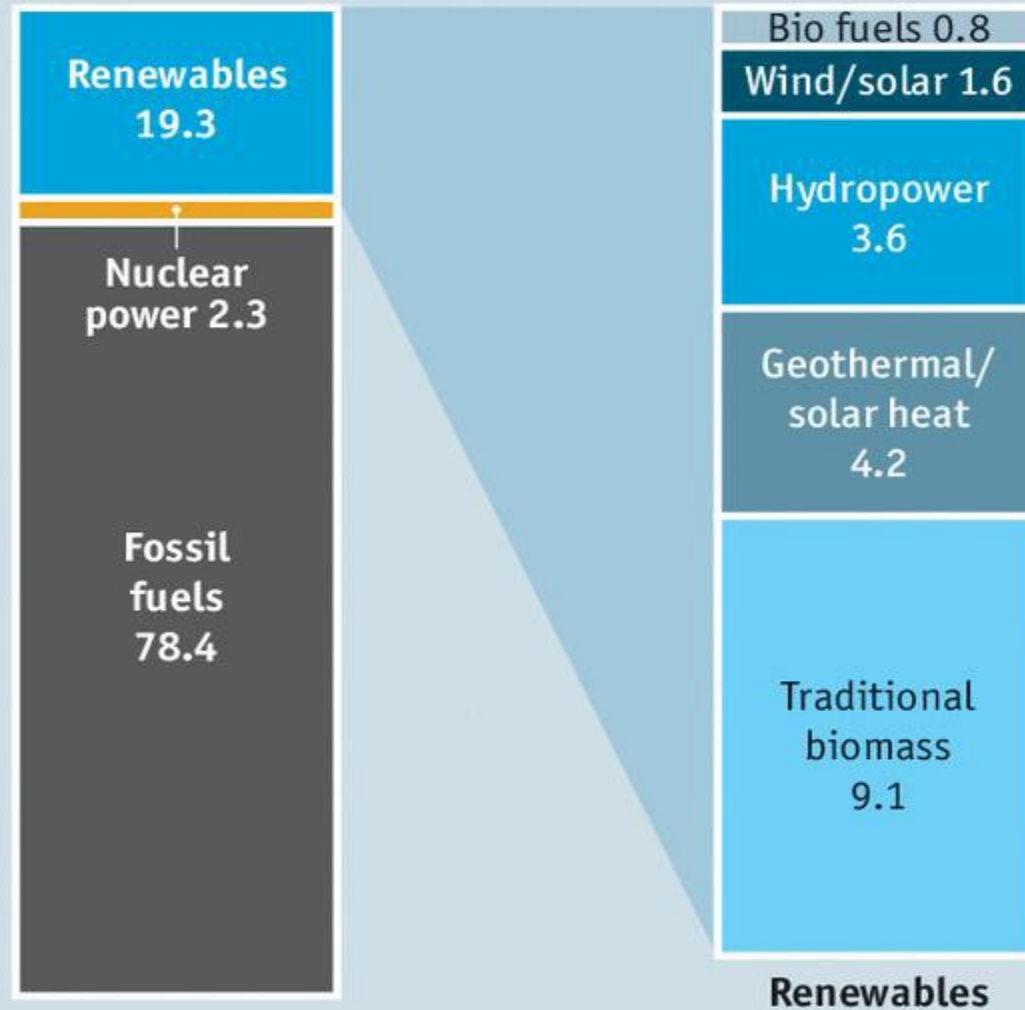
**FOSSIL FUELS' SHARE OF ENERGY CONSUMPTION HAS DECLINED ONLY
MARGINALLY OVER PAST 50 YEARS**

Global fossil-fuel energy use, as a share of total energy use



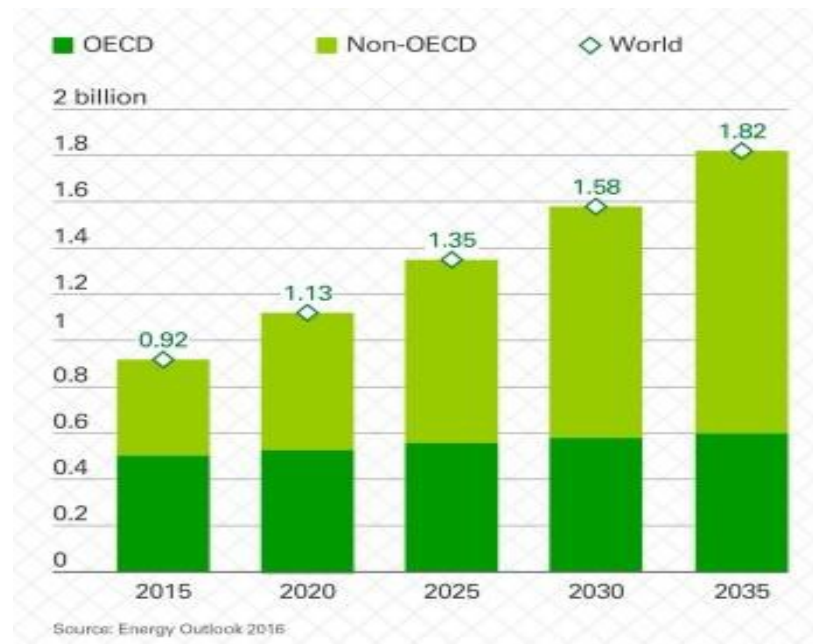
Growing power

Global energy consumption
2015, %



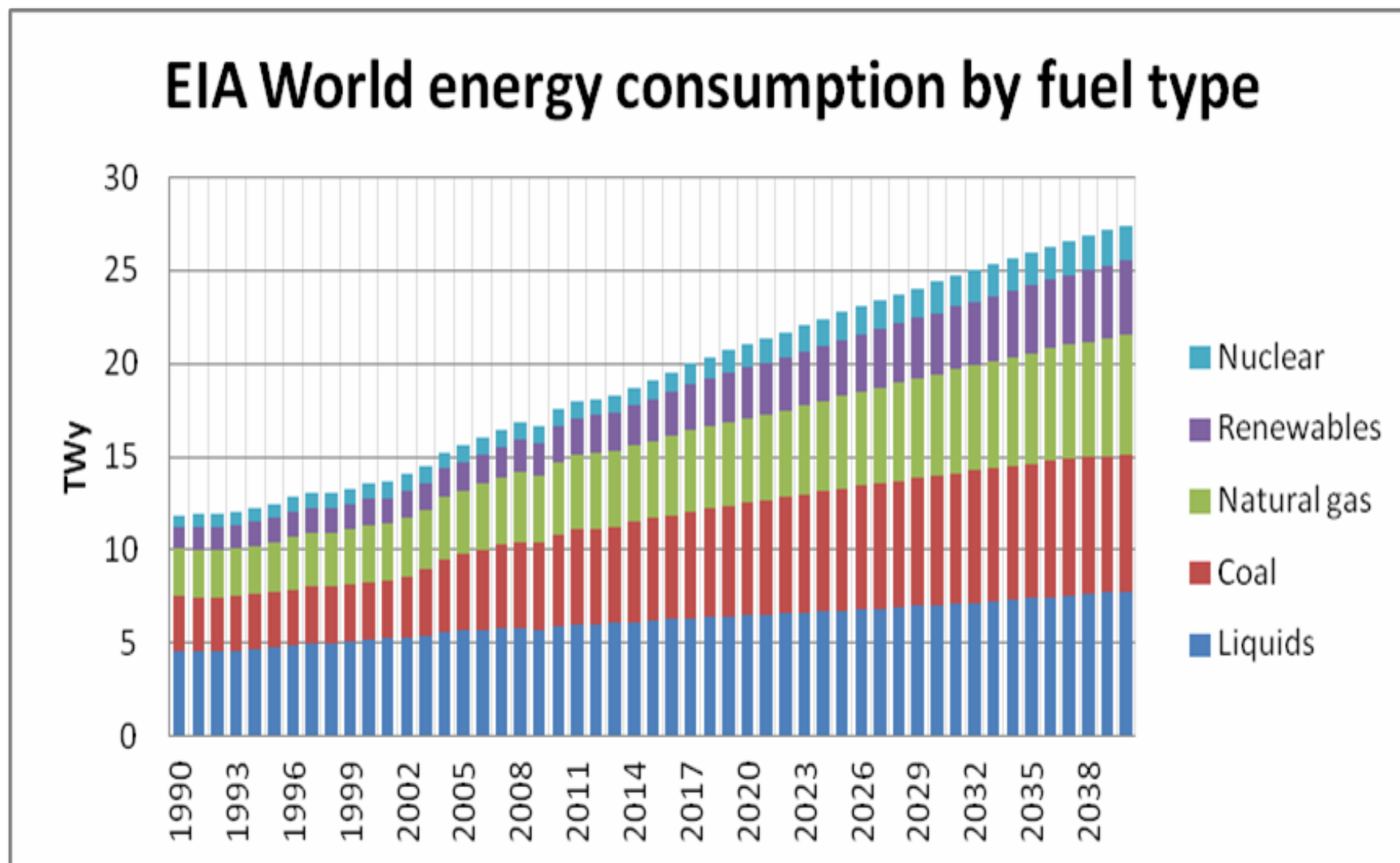
Source: REN21 Global Status Report 2017

GLOBAL DEMAND FOR OIL GROWS THROUGH 2035, MAINLY IN DEVELOPING COUNTRIES



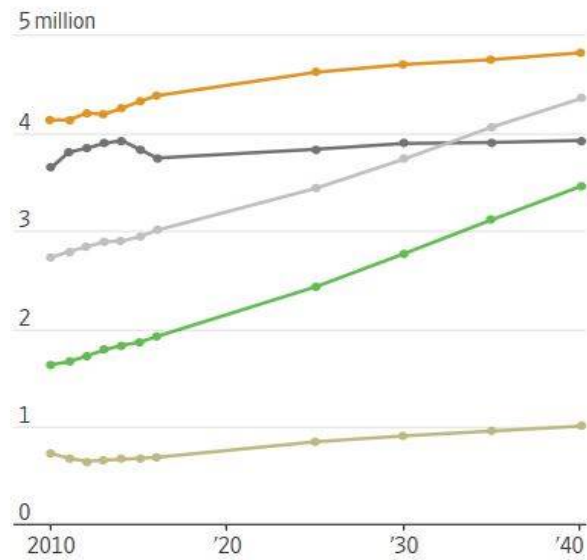
Source: BP Energy Outlook

FOSSIL FUELS AREN'T GOING AWAY ANY TIME SOON



Primary energy demand, in millions of metric tons of oil equivalent

■ Natural gas ■ Oil ■ Coal
■ Bioenergy, hydro, other renewables
■ Nuclear



Note: Forecasts from 2016 based on current and announced global energy policy commitments
Source: International Energy Agency

BASIC BREAKDOWN OF PETROLEUM USAGE

- Gasoline 46%
- Heating Oil / Diesel Fuel 20%
- Jet Fuel (kerosene) 8%
- Propane / Propylene 7%
- NGL / LRG 6%
- Still Gas 4%
- Petrochemical Feedstocks 2%
- Petroleum Coke 2%
- Residual / Heavy Fuel Oil 2%
- Asphalt / Road Oil 2%
- Lubricants 1%
- Miscellaneous Products / Special Naphthas 0.4%
- Other Liquids 1%
- Aviation Gasoline 0.1%
- Waxes 0.04%
- Kerosene 0.02%

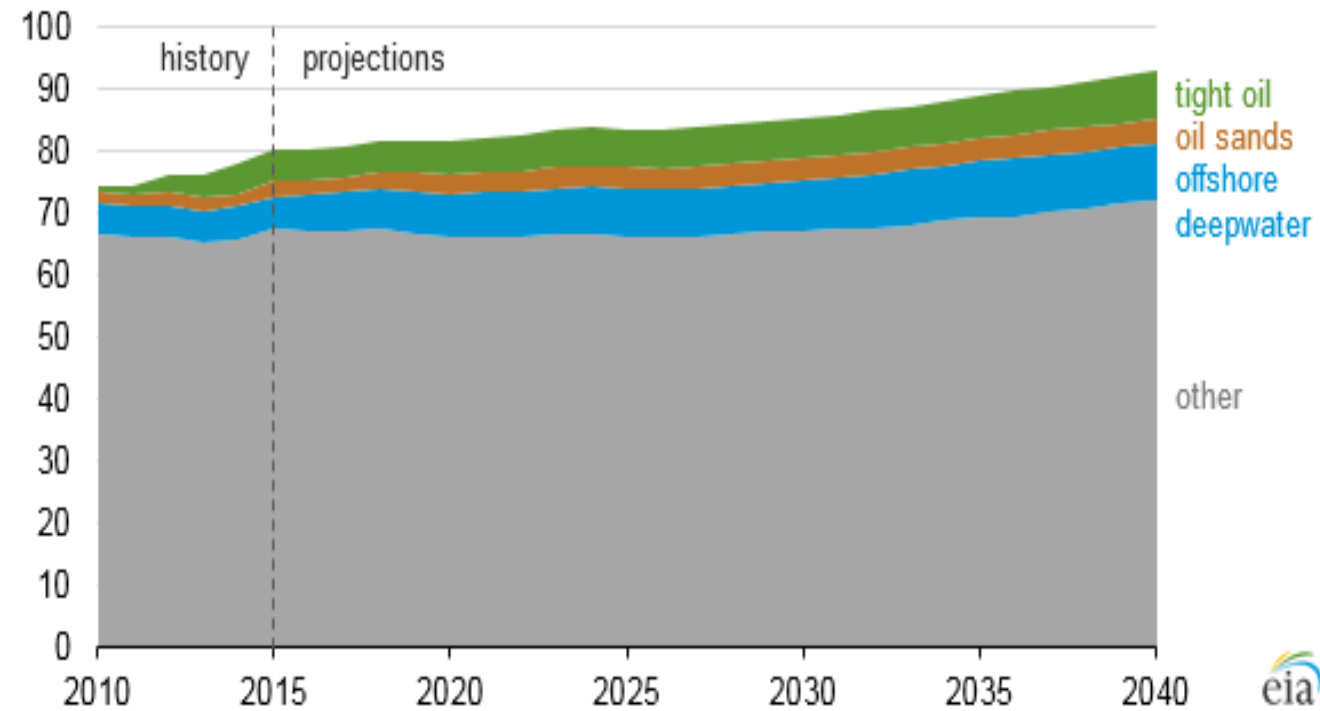
A FEW OF THE HUNDREDS OF PRODUCTS MADE FROM PETROLEUM AND NATURAL GAS

Solvents	Diesel fuel	Motor Oil	Bearing Grease
Ink	Floor Wax	Ballpoint Pens	Football Cleats
Upholstery	Sweaters (that explains the itchy sweater I have at home)	Boats	Insecticides
Bicycle Tires	Sports Car Bodies	Nail Polish	Fishing lures
Dresses	Tires	Golf Bags	Perfumes
Cassettes	Dishwasher parts	Tool Boxes	Shoe Polish
Motorcycle Helmet	Caulking	Petroleum Jelly	Transparent Tape
CD Player (do people still have these?)	Faucet Washers	Antiseptics	Clothesline
Curtains	Food Preservatives	Basketballs	Soap (that explains why soap doesn't clean oil off your hands)
Vitamin Capsules	Antihistamines	Purses	Shoes
Dashboards	Cortisone	Deodorant	Footballs
Putty	Dyes	Panty Hose	Refrigerant
Percolators	Life Jackets	Rubbing Alcohol	Linings
Skis	TV Cabinets	Shag Rugs	Electrician's Tape
Tool Racks	Car Battery Cases	Epoxy	Paint

FORECAST OF GLOBAL OIL PRODUCTION BY SOURCE

Production of crude oil from tight oil, oil sands, and offshore deepwater (2010-2040)

million barrels per day



PEAK OIL IN 2040?



WHY WOMEN WIN ELECTIONS

THE GENIUS OF
HENRY KISSINGER

HOW TO GET
LARGELY FOR
YOURSELF

The Atlantic

**WE WILL NEVER
RUN OUT OF OIL**



Why the
**FOSSIL-
FUEL BOOM**
is good for
America,
bad for
Saudi Arabia—
and scary
for the planet
By Charles C. Mann

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