



OIL AND GAS MARKETS

IN 2019 AND BEYOND

BOB TIPPEE, EDITOR, OIL & GAS JOURNAL

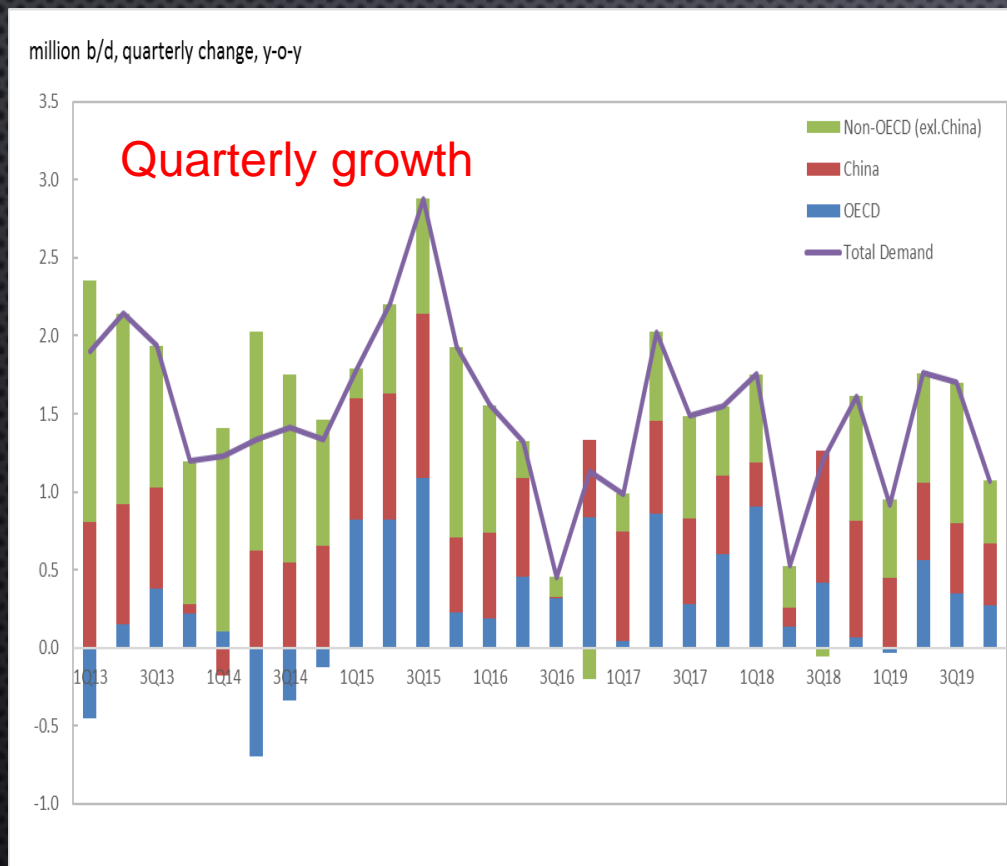
RICE GLOBAL E&C FORUM MONTHLY ROUNDTABLE

MARCH 8, 2019

THE AGENDA

- OIL AND GAS MARKETS THIS YEAR, GLOBAL AND US
 - OGJ's FORECAST & REVIEW, JAN. 7, 2019
 - CONGLIN XU, SENIOR EDITOR-ECONOMICS; LAURA BELL, STATISTICS EDITOR
 - UPDATE: MIDYEAR FORECAST, JULY 1, 2019
- WHAT WILL MAKE THE FORECAST WRONG?
- OIL, GAS, AND ENERGY IN THE FUTURE (GREEN NEW DEAL?)

GLOBAL OIL DEMAND (MMB/D)



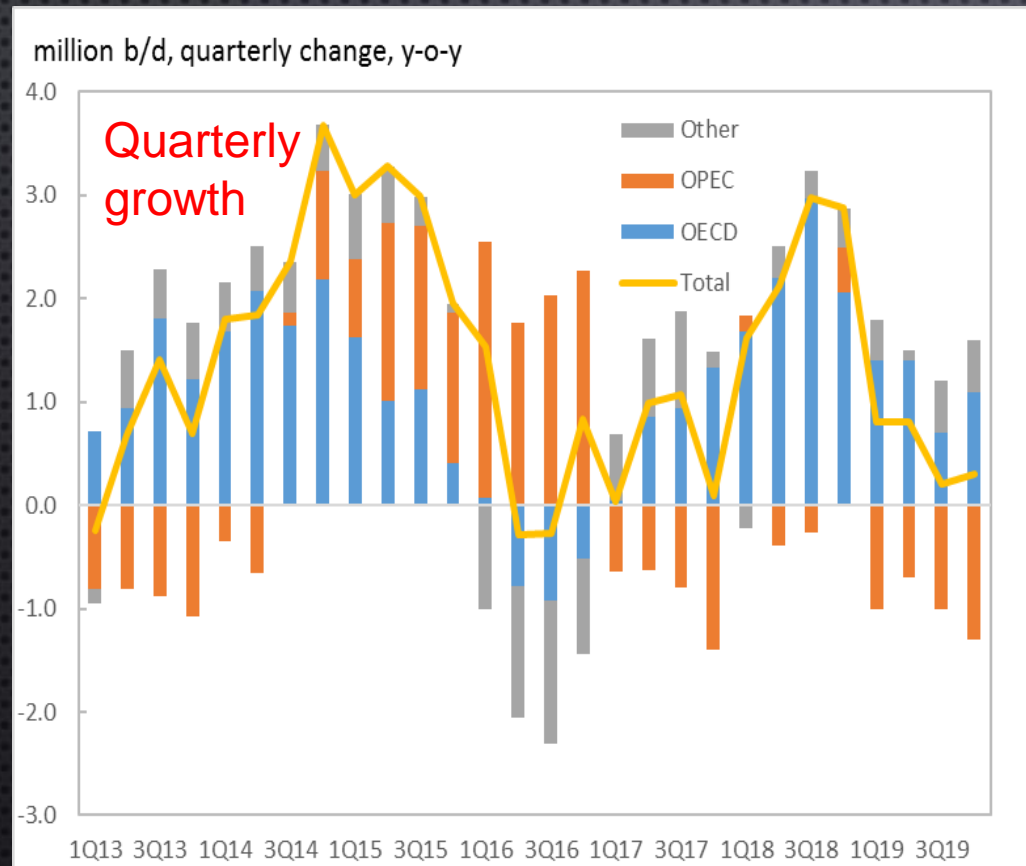
	2019	2018
OECD	48.1	47.8
Non-OECD	52.5	51.4
Total	100.6	99.2

Growth in oil demand is slowing.

Growth dominated by China, other non-OECD (developing countries).

Source: OGJ Forecast & Review, Jan. 7, 2019

GLOBAL OIL SUPPLY (MMB/D)



	2019F	2018E
OPEC crude	31.5*	32.5
OPEC NGL	7.0	7.0
Non-OPEC	61.9	60.4
Total	100.4	99.9
*OGJ estimate. Other from IEA.		

**OPEC is yielding to non-OPEC supply:
North American unconventionals, Brazil**

Source: OGJ Forecast & Review, Jan. 7, 2019

WILL OPEC+ KEEP MARKET BALANCED? (MMBD)

	2019	Vs. 2018
Demand	100.6	+1.4
Non-OPEC supply	61.9	+1.5
OPEC NGL	7.0	NC
Need for OPEC crude	31.7	-0.1
OPEC crude	31.5	-1.0
<i>Stock change</i>	-0.2	-0.9

Key uncertainties:

Demand growth
(and, therefore,
global economy)

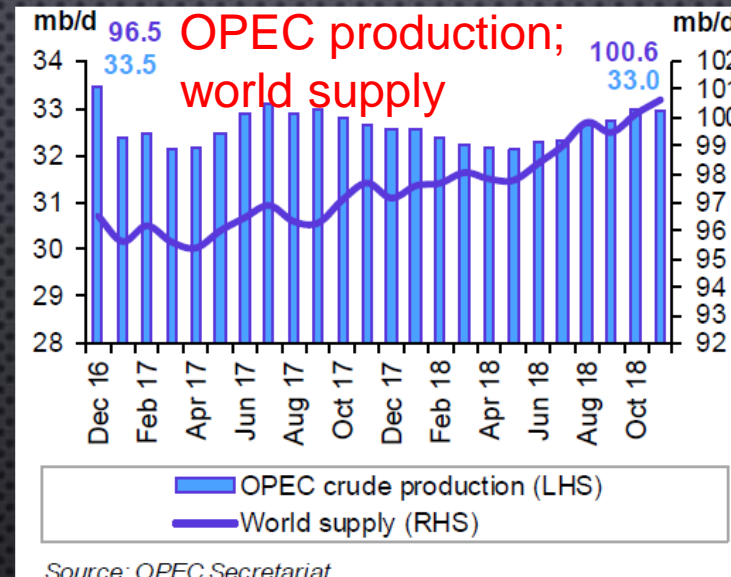
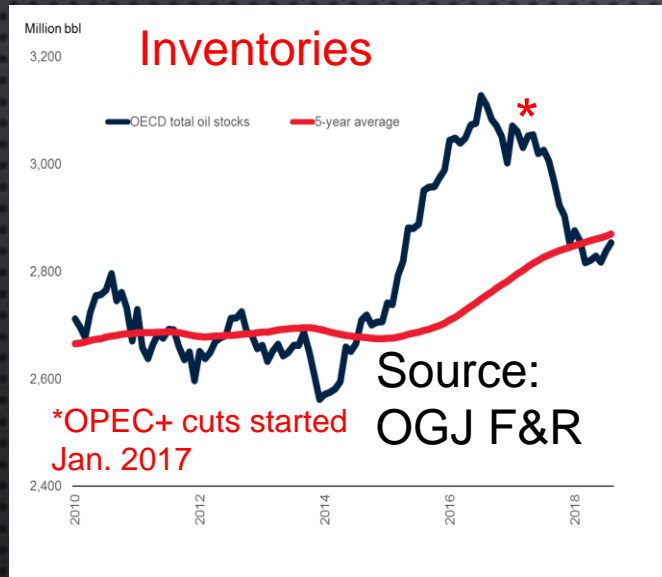
OPEC restraint
after agreement
expires in June

Source: IEA Oil Market Report,
December 2018 with OGJ
projection for OPEC crude

Main changes in IEA February:
Non-OPEC supply--64.4
Stock change--+0.3

OIL SUPPLY MANAGEMENT

The oil market seems to crave coordinated supply management



December 2018 agreement: Cut 1.2 MMb/d from October levels, 800 Mb/d OPEC, 400 Mb/d non-OPEC

THE LEADERS (MMB/D)		
	Saudi Arabia	Russia
Orig. quota	10.54	11.597
Oct. 2017	10.05	11.303
Oct. 2018	10.65	11.79
Agreed in December:	Needed cut +	Cut 0.230

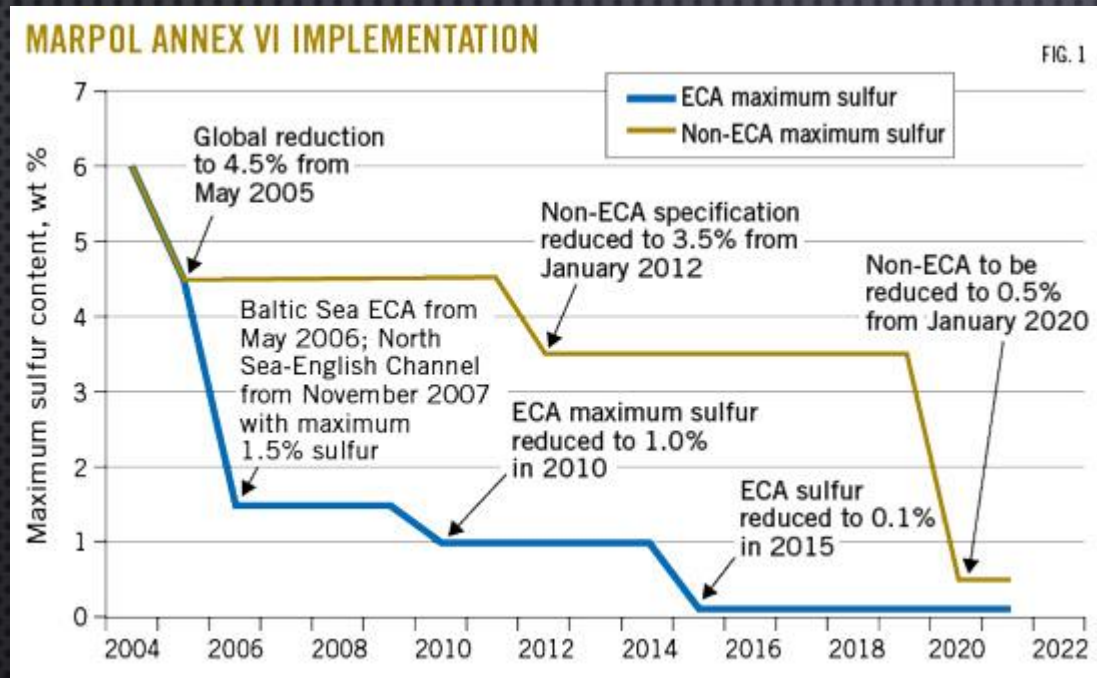
Vienna, Dec. 2016: Cuts of 1.2 MMb/d by 12 OPEC members, 600 Mb/d by 10 nonmembers, effective Jan. 2017.

Production surged late 2018 to compensate for losses from Venezuela, others, expected from Iranian sanctions scheduled for November but waived for 6 months (until May, one month before OPEC meets).

THE OIL MARKET'S UNCERTAIN VARIABLES

- MIDDLE EASTERN UNREST
 - US DISENGAGEMENT
 - EXHAUSTION OF RENTIER ECONOMICS IN SAUDI ARABIA, UAE
 - SAUDI TURBULENCE (YEMEN QUAGMIRE, JAMAL KHASHOGGI MURDER, ECONOMIC AND CULTURAL REFORM, ARAMCO IPO)
 - BLOCKADE OF QATAR AND WEAKENING OF GCC
 - IRANIAN EXPANSIONISM (YEMEN, SYRIA, IRAQ, LEBANON) AND SANCTIONS
 - MANEUVERS FOR INFLUENCE BY RUSSIA, CHINA, TURKEY
- VENEZUELAN COLLAPSE
- GLOBAL ECONOMIC GROWTH – OR CONTRACTION?
- IMO 2020

THE IMO 2020 RULE



Source: Ken Cowell et al., Muse, Stancil & Co., in OGJ, July 2, 2018

International Maritime Organization regulation effective Jan. 1, 2020

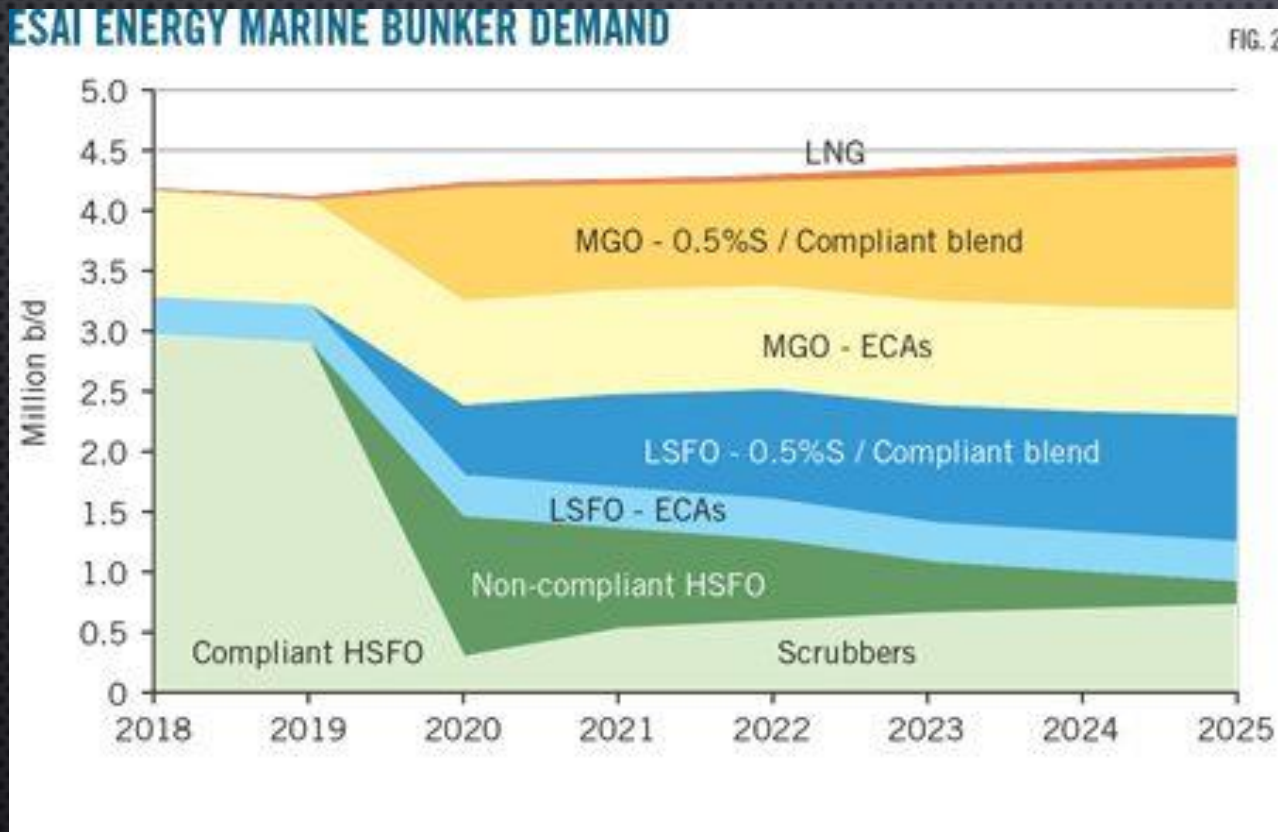
Lowers sulfur limit in marine bunker fuel to 0.5 wt % from 3.5 wt %

Lower limits already apply in four emission control areas (ECAs)

What happens to ~3.4 million b/d of high-sulfur fuel oil?

What happens to sweet-sour price spreads?

IMO 2020 COMPLIANCE OUTLOOK



LNG=liquefied natural gas
MGO=marine gas oil
ECA=Emission control area
LSFO=low sulfur fuel oil
HSFO=high sulfur fuel oil

- *Refinery runs will rise*
- *Sweet-sour crude spreads will increase*
- *Prices of distillate-range products (diesel) will rise*

Source: "Ship compliance will determine IMO 2020 market impact," Chris Cote, ESAI Energy LLC, OGJ, Jan. 7, 2019

US OIL DEMAND

Gasoline is no longer the growth market

	2019		2018	
	Amount MMb/d	Change %	Amount MMb/d	Change %
Motor gasoline	9.370	+0.6	9.311	-0.2
<i>Jet fuel</i>	<i>1.780</i>	<i>+3.5</i>	<i>1.720</i>	<i>+2.3</i>
<i>Distillate</i>	<i>4.200</i>	<i>+1.7</i>	<i>4.130</i>	<i>+5.0</i>
Residual	0.320	+0.6	0.318	-7.0
<i>LPG + ethane</i>	<i>3.150</i>	<i>+5.4</i>	<i>2.990</i>	<i>+13.1</i>
Other products	2.060	+0.5	2.050	+0.9
TOTAL	20.880	+1.8	20.519	+2.8

Source: OGJ Forecast & Review, Jan. 7, 2019

US OIL SUPPLY

Unless oil prices crash, growth constraint is physical until Permian pipelines open in 2H 2019

	2019		2018	
	Amount MMb/d	Change %	Amount MMb/d	Change %
<i>Crude & cond.</i>	12.070	+10.7	10.900	+16.6
<i>NGPL</i>	5.000	+14.2	4.380	+15.8
<i>TOTAL FIELD</i>	17.070	+11.7	15.280	+16.3
Renewables, oxygenates	1.220	-0.8	1.230	+3.4
Proc. gain, etc.	1.120	-0.9	1.130	+1.7
TOTAL SUPPLY	19.41	+10.0	17.64	+14.0

Source: OGJ Forecast & Review, Jan. 7, 2019

US OIL IMPORTS AND EXPORTS

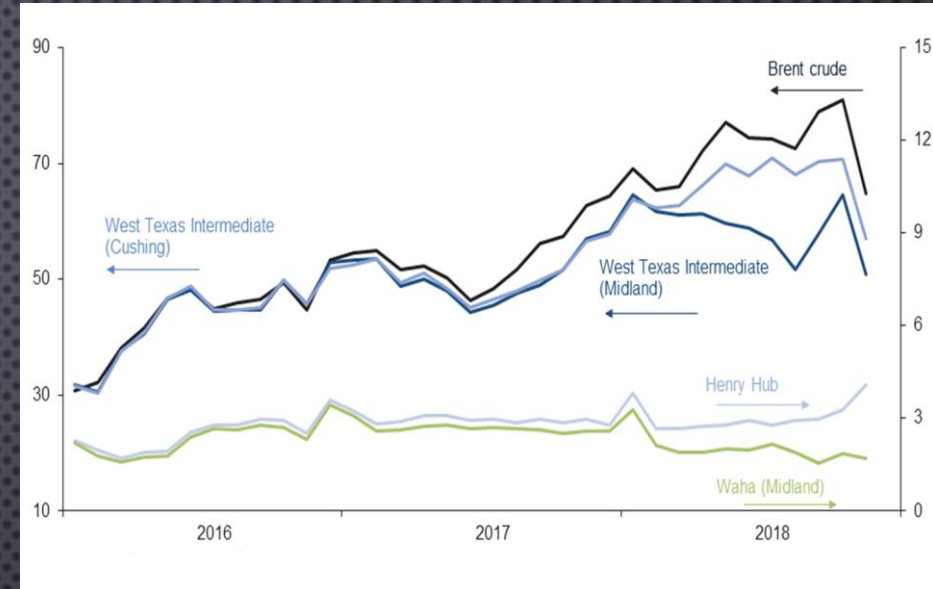
*Net-exporter status
is in view*

	2019		2018	
	Amount MMb/d	Change %	Amount MMb/d	Change %
Crude imports	7.700	-1.9	7.850	-1.5
Product imports	2.250	-0.9	2.270	+4.4
TOT. IMPORTS	9.950	-1.7	10.120	-0.2
Crude exports	2.800	+33.3	2.100	+81.3
Product exports	5.890	+6.1	5.550	+6.4
TOT. EXP'TS	8.690	+13.6	7.650	+20.0
<i>NET IMPORTS</i>	<i>1.26</i>		<i>2.47</i>	

Source: OGJ Forecast & Review, Jan. 7, 2019

US REFINING

High refinery utilization reflects margins widened by US crude price discount to Brent



	2019		2018	
	Amount MMb/d	Change %	Amount MMb/d	Change %
Crude runs	17.03	+0.7	16.92	+2.0
Total inputs	17.20	-0.3	17.26	+2.1
Refining cap.	18.62	+0.1	18.60	+0.2
Cap. utilization	92%		93%	

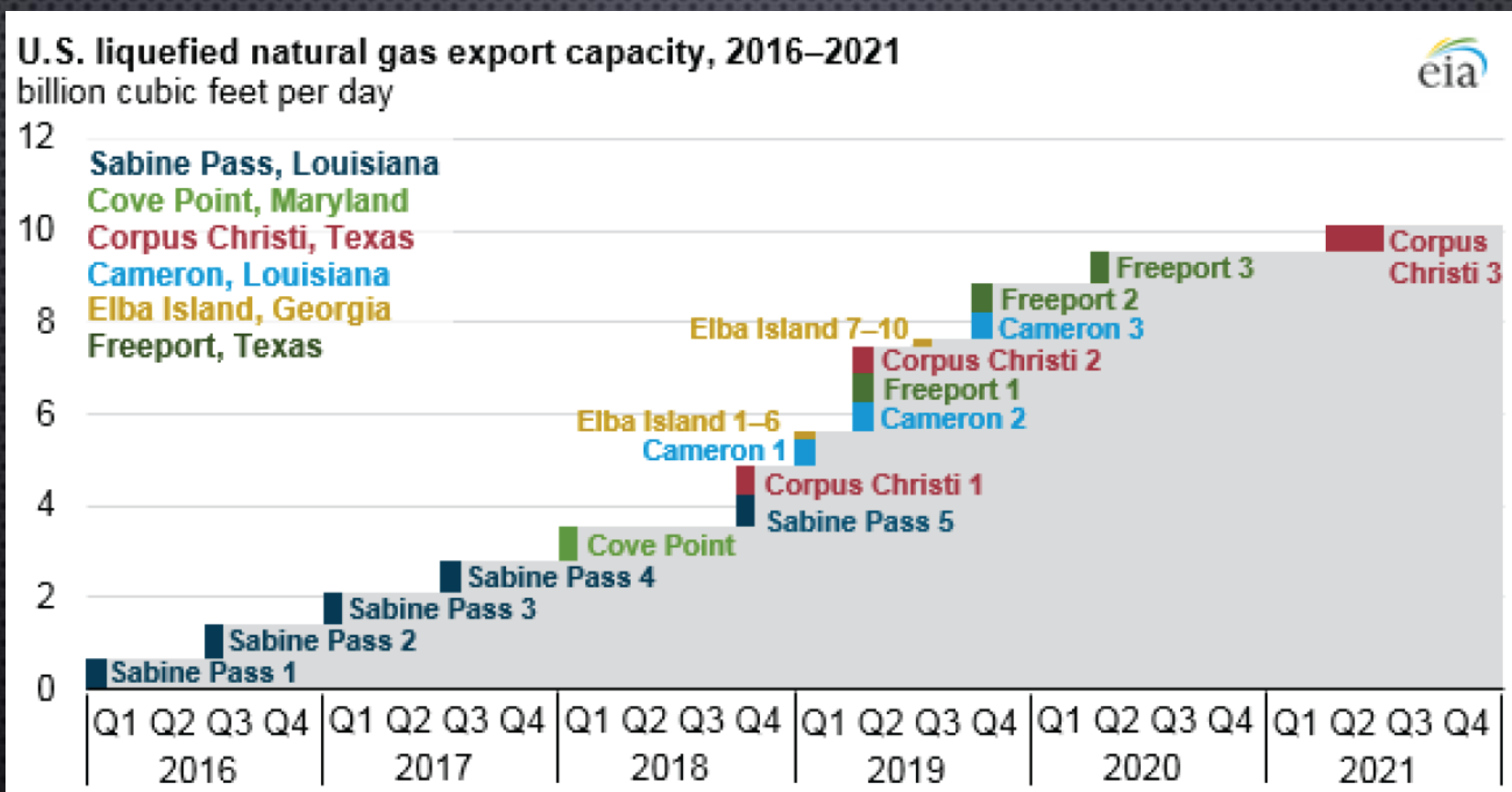
US GAS PRODUCTION AND TRADE

*Exports will
grow with LNG
project starts*

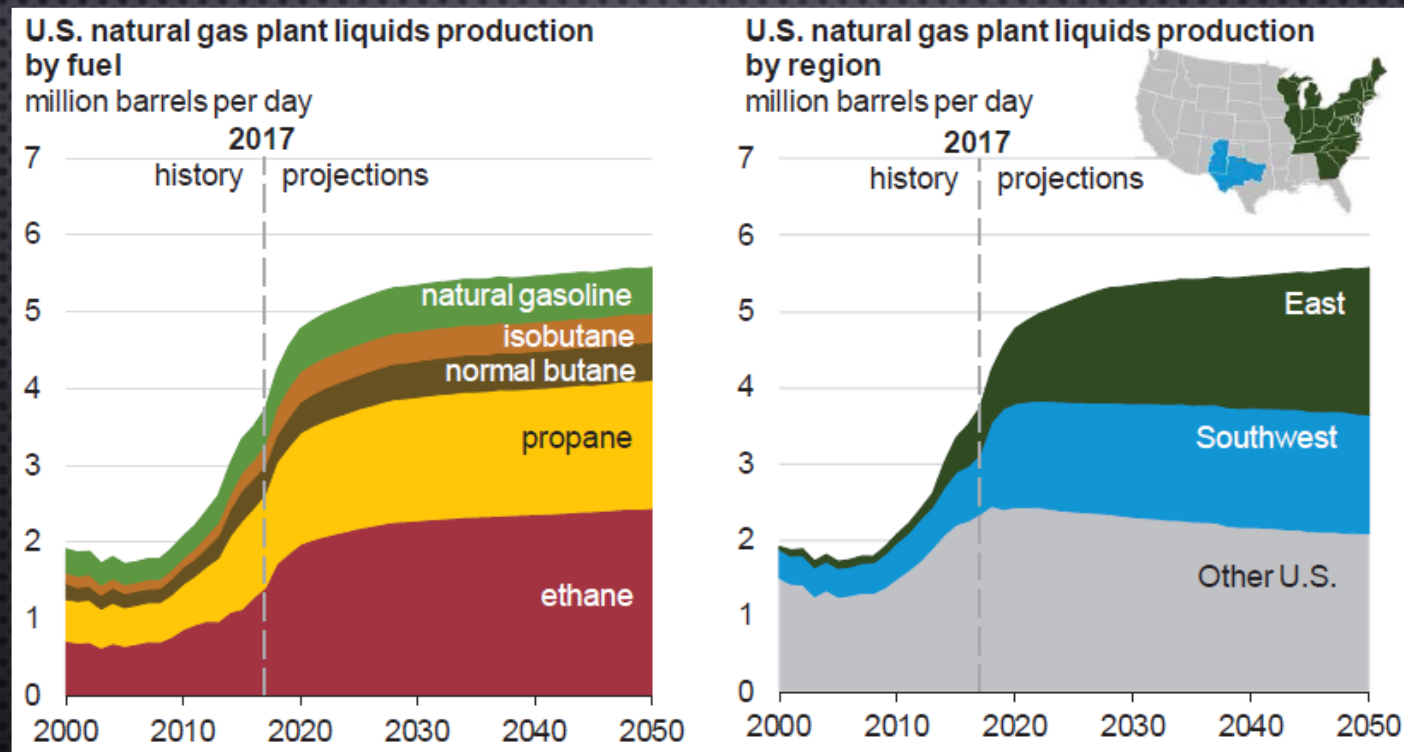
	2019		2018	
	Amount tcf	Change %	Amount tcf	Change %
<i>Production</i>	35.697	+9.1	32.715	+12.0
Pipeline imports	2.612	-8.4	2.851	-3.8
LNG imports	0.073	+5.3	0.069	-11.1
Pipeline exports	3.066	+15.1	2.665	+8.3
LNG exports	2.044	+89.8	1.077	+52.1
<i>Net exports</i>	2.425		0.822	

Source: OGJ Forecast & Review, Jan. 7, 2019

US LNG EXPORT PROJECTS, 2016-21



US GAS: MORE GAS, MORE LIQUIDS



Source: US Energy Information Administration, 2018 Annual Energy Outlook

THE LONG TERM: IEA'S WORLD ENERGY OUTLOOK 2018

- NEW POLICIES SCENARIO

- CURRENT AND PLANNED POLICIES, INCLUDING PARIS 2015 COUNTRY COMMITMENTS

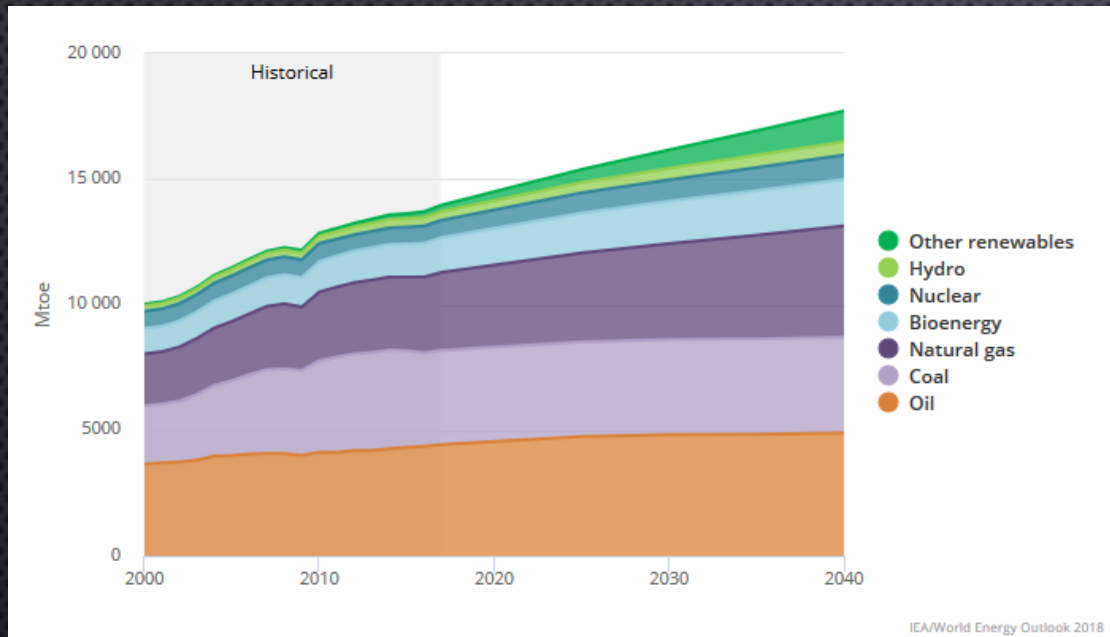
- SUSTAINABLE DEVELOPMENT SCENARIO

- “A PATHWAY TO MEETING VARIOUS CLIMATE, AIR QUALITY AND UNIVERSAL ACCESS GOALS IN AN INTEGRATED WAY. “
 - ENERGY-RELATED, GLOBAL EMISSIONS OF CO₂ PEAK IN 2020 THEN DECLINE IN TRAJECTORY NEEDED TO MEET GOALS OF PARIS CLIMATE AGREEMENT.

LONG-TERM ENERGY IN IEA/WEO 2018

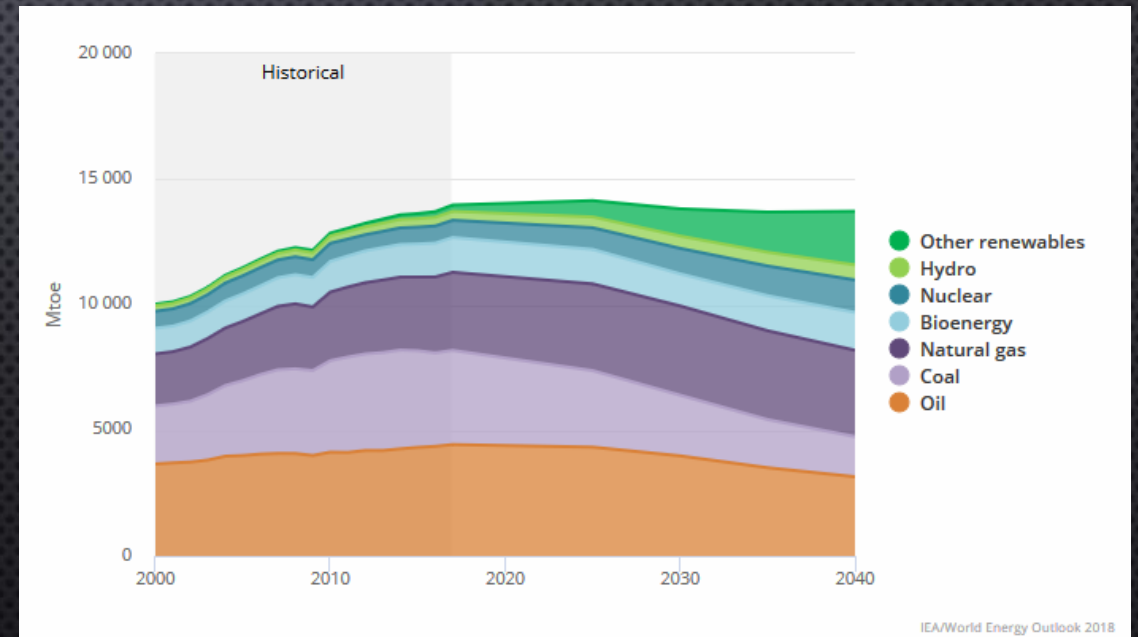
New Policies Scenario

2017-40:
Oil +10%
Gas +43%



Sustainable Development Scenario

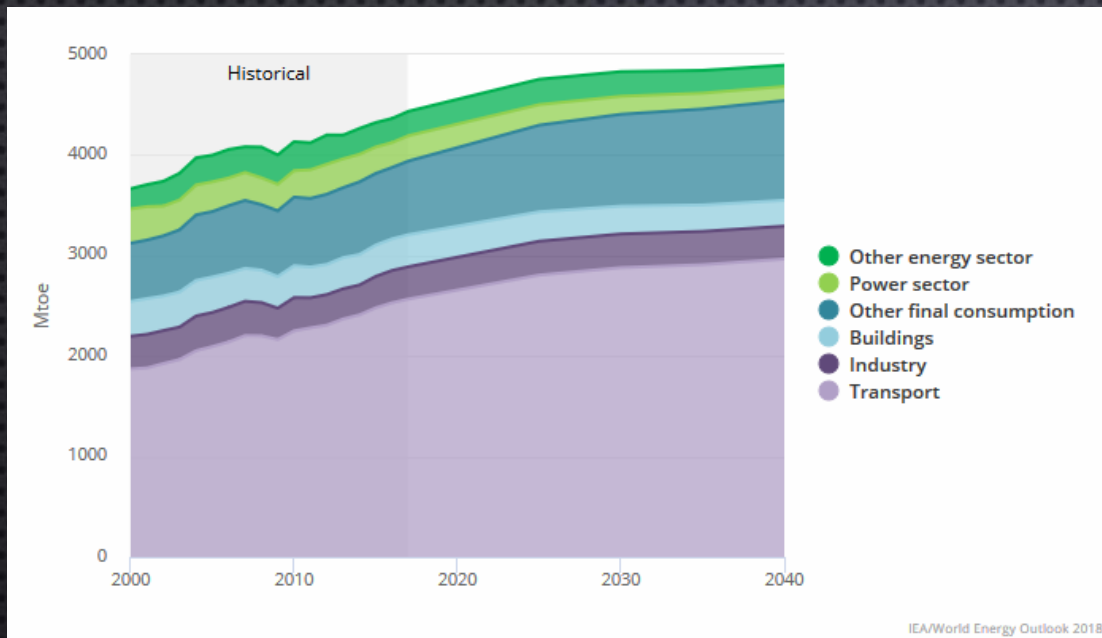
2017-40:
Oil -29%
Gas +11%



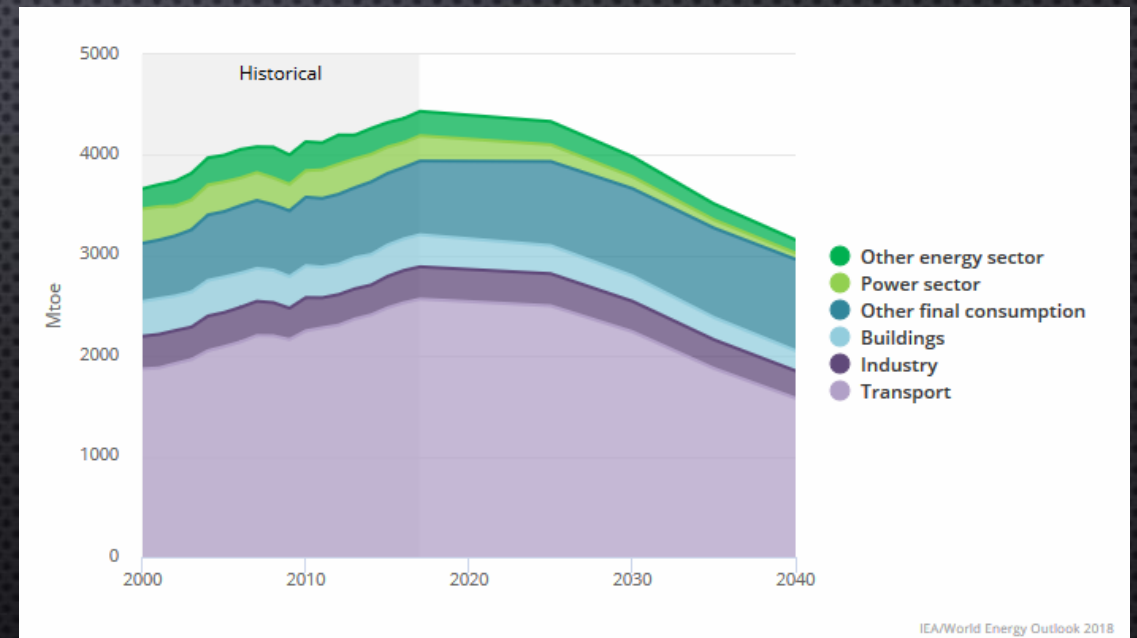
Source: International Energy Agency World Energy Outlook 2018

LONG-TERM OIL DEMAND IN IEA/WEO 2018

New Policies Scenario

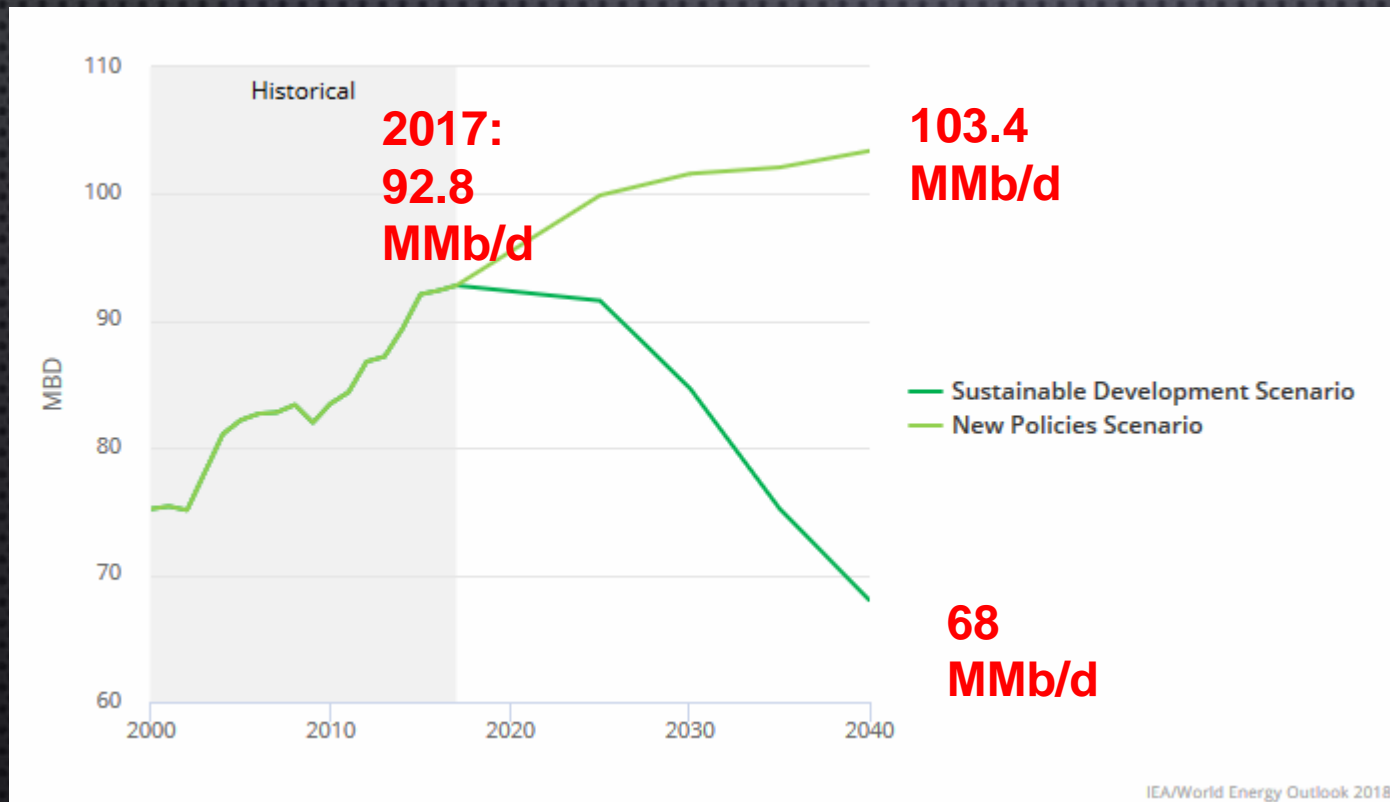


Sustainable Development Scenario



Source: International Energy Agency World Energy Outlook 2018

LONG-TERM OIL PRODUCTION IN IEA/WEO 2018



Policy is important!

Change vs. 2017:

New Policies +11.4%

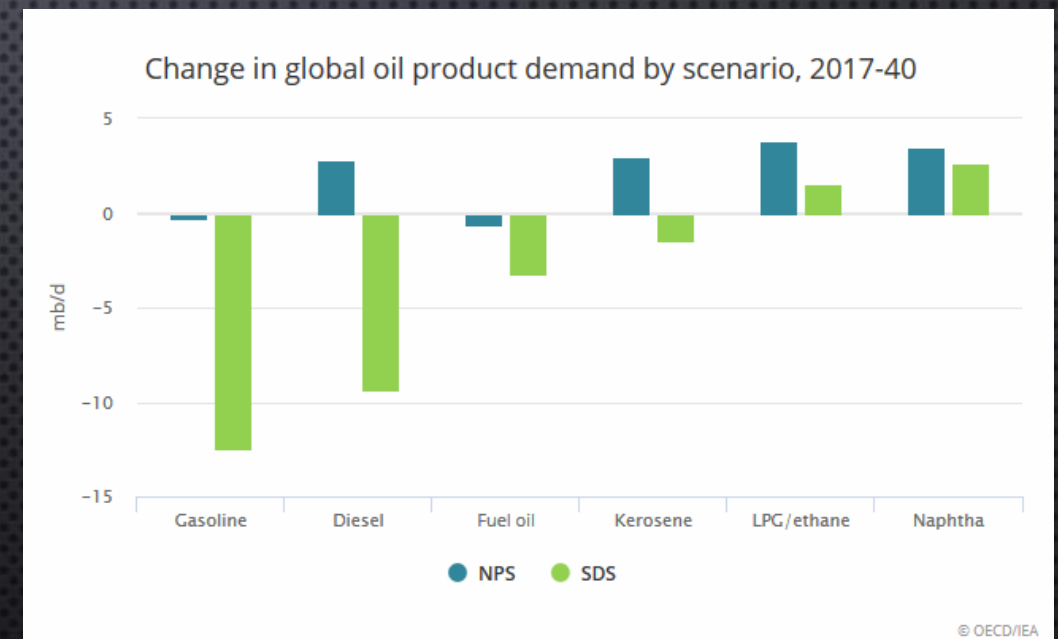
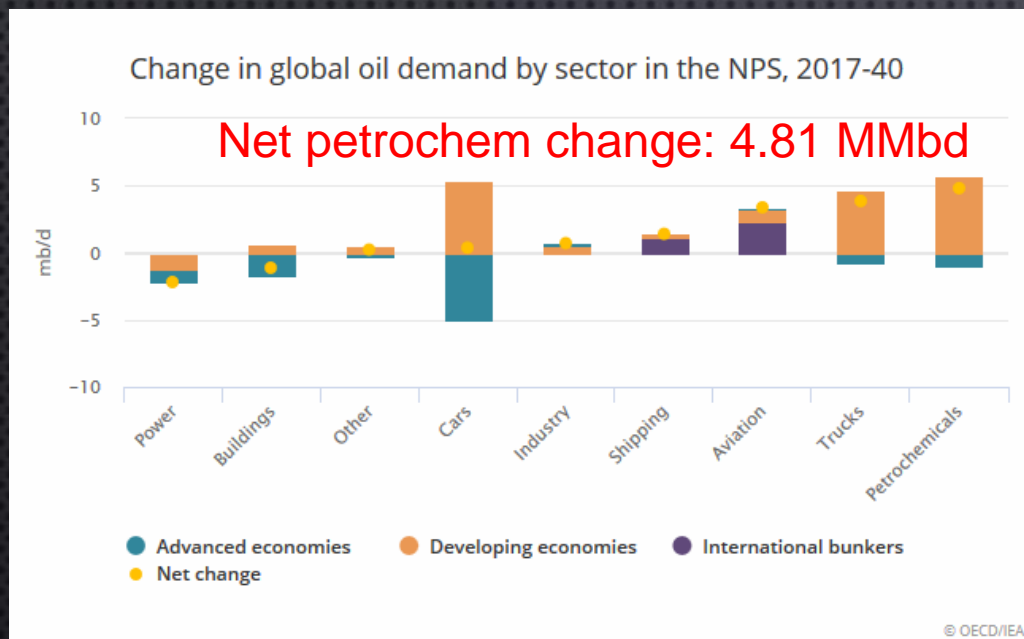
*Sustainable
Development -26.7%*

*Oil and gas investment
still needed because
depletion exceeds the
demand-decline rate!*

Source: International Energy Agency World Energy Outlook 2018

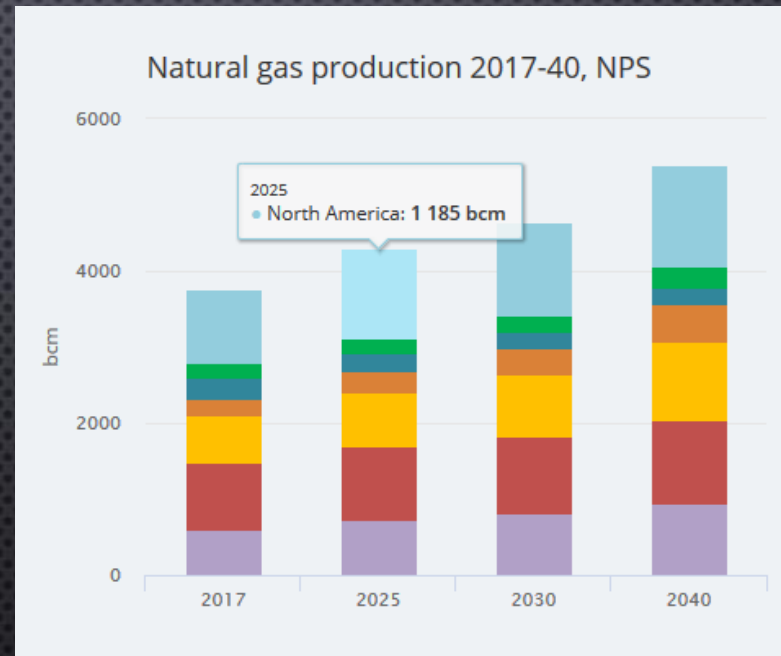
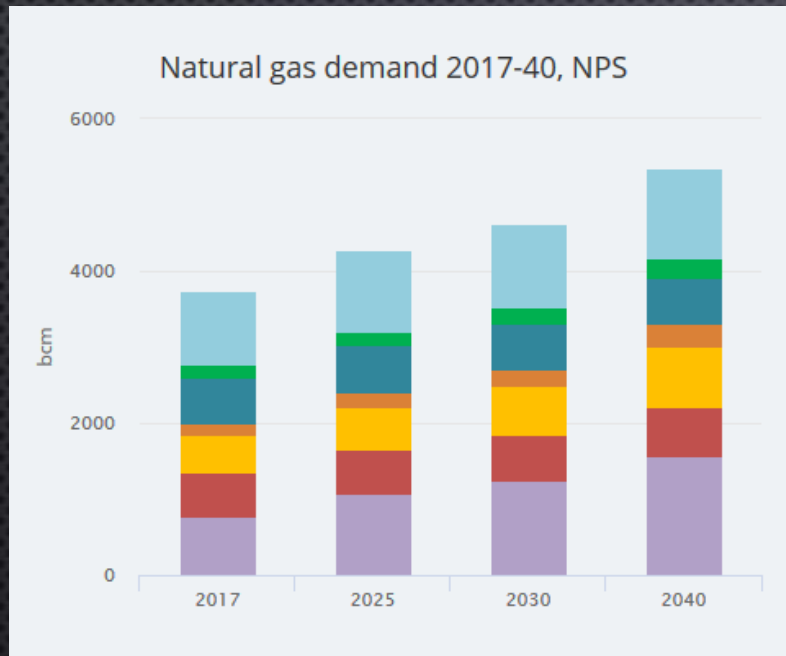
OIL-DEMAND GROWTH LEADER: PETROCHEMICALS

Oil demand for
petrochemical feedstocks
grows in both scenarios



Source: International Energy Agency World Energy Outlook 2018

LONG-TERM GAS OUTLOOK: 'NEW POLICIES'

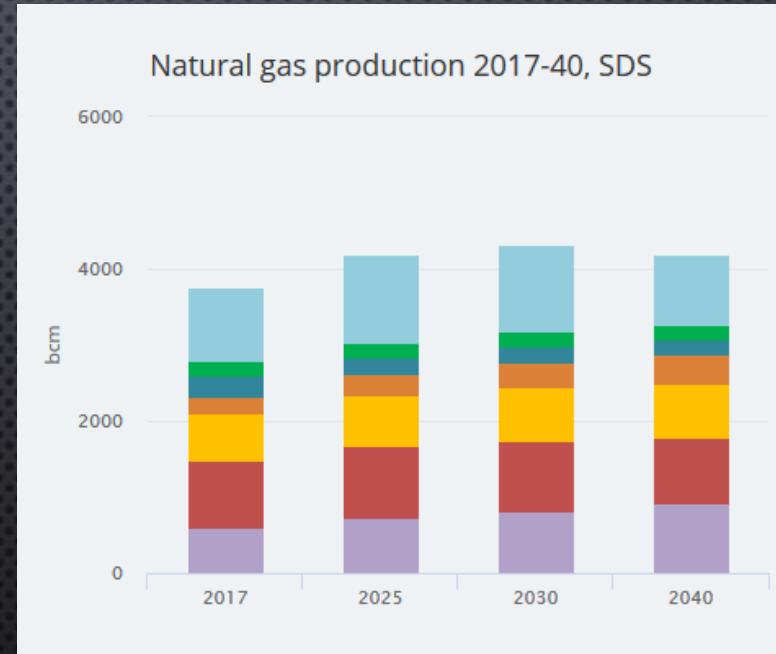
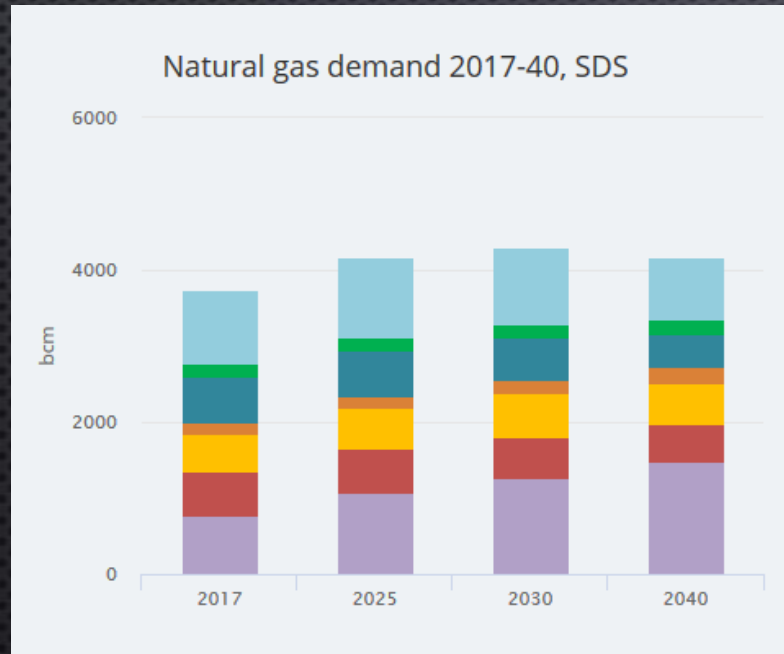


North America Central and South America Europe Africa Middle East Eurasia Asia Pacific

© OECD/IEA

Source: International Energy Agency World Energy Outlook 2018

LONG-TERM GAS OUTLOOK: 'SUSTAINABLE DEVELOPMENT'



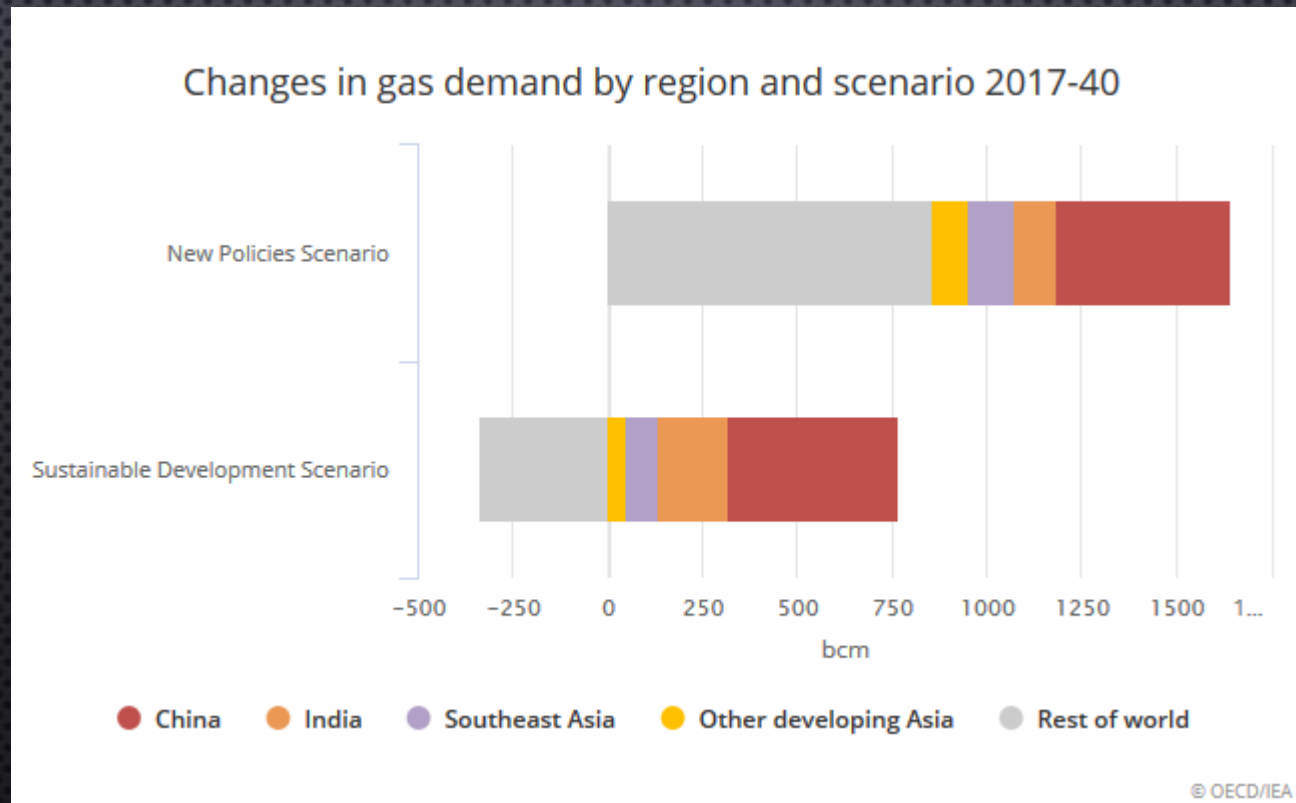
Consumption, production declining by 2040 but still above 2017 levels

North America Central and South America Europe Africa Middle East Eurasia Asia Pacific

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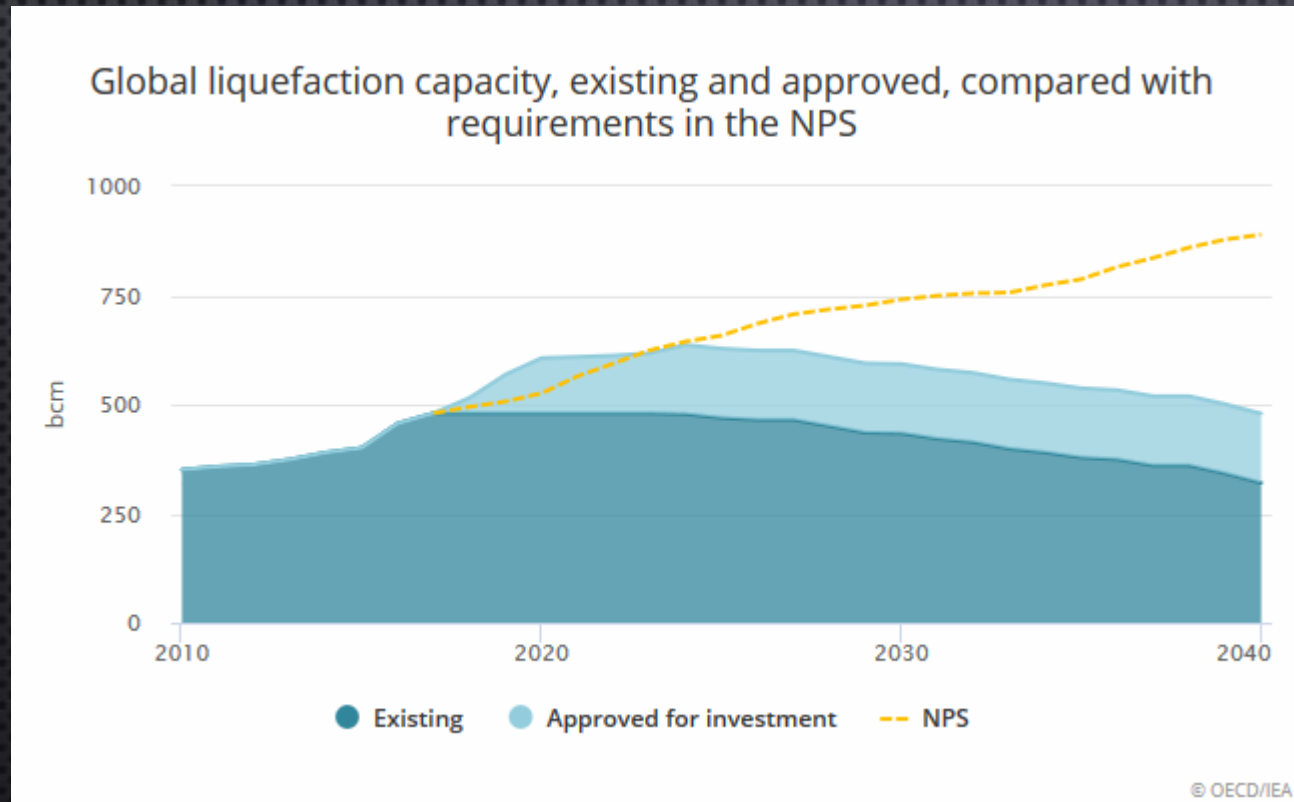
Source: International Energy Agency World Energy Outlook 2018

LONG-TERM GAS SENSITIVE TO POLICY (BUT DEMAND GROWS IN BOTH CASES)



Source: International Energy Agency World Energy Outlook 2018

LNG REQUIREMENTS UNDER 'NEW POLICIES'



LNG will overtake pipeline share of gas trade in this period

US LNG growing rapidly under uniquely flexible contracts

Economically, gas will act increasingly like oil (but never totally)

Source: International Energy Agency World Energy Outlook 2018

WHAT IT MEANS

- OIL MARKET REMAINS DEPENDENT ON SUPPLY MANAGEMENT
- MIDDLE EASTERN INSTABILITY HAMPERS BUT HASN'T IMPAIRED SUPPLY MANAGEMENT
- SHALE MAKES US A NET GAS EXPORTER, NEARLY A NET OIL EXPORTER, A GROWING EXPORTER OF NGL
- LONG-TERM OIL DEMAND VERY SENSITIVE TO CLIMATE-RELATED REGULATION
- LONG-TERM GROWTH IN OIL DEMAND DOMINATED BY PETROCHEMICALS
- GAS GROWTH MEANS MORE NGLS, MORE COMPETITION IN PETROCHEMICAL MARKET
- FORECASTS OF CARBON-FREE ECONOMY ANY TIME SOON ARE UNREALISTIC

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