Climate Change, Carbon Politics and the Future of Fossil Fuels

October 31, 2020

By David Yager

Author, "*FROM MIRACLE TO MENACE – Alberta, A Carbon Story*"

Why oil is "Hard To Kill"

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- *The upstream oil and gas industry is dynamic. The contents reflect a point in time. Actual conditions change frequently*
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Canada's Oil & Gas Industry is "Hard To Kill"

- Record combined oil and gas production
- Fifth largest combined oil and gas producer in the world
- Canada's largest private sector industry behind only residential housing
- Maintaining 7.6 million boe/day is big business
- No practical substitute for fossil fuels yet
- Rumors of its demise their is greatly exaggerated

Climate Change Milestones

1988 – US Senate hearings into Global Warming, New York City

1992 – UN “Earth Summit” in Rio de Janeiro

1997 – Climate Conference in Japan results in the “Kyoto Protocol”

2005 – Ontario pledges to phase out coal, introduce renewables

2005 – George W. Bush introduces Energy Policy Act including corn-based biofuels

2007 – Alberta introduces large emitter carbon tax, CSS funding

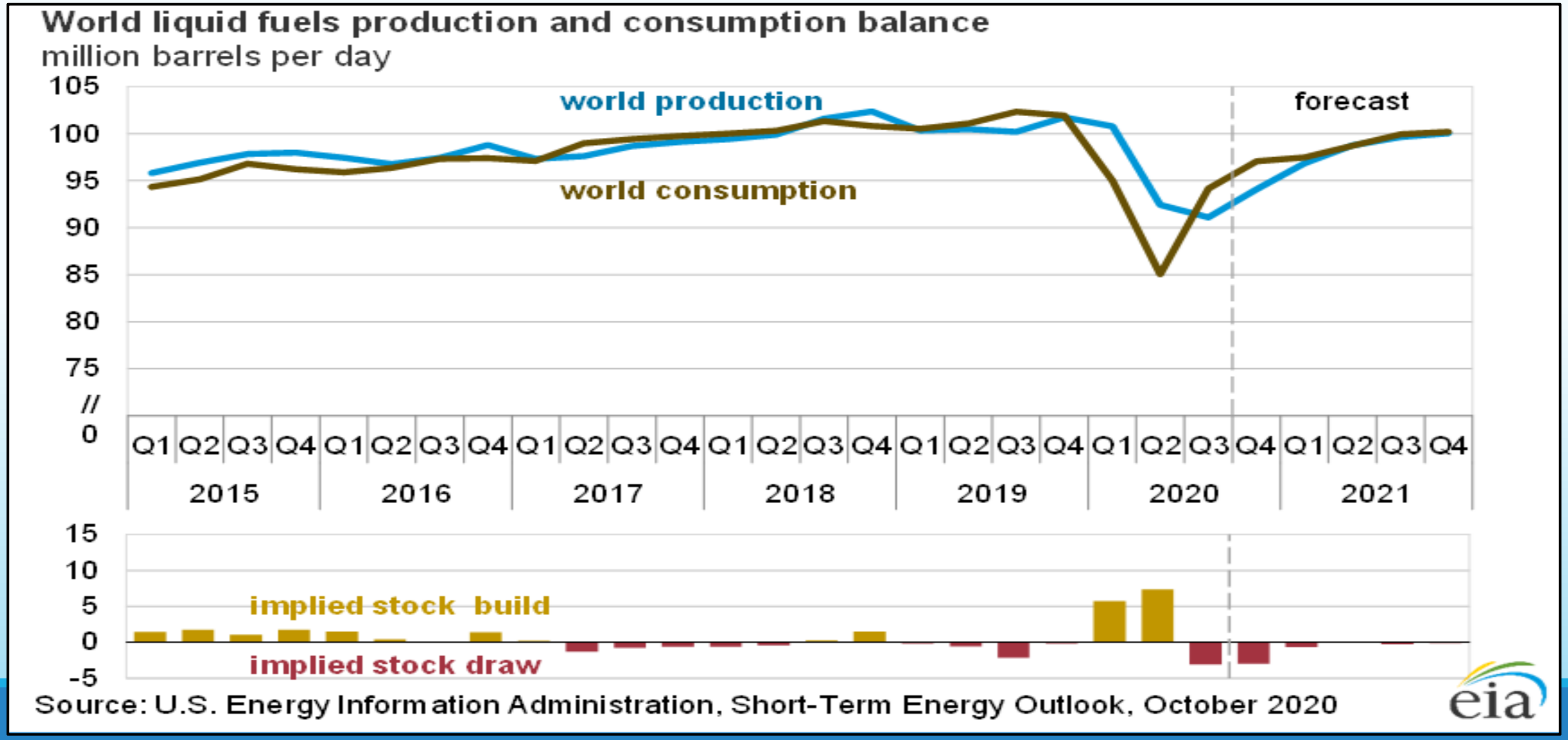
2008 – BC introduces retail carbon tax

2009 – US EPA declares carbon dioxide a “pollutant”

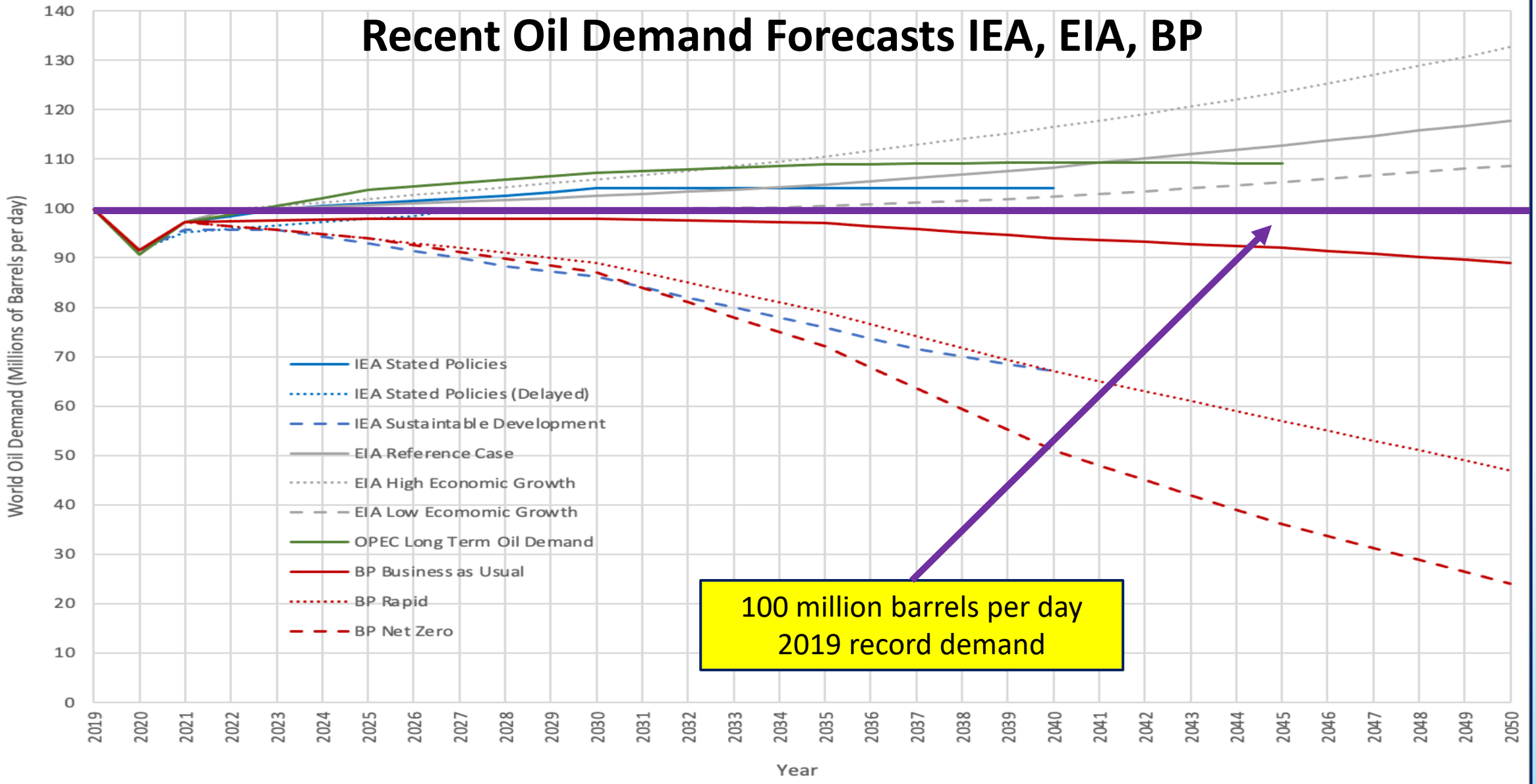
2015 – Alberta NDP introduces “Climate Leadership Plan”

2015 – Canada signs COP 21 in Paris to reduce 2030 emissions 30% from 1990 levels

Quick Recovery in Oil Demand – EIA



Recent Oil Demand Forecasts IEA, EIA, BP



Source: Glenloch Energy LLC October 22, 2020

Carbon Politics – Climate Ideal Political Issue

- Big oil has had no friends since the early 1970s – an easy target
- Politicians will “Find a parade and get in front of it”
- Social media and advanced voter identification has changed politics
- Single issue politics increasingly popular
- Modern political parties are “tribal” – us versus them
- The percentage of the population driving major policy issues continues to shrink

Pipelines: Public Opinion Versus Public Policy

- BC poll June 2019 shows 60% support TMX. Horgan NDP forms government opposing pipelines June 2017 with 40% of popular vote
- Quebec poll December 2019 shows 66% support for Canadian oil. Coalition Avenir wins 2018 election with 37% of popular vote and opposes new oil pipelines from western Canada
- National poll December 2019 shows 65% of Canadians support pipelines. Liberals kill Northern Gateway in 2016 with 39.5% of popular vote
- Only 30% of voters said climate change was important last election, 100% are paying carbon taxes

Your Federal Government By The Numbers

2019 Election	Millions	Percentage
Population of Canada	37	100%
Eligible Voters	27.1	73%
Voter Turnout	17.8	66%
Voted Liberal	5.9	33.1%
Liberal/Eligible	5.9/27.1	21.7%

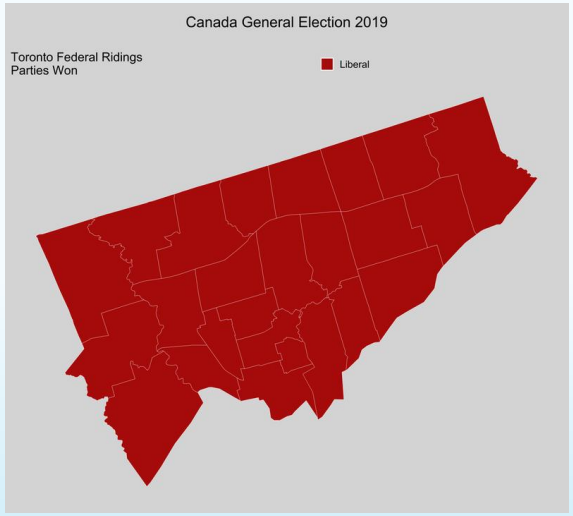
Liberals won 157 of 338 seats with 33.1% of the popular vote
Conservatives won 122 of 338 seats with 34.3% of the popular vote

Canada is Increasingly Urban Which Votes Differently Than Rural

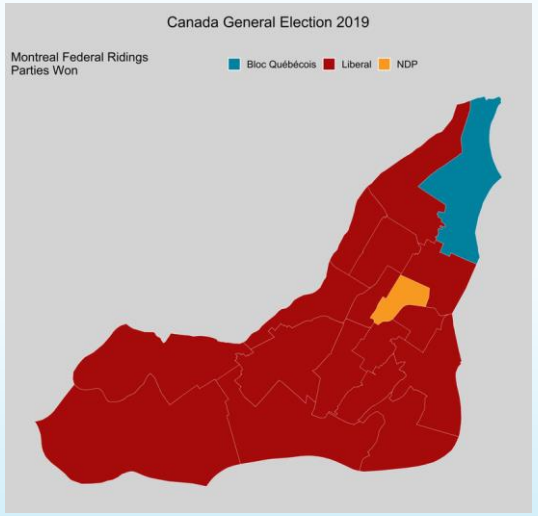
2016 Census	
Population	35 million
Urban	23 million/66%
Living in Cities of 100,000+	16 million/70%

- **16 million – 43% of Canadians - live in 48 urban centres with a population of 100,000 or more in Newfoundland & Labrador, Quebec, Ontario and the Lower Mainland of BC**
- **Canadians increasingly have no direct connection with resource production – fossil fuels, mining, forestry, agriculture**

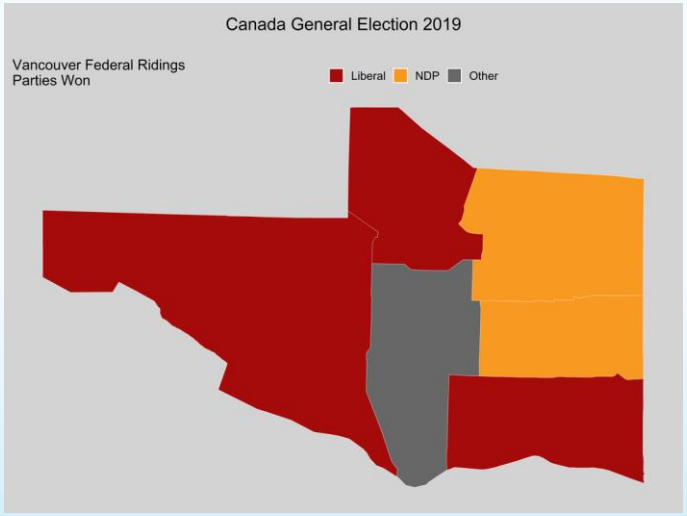
Conservatives Didn't Win One Seat in Toronto, Montreal or Vancouver



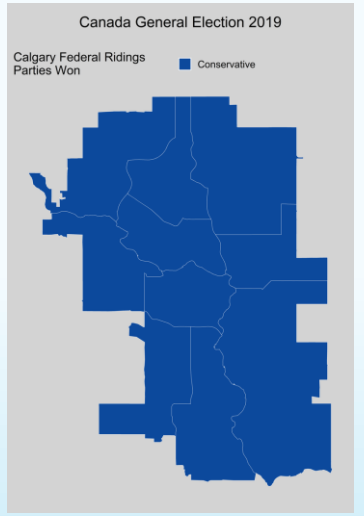
Toronto



Montreal

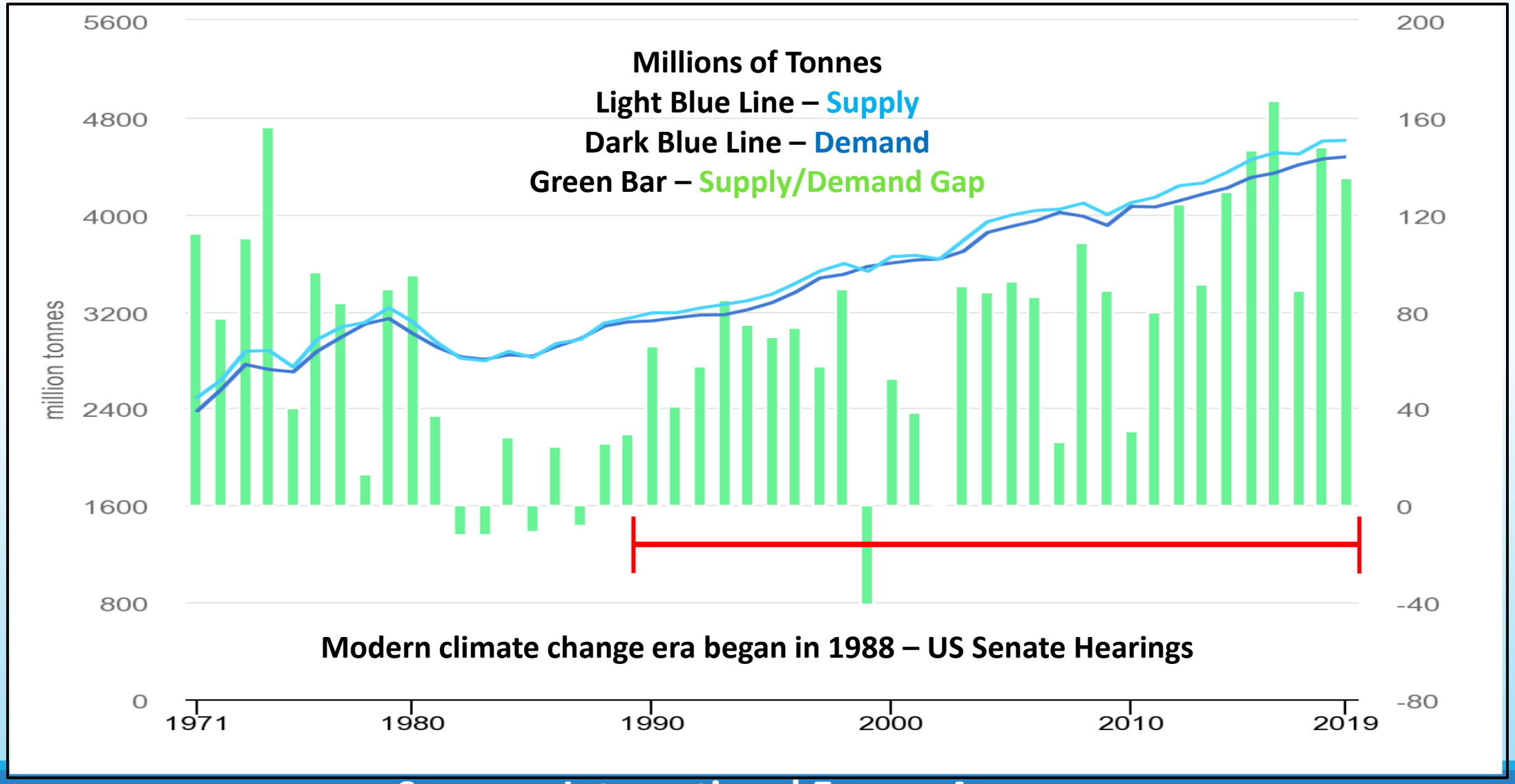


Vancouver



Calgary

Climate Change and Oil Consumption

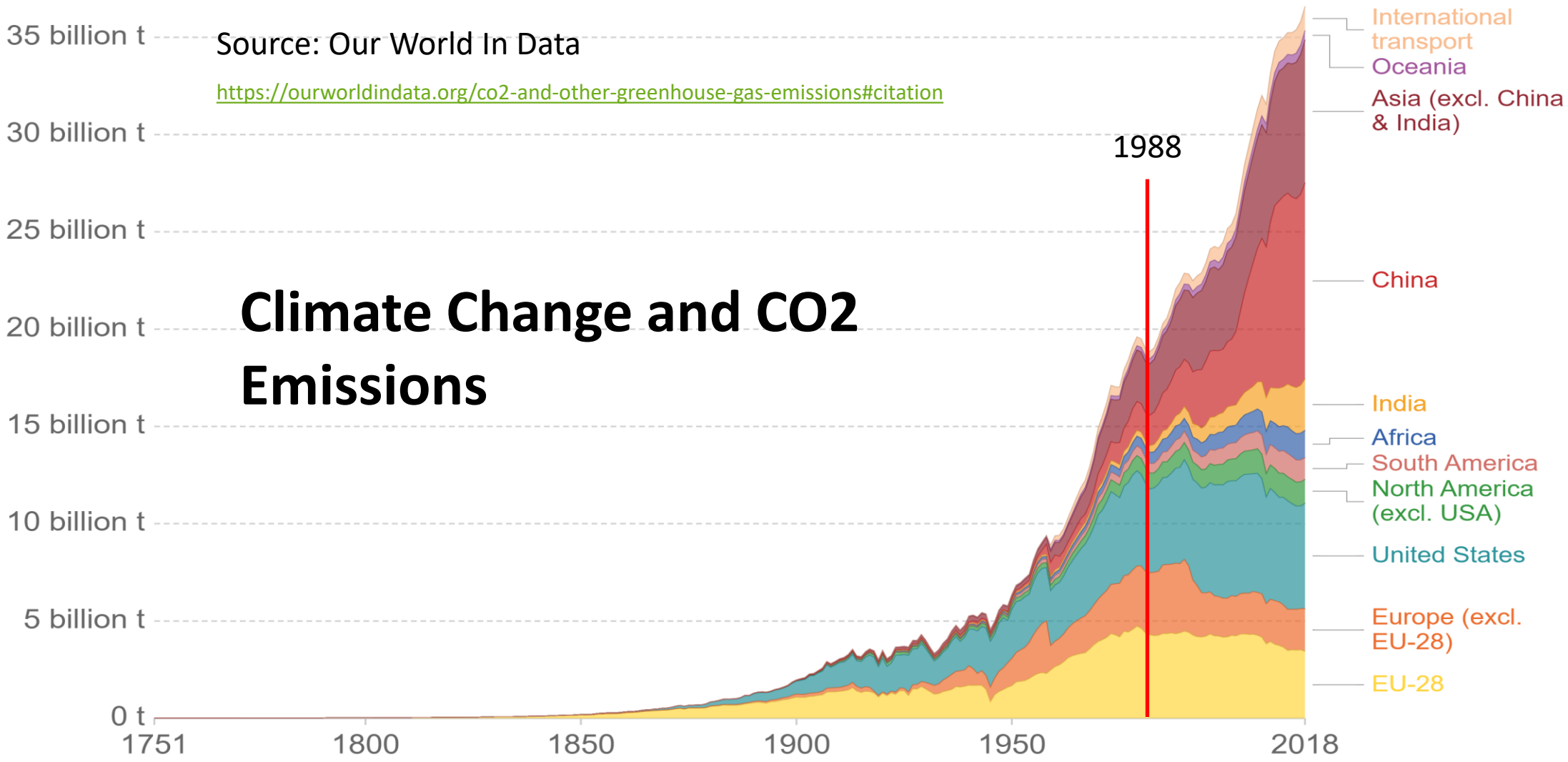


Source – International Energy Agency

Annual total CO_2 emissions, by world region

This measures CO_2 emissions from fossil fuels and cement production only – land use change is not included.

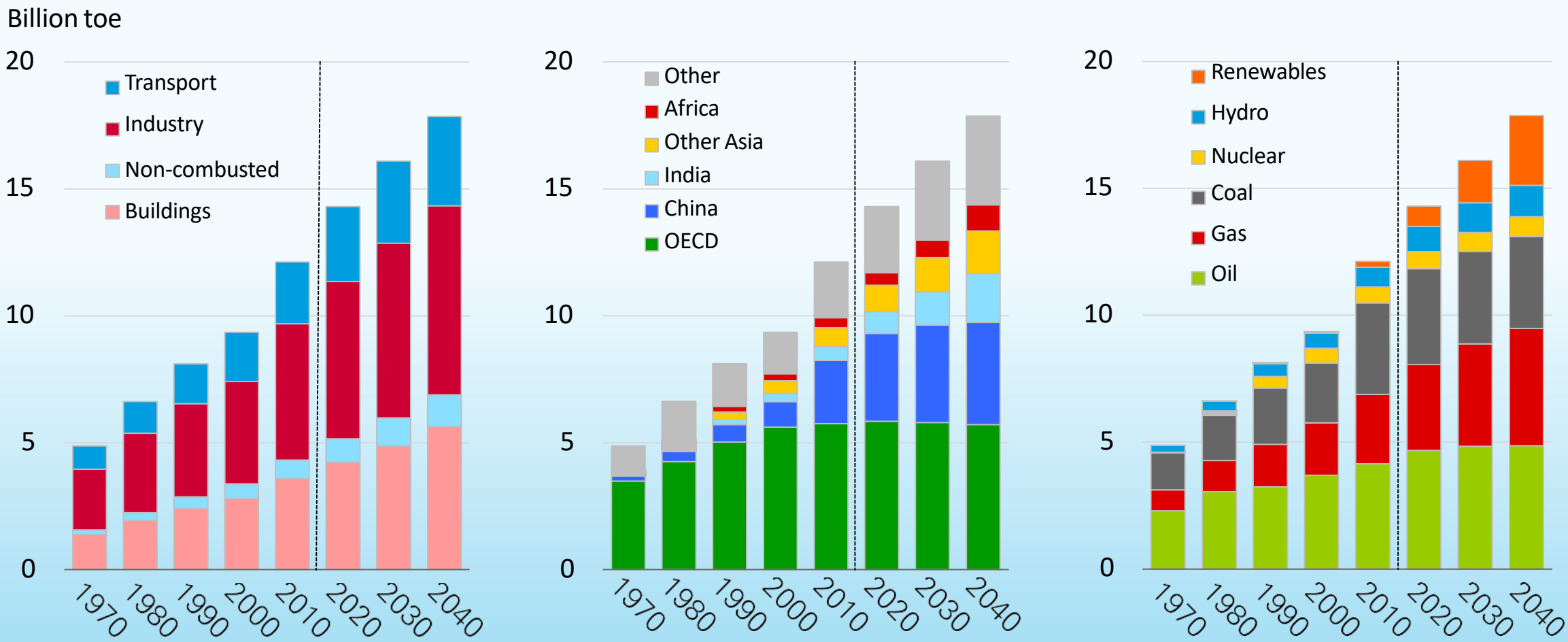
Our World in Data



Source: Carbon Dioxide Information Analysis Center (CDIAC); Global Carbon Project (GCP)
Note: 'Statitistical differences' included in the GCP dataset is not included here.
OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

Future of Oil BP 2019

End-use sector | Region | Fuel

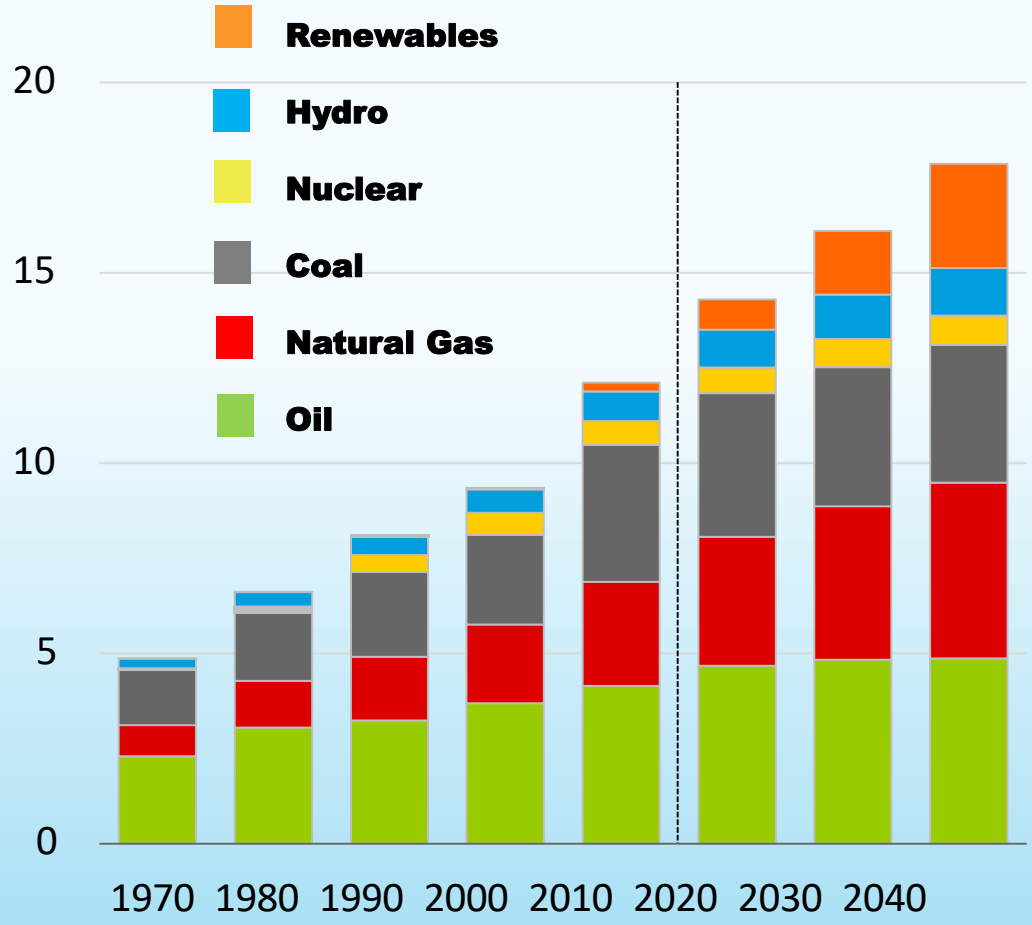


BP estimates there will be 100 million EVs in use by 2035 compared to 1.5 million in 2015

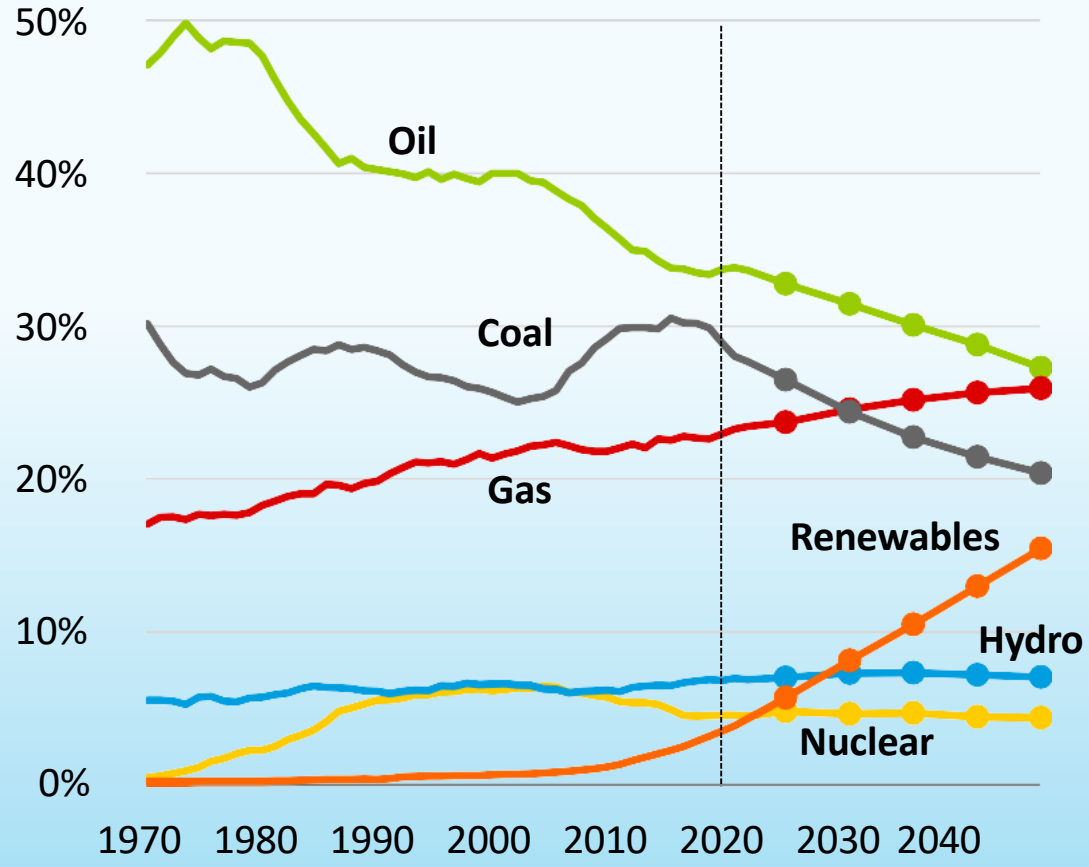
Global energy demand by fuel type BP 2019

Primary energy consumption by fuel

Billion toe



Shares of primary energy

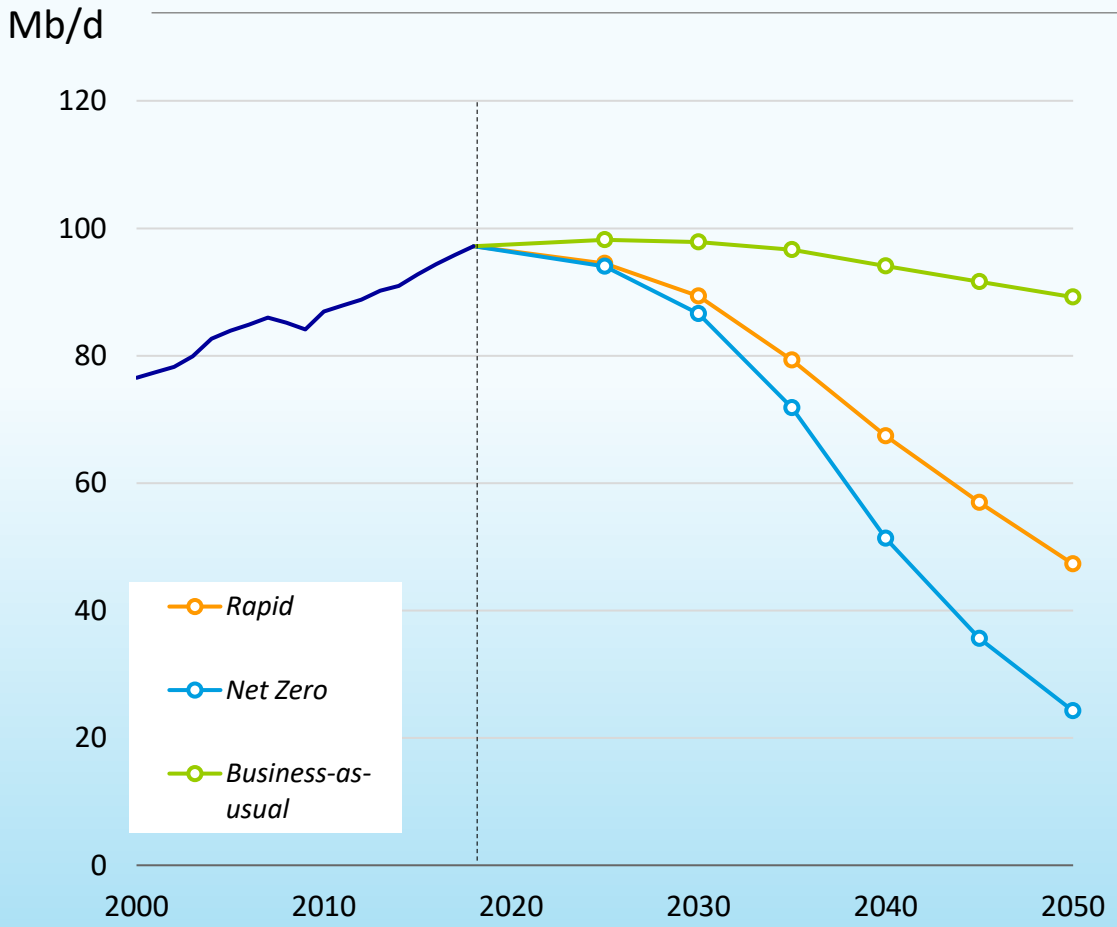


2019 BP ENERGY OUTLOOK

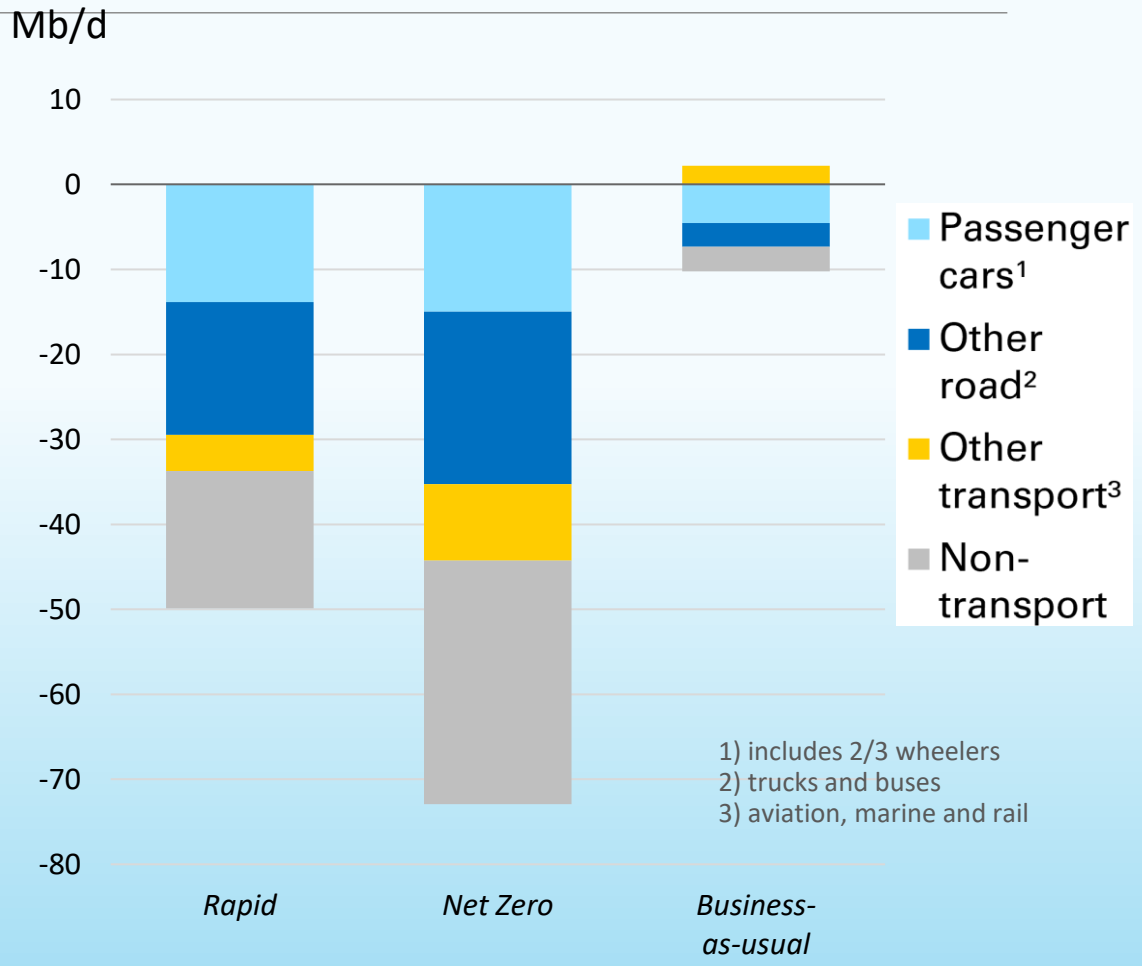
46% increase in natural gas demand 2017 - 2040

Future of Oil BP 2020

Oil consumption

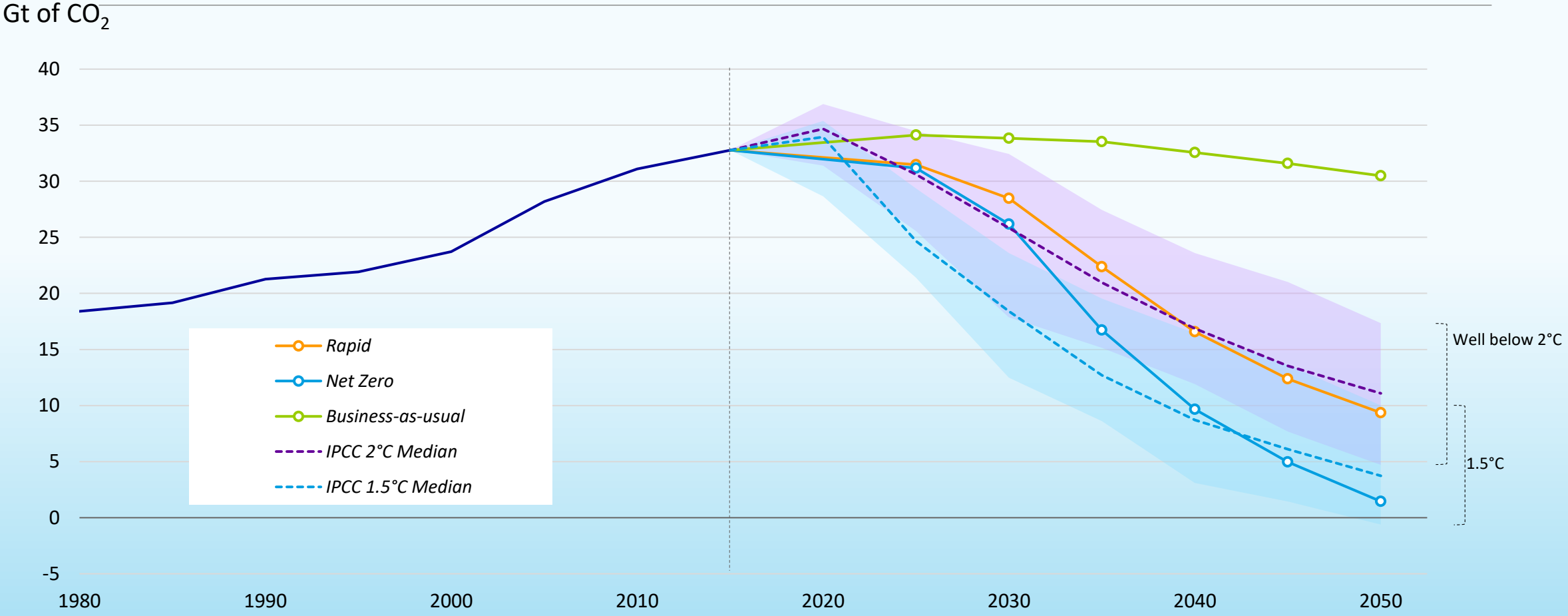


Change in oil demand, 2018-2050



CO2 Emissions By Scenario – BP 2020

CO_2 emissions from energy use

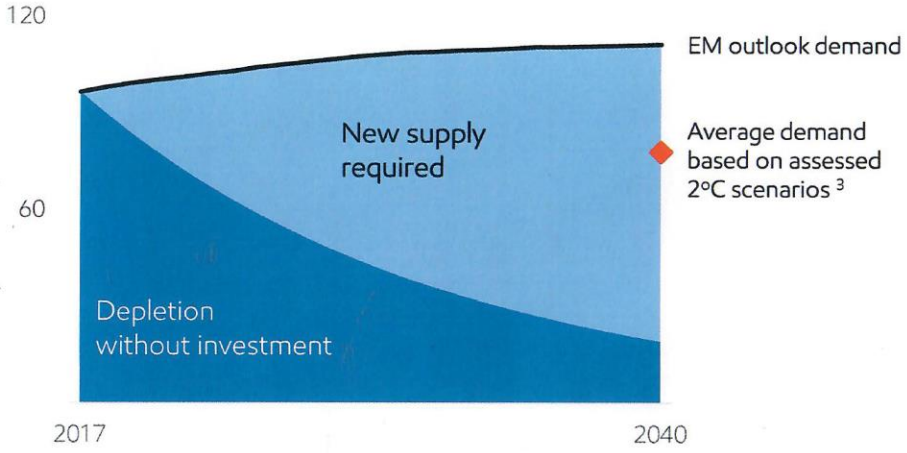


Ranges show 10th and 90th percentiles of IPCC scenarios, see pp 150-151 of *Energy Outlook* for more details

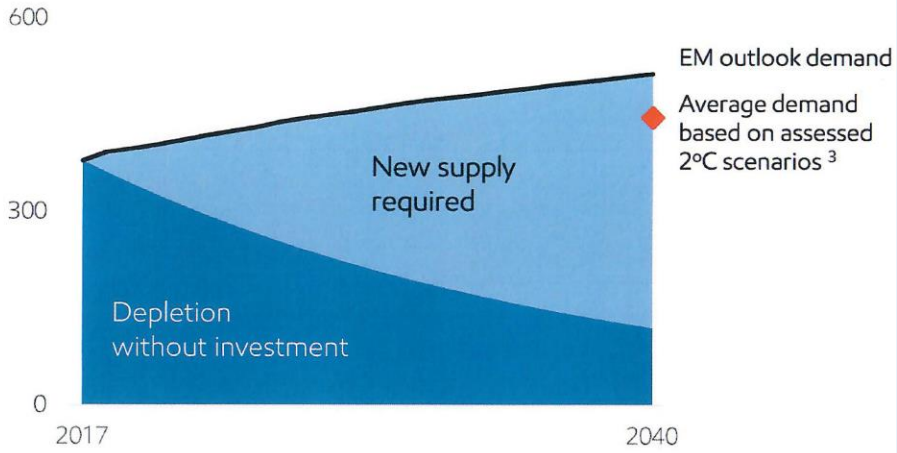
ExxonMobil – Demand and Depletion 7% Annual

LONG-TERM FUNDAMENTALS

OIL SUPPLY/DEMAND[1]
Moebd



NATURAL GAS SUPPLY/DEMAND[2]
Bcfd



- Depletion nature of business requires significant new supplies across range of scenarios
- IEA estimates approximately $21 trillion of oil and natural gas investment needed by 2040

[1] Excludes bio fuels; Source: IEA, EM Analyses – For illustration
[2] Source: IHS, EM Analyses – For illustration
[3] Assessed 2°C scenarios based on EMF 27 full technology / 450 ppm cases targeting a 2°C pathway, see EM 2019 Outlook for Energy

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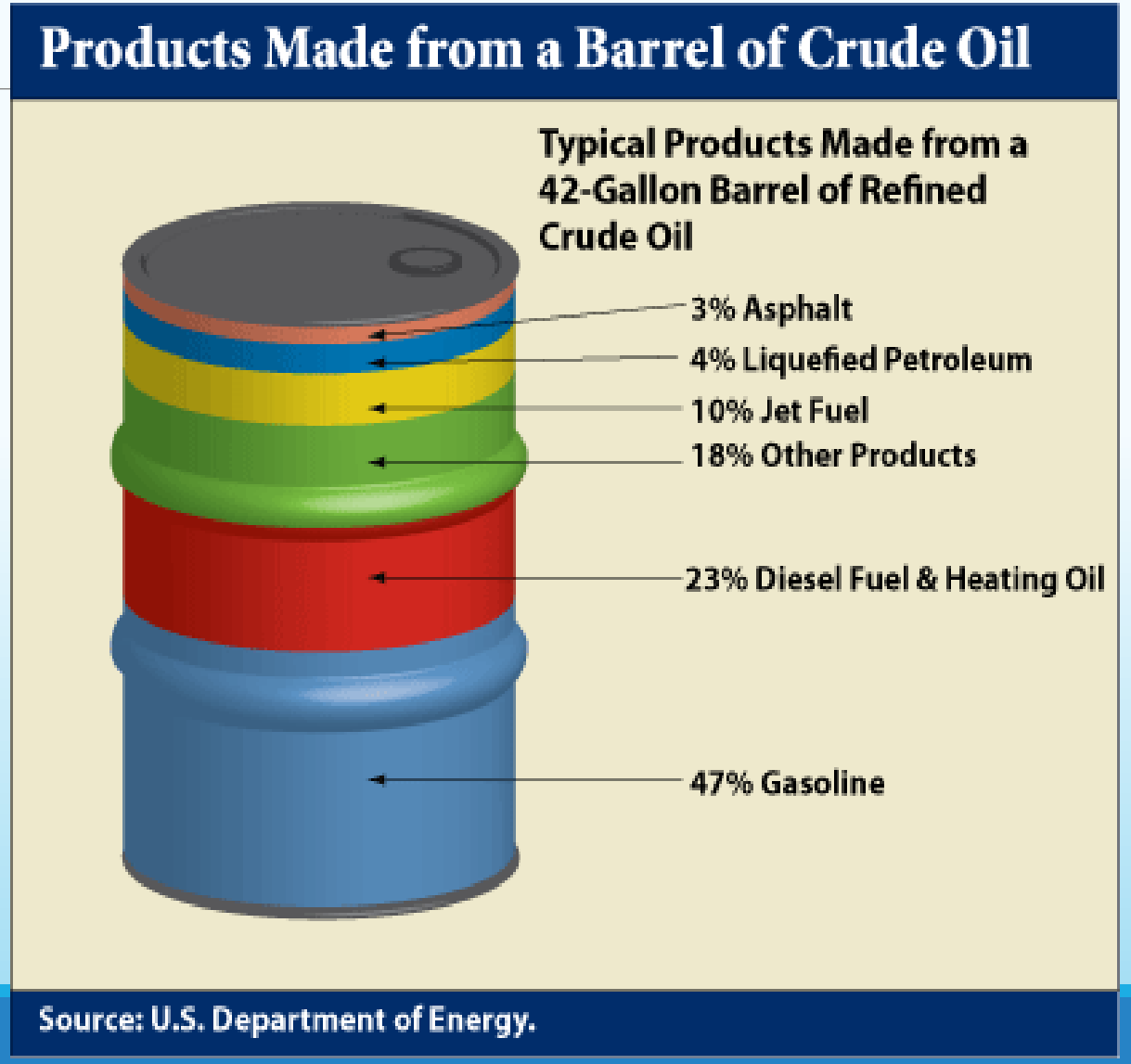
ExxonMobil's demand forecast to 2040, estimated natural reservoir depletion, supply shortfall in 2040 with more development

Current Oil Usage By Sector

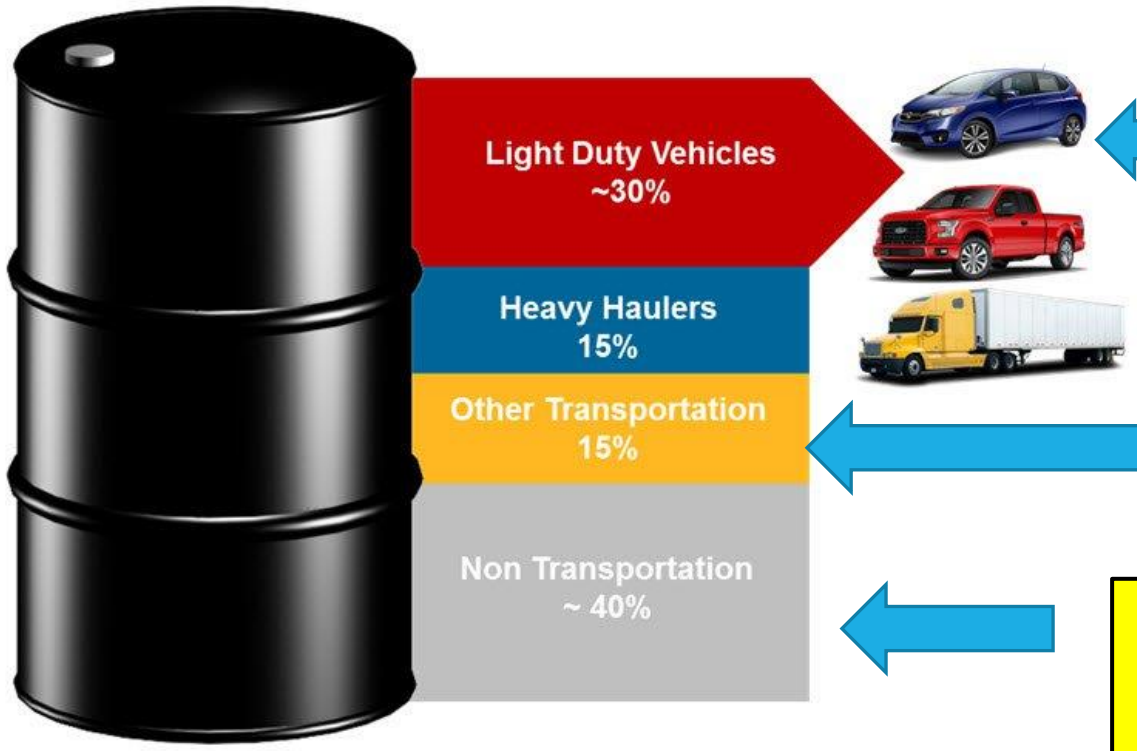
The main variable in future oil demand is the rate at which Electric Vehicles will replace diesel and gasoline Internal Combustion engines for light trucks and cars

The primary factors driving EV switchover will include:

- ***Upgrading the power grid for recharging during peak load periods in residential and commercial locations***
- ***Vehicle range***
- ***Battery cost, weight and life***



70% of Current Oil Use Cannot Currently be Replaced by Renewable Energy



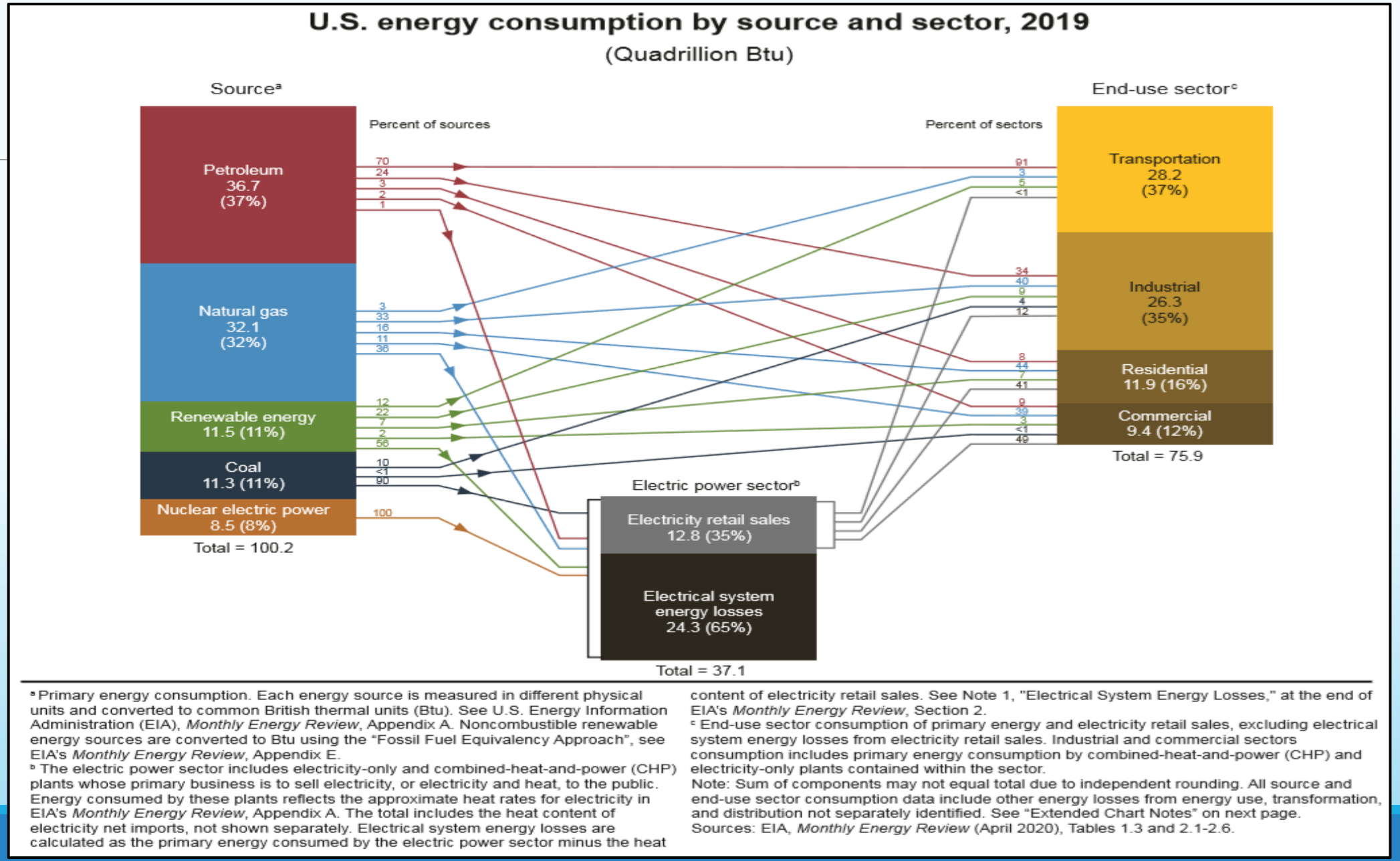
Source: IEA (2014)

Assumes 100% EV adoption

Trains, ships, airplanes

Plastic, asphalts, petrochemicals, industrial products

https://www.eia.gov/energyexplained/us-energy-facts/



[a] Primary energy consumption. Each energy source is measured in different physical units and converted to common British thermal units (Btu). See U.S. Energy Information Administration (EIA), *Monthly Energy Review*, Appendix A. Noncombustible renewable energy sources are converted to Btu using the "Fossil Fuel Equivalency Approach", see EIA's *Monthly Energy Review*, Appendix E.

[b] The electric power sector includes electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public. Energy consumed by these plants reflects the approximate heat rates for electricity in EIA's *Monthly Energy Review*, Appendix A. The total includes the heat content of electricity net imports, not shown separately. Electrical system energy losses are calculated as the primary energy consumed by the electric power sector minus the heat content of electricity retail sales. See Note 1, "Electrical System Energy Losses," at the end of EIA's *Monthly Energy Review*, Section 2.

[c] End-use sector consumption of primary energy and electricity retail sales, excluding electrical system energy losses from electricity retail sales. Industrial and commercial sectors consumption includes primary energy consumption by combined-heat-and-power (CHP) and electricity-only plants contained within the sector.

Note: Sum of components may not equal total due to independent rounding. All source and end-use sector consumption data include other energy losses from energy use, transformation, and distribution not separately identified. See "Extended Chart Notes" on next page.

Sources: EIA, *Monthly Energy Review* (April 2020), Tables 1.3 and 2.1-2.6.

Canada World's 5th Largest Hydrocarbon Producer on Barrel of Oil Equivalent Basis

1 – United States

2 – Russia

3 – Saudi Arabia

4 – Iran

5 - Canada

6 – China

7 – Qatar

8 – United Arab Emirates

9 – Kuwait

10 - Iraq

Crude oil, natural gas, natural gas liquids

98% of oil consumed, 95% of oil produced outside of Canada

Oil Sands Increasingly Competitive

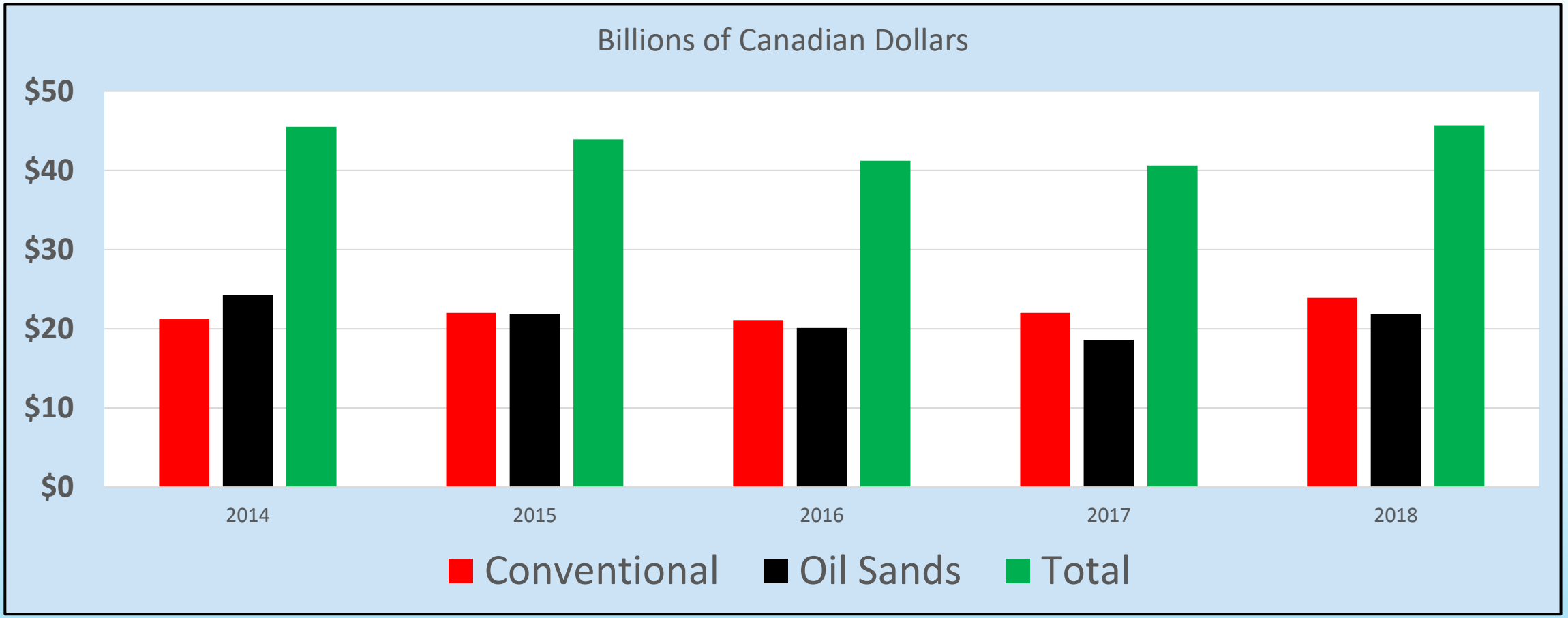
	2014	2015	2016	2017	2018
Production, Millions of Barrels Per Day	**2.0**	**2.4**	**2.4**	**2.7**	**2.9**
Operating Costs, Billions of Dollars	**$24.3**	**$21.9**	**$20.1**	**$18.6**	**$21.8**
Cost Per Barrel	**$33.9**	**$25.1**	**$22.8**	**$19.0**	**$20.5**

Average operating costs per produced barrel down $13 or 40% in four years

Source: CAPP 2019 Statistical Handbook

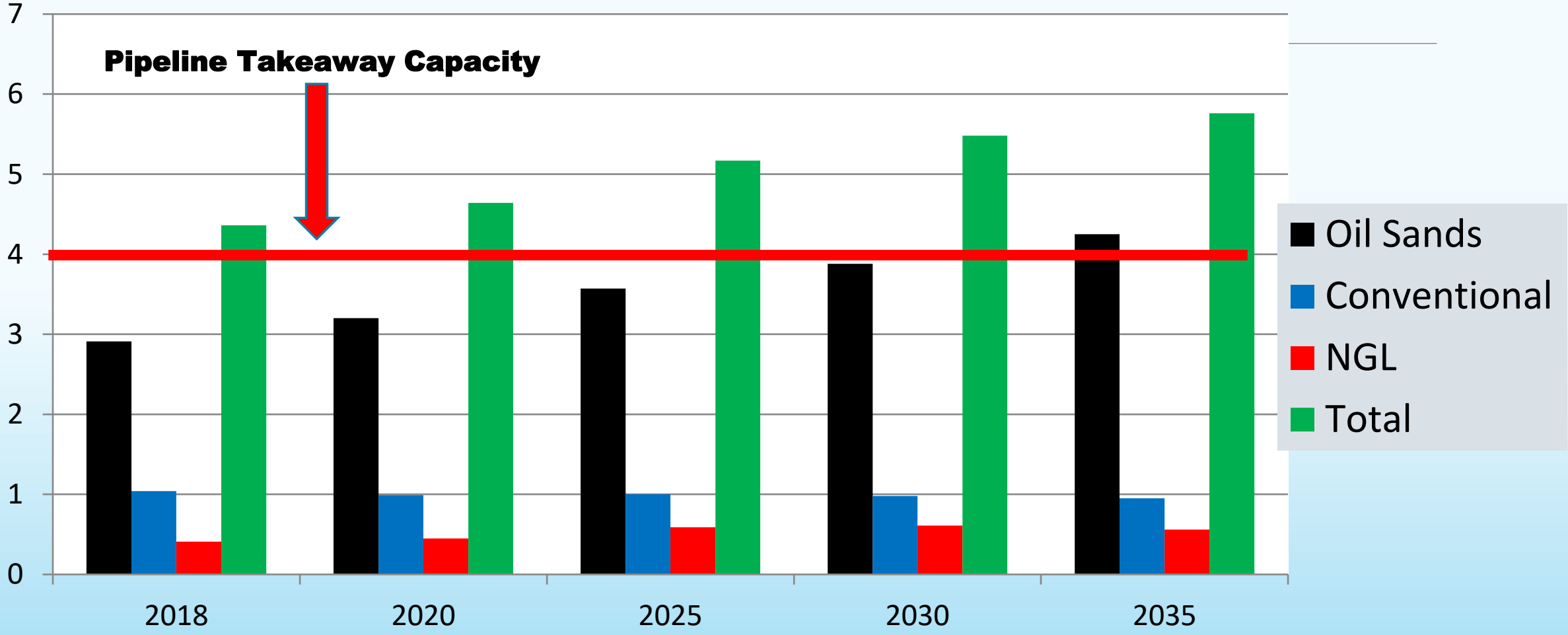
Production Operating Costs 2014 – 2018

$45 billion/year to sustain output



Source: CAPP Statistical Handbook 2019

WCSB Oil/NGL Production Growth to 2035
Millions of Barrels Per Day



Source: CAPP Crude Oil Forecast April 2020

Production to increase 1.4 million b/d or 32%, 2018 - 2035

New Pipelines – Perhaps…

Name	Distance Km	In Service	Capacity B/D
Enbridge Line 3	1,659	2021	370,000
Trans Mountain	1,184	2022	590,000
Keystone XL	1,897	202?	830,000
			1,790,000

- Enbridge Line 3 - they're trying
- Trans Mountain - yes, no, yes, maybe, under construction
- Keystone XL – progress but new worries about US 2020 election

Canadian Pipeline History

1949 – Interprovincial Pipe Line Edmonton to Superior Wisconsin

95,000 b/d, 20 months, 7 governments approved

1953 – Trans Mountain Edmonton to Burnaby

150,000 b/d, 19 months, 3 governments approved

1957 – Westcoast Transmission NE BC, NW AB to Lower Mainland

400 mmcf/day, 72 months, 3 governments approved

1958 – Trans Canada Pipeline Alberta to Ontario/Quebec

300 mmcf/day, 60 months, 6 governments approved

LNG Exports? Is It True?

- Shell-led LNG Canada is under construction
- Latest pipeline challenge cleared by BC Supreme Court
- This is a $40 billion project over its life
- B.C. and federal governments have offered meaningful tax incentives
- Will remove 2 bcf/day and increase Canadian gas production by 13%
- Three more planned – Woodfibre (BC), Pieridae (NS) Saguenay (PQ)
- 5.5 bcf/day or 34% gas production increase if all built

The Real World

- 7.8 billion people want more cheap energy and carbon-based products
- Everybody on earth is a fossil fuel consumer – energy, plastic, chemicals, medicine, food
- Only 1.3 billion live in OECD countries
- 6.5 people – everyone else - want the good life
- Major concern is tomorrow, not 2030, 2050 or 2100
- They have no capacity to pay more for anything

OECD Compared To The Rest of the World

	GJ	toe
United States	285	6.8
Saudi Arabia	268	6.3
Russia	218	5.3
Australia	214	5.1
OECD Average	173	4.2
China	93	2.3
World	72	1.7
Brazil	58	1.4
Non-OECD Average	51	1.2
India	29	0.7
Ethiopia	16	0.4

Primary Energy Consumption Per Capita By Country

- 1.3 billion people in OECD countries consume over 3X that of 6.5 billion people in non-OECD countries
- Climate change is not a major public policy issue outside of developed countries, primarily OECD
- Demand growth this century has primarily outside of OECD countries
- All the advice comes from a handful of people who are very comfortable

Sources: World Bank, IEA

OPEC Global Demographics to 2045

- World population 9.5 billion, up 23%
- Growth in Middle East, Africa, Asia, OPEC countries, India
- China population flat, India to exceed China
- Urbanization from 56% to 66%
- Annual GDP growth 3.3% 2022 onward
- Using 2011 benchmark, GDP to rise from US$121 trillion to US$258 trillion, 213% gain
- China and India will be 40% of GDP, OECD only 31% compared to 50% today
- Climate policy will mirror 2015 Paris Agreement but compliance will vary by country and respond to changing conditions

Source: OPEC 2020 World Oil Outlook

The Parallel Universe Factor

- The debate about fossil fuels and climate change is increasingly based on emotion, not facts
- Total polarization – no middle ground or common sense
- Regional solutions to global problems won't result in material changes
- Climate change is no longer about the chemical composition of the atmosphere
- Climate intertwined with social justice and wealth redistribution

US

THEM

“The Progress Paradox” - 2003

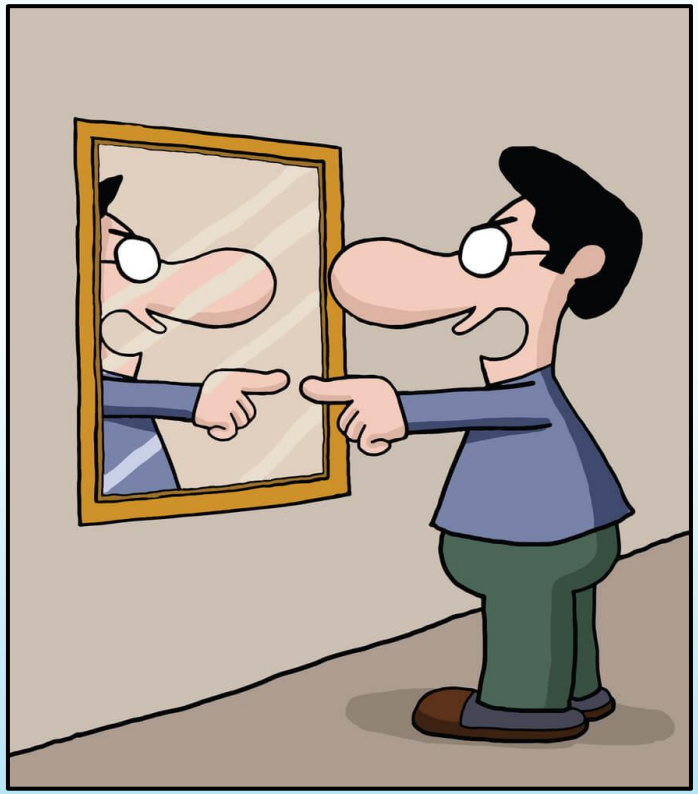
- “…society is undergoing a fundamental shift from *material* want to *meaning* want”
- “…we should be glad society is creating the leisure and prosperity that allows people by the millions to feel depressed, for its better to be prosperous, free and unhappy than the other possibilities…”

GRETA THUNBERG AT THE U.N.
“People are dying…We are in the beginnings of a mass extinction…How dare you!”

Gregg Easterbrook: *The Progress Paradox – How Life Gets Better While People Feel Worse*

The Insularity of the OECD Climate Debate

- Who is the west speaking to?
- Who is the west speaking for?
- How do we get China and India to do anything?
- Is the North American/European climate obsession really about the chemical composition of the Earth's atmosphere ***or*** winning the next election?



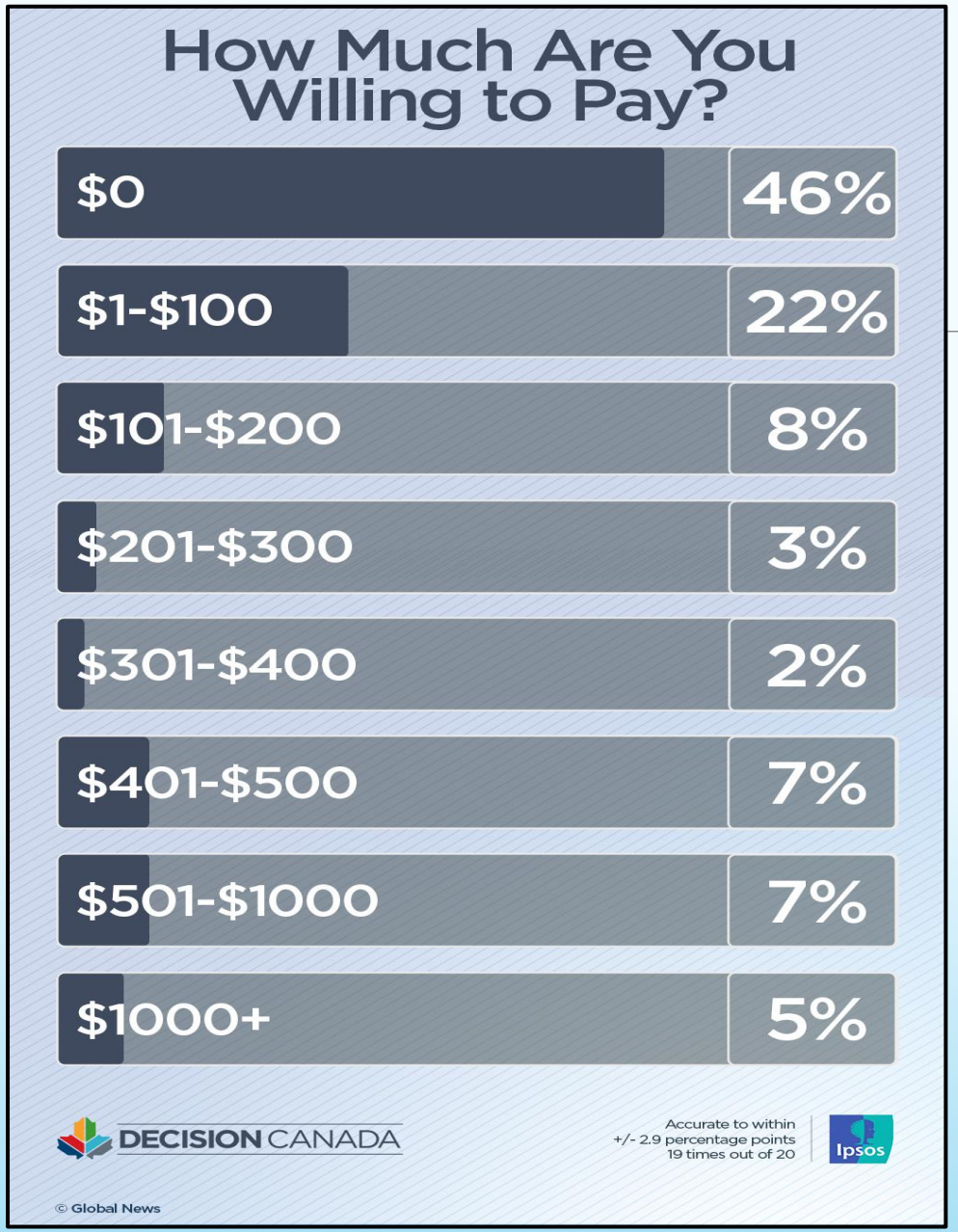
"I agree with you"

Future of Oil in a Post-COVID World

- Governments have borrowed US$9 trillion this year to stabilize the economy to offset legislated lockdowns
- Current economic activity artificially propped up by massive government stimulus
- Private sector still struggling – major sectors like airlines, tourism, restaurants, retail
- High real unemployment, savings and accumulated wealth reduced, investor and consumer confidence shattered
- Voters support climate change and environmental protection but are reluctant to pay for it
- Can governments afford the pre-COVID climate playbook when facing post-COVID realities?

Peak Oil Forecasts And Future Demand Declines Are Based Upon….

- Governments will borrow even more money to continue forced energy transition
- Governments representing the 6.5 billion poorest people will force their flock to pay more for energy and oil/gas by-products
- People with electricity and clean energy for the first time will accept losing both
- Climate change will remain a major public policy issue at the ballot box
- The true emissions and costs of renewables will continue to be ignored
- Fossil fuel producers will make no further technological and operational improvements



Public Opinion on Climate Change

- *Global News* public opinion poll on climate change September 26, 2019
- IPSOS September 11, 2019 top five campaign issues
  1. Health care
  2. Affordability
  3. Taxes
  4. Social inequality
  5. Climate change
- Clean Fuel Standard to cost each household at least $1,395/yr, effective fuel carbon tax of $163 - $170/tonne*

*Canadian Energy Research Institute 2019

Top 10 CO2 Emitters, Change Since Kyoto

Country	2018 CO2 Billion Tonnes	Global Share	Since 1997
China	9.43	27.8%	54.6%
USA	5.15	15.2%	-12.1%
India	2.49	7.3%	105.8%
Russia	1.55	4.6%	5.7%
Japan	1.15	3.4%	-10.1%
Germany	0.73	2.1%	-11.7%
South Korea	0.70	2.1%	34.1%
Iran	0.66	1.9%	57.7%
Saudi Arabia	0.57	1.7%	59.9%
Canada	0.55	1.6%	1.6%

Source: Forbes 04.12.2019

Conclusions – Oil Versus Climate

- Climate change is real and must be addressed
- It is a global issue that cannot be addressed without global cooperation and participation
- Canadian climate policy is not real because it ignores global realities
- Economic self-immolation is more about votes the chemical composition of the atmosphere
- Technological innovation comes from the private sector, not government departments of clever ideas
- Governments can be a catalyst through tax policy and incentives, not by picking winners
- Canada's greatest contribution will be innovative carbon reduction technologies for fossil fuels
- Incumbent high density, low cost fossil fuels will be part of the global energy and product mix for decades if not forever

Rarely Reported Facts On the Human Condition

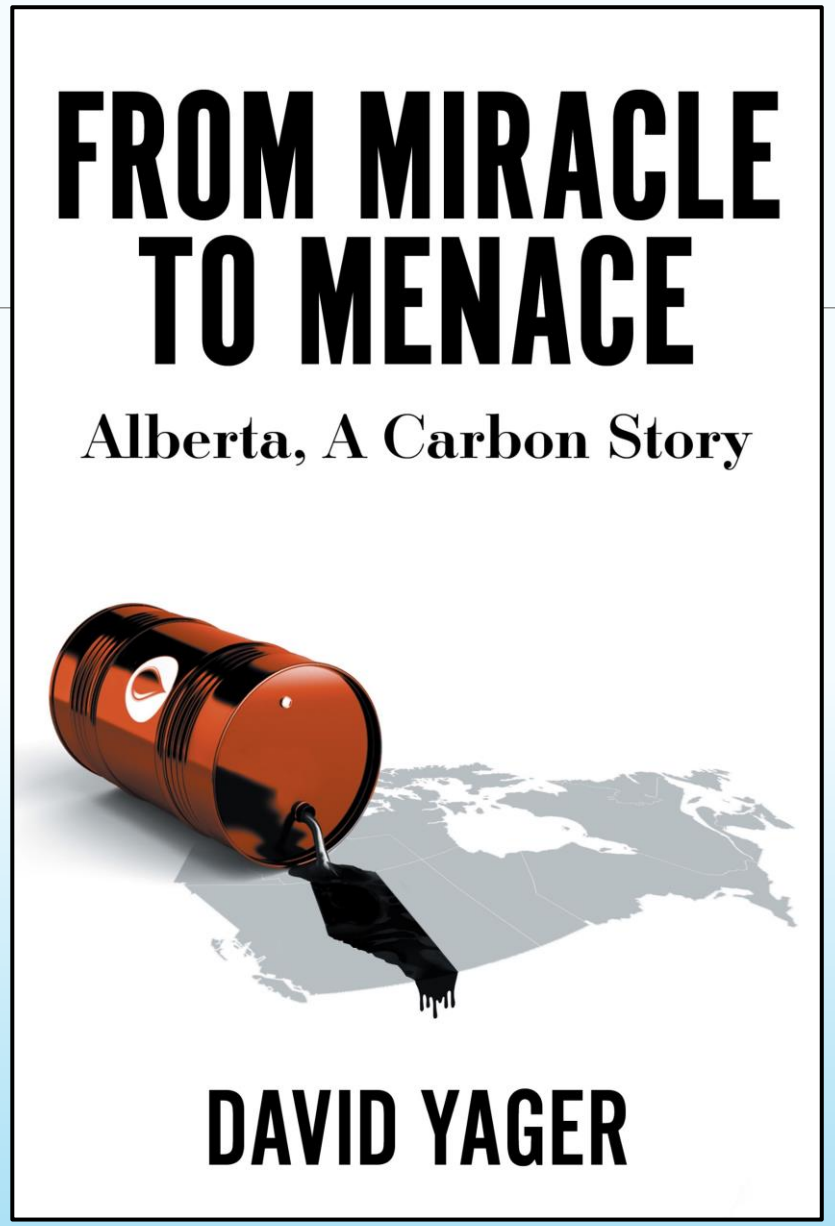
Event	Data
Births in 2020	116.0 million
Deaths in 2020	48.7 million
Net Population Gain	67.3 million, 1.8X Canada
Deaths Attributed to COVID-19	1,181,171 or 2.4%
Average Life Span 1950	47 years
Average Life Span 2000	67.1 years
Average Life Span 2020	73.2, up 9%
Infant Mortality Rate 2000	49.22/100,000 births
Infant Mortality Rate 2020	26.05/100,000, down 47%
Deaths Children Under 5 2000	70/100,000
Deaths Children Under 5 2020	35.9/100,000, down 49%

- Birth rates decline as wealth grows
- More people are educated
- More women are entering the workforce
- More people have clean water and better sanitation
- More people have access to food and medicine
- More people have access to better health care

Source: www.worldmeters.info October 29, 2020

Fearless Predictions

- "***HARD TO KILL***" – oil and gas will be around for a long time
- Economic recovery from COVID-19 will be driven by the private sector, not government spending
- Voters and consumer will change priorities, politicians will react accordingly
- The economic flaws of western climate policy will emerge as consumers pay more for the "energy transition"
- Governments will focus more on the necessities of life today, not decades into the future



- Alberta
- Our industry
- Climate change
- Our future

www.miracletomenace.ca