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”
Use Of This Material

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• The upstream oil and gas industry is dynamic. The contents reflect a point in time. Actual conditions change frequently.

• All opinions expressed herein are those of the author.
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
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>US Senate hearings into Global Warming, New York City</td>
</tr>
<tr>
<td>1992</td>
<td>UN “Earth Summit” in Rio de Janeiro</td>
</tr>
<tr>
<td>1997</td>
<td>Climate Conference in Japan results in the “Kyoto Protocol”</td>
</tr>
<tr>
<td>2005</td>
<td>Ontario pledges to phase out coal, introduce renewables</td>
</tr>
<tr>
<td>2005</td>
<td>George W. Bush introduces Energy Policy Act including corn-based biofuels</td>
</tr>
<tr>
<td>2007</td>
<td>Alberta introduces large emitter carbon tax, CSS funding</td>
</tr>
<tr>
<td>2008</td>
<td>BC introduces retail carbon tax</td>
</tr>
<tr>
<td>2009</td>
<td>US EPA declares carbon dioxide a “pollutant”</td>
</tr>
<tr>
<td>2015</td>
<td>Alberta NDP introduces “Climate Leadership Plan”</td>
</tr>
<tr>
<td>2015</td>
<td>Canada signs COP 21 in Paris to reduce 2030 emissions 30% from 1990 levels</td>
</tr>
</tbody>
</table>
Quick Recovery in Oil Demand – EIA

Source: U.S. Energy Information Administration, Short-Term Energy Outlook, October 2020
Recent Oil Demand Forecasts IEA, EIA, BP

100 million barrels per day
2019 record demand

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

<table>
<thead>
<tr>
<th>2019 Election</th>
<th>Millions</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population of Canada</td>
<td>37</td>
<td>100%</td>
</tr>
<tr>
<td>Eligible Voters</td>
<td>27.1</td>
<td>73%</td>
</tr>
<tr>
<td>Voter Turnout</td>
<td>17.8</td>
<td>66%</td>
</tr>
<tr>
<td>Voted Liberal</td>
<td>5.9</td>
<td>33.1%</td>
</tr>
<tr>
<td>Liberal/Eligible</td>
<td>5.9/27.1</td>
<td>21.7%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>2016 Census</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>35 million</td>
</tr>
<tr>
<td>Urban</td>
<td>23 million/66%</td>
</tr>
<tr>
<td>Living in Cities of 100,000+</td>
<td>16 million/70%</td>
</tr>
</tbody>
</table>

- 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
Climate Change and Oil Consumption

Modern climate change era began in 1988 – US Senate Hearings

Source – International Energy Agency
Annual total CO₂ emissions, by world region
This measures CO₂ emissions from fossil fuels and cement production only – land use change is not included.

Climate Change and CO₂ Emissions

Source: Our World In Data
https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#citation

Source: Carbon Dioxide Information Analysis Center (CDIAC); Global Carbon Project (GCP)
Note: ‘Statistical differences’ included in the GCP dataset is not included here.
OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY
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
© BP P.L.C. 2019

46% increase in natural gas demand 2017 - 2040
Future of Oil BP 2020

Oil consumption

- **Rapid**
- **Net Zero**
- **Business-as-usual**

Change in oil demand, 2018-2050

- **Passenger cars¹**
- **Other road²**
- **Other transport³**
- **Non-transport**

1) includes 2/3 wheelers
2) trucks and buses
3) aviation, marine and rail
CO2 Emissions By Scenario – BP 2020

CO₂ emissions from energy use

Gt of CO₂

Ranges show 10th and 90th percentiles of IPCC scenarios, see pp 150-151 of Energy Outlook for more details.
ExxonMobil’s demand forecast to 2040, estimated natural reservoir depletion, supply shortfall in 2040 with more development
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**

*Source: U.S. Department of Energy.*
70% of Current Oil Use Cannot Currently be Replaced by Renewable Energy

Source: IEA (2014)
U.S. energy consumption by source and sector, 2019
(Quadrillion Btu)

Source

- Petroleum: 36.7 (37%)
- Natural gas: 32.1 (32%)
- Renewable energy: 11.5 (11%)
- Coal: 11.3 (11%)
- Nuclear electric power: 8.5 (8%)

Total = 100.2

End-use sector

- Transportation: 28.2 (37%)
- Industrial: 26.3 (35%)
- Residential: 11.9 (16%)
- Commercial: 9.4 (12%)

Total = 75.9

Electric power sector

- Electricity retail sales: 12.8 (35%)
- Electrical system energy losses: 24.3 (55%)

Total = 37.1

*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.

* 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.

* 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.

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

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Rank</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>United States</td>
<td>6</td>
<td>China</td>
</tr>
<tr>
<td>2</td>
<td>Russia</td>
<td>7</td>
<td>Qatar</td>
</tr>
<tr>
<td>3</td>
<td>Saudi Arabia</td>
<td>8</td>
<td>United Arab Emirates</td>
</tr>
<tr>
<td>4</td>
<td>Iran</td>
<td>9</td>
<td>Kuwait</td>
</tr>
<tr>
<td>5</td>
<td><strong>Canada</strong></td>
<td>10</td>
<td>Iraq</td>
</tr>
</tbody>
</table>

Crude oil, natural gas, natural gas liquids

98% of oil consumed, 95% of oil produced outside of Canada
## Oil Sands Increasingly Competitive

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production, Millions of Barrels Per Day</strong></td>
<td>2.0</td>
<td>2.4</td>
<td>2.4</td>
<td>2.7</td>
<td>2.9</td>
</tr>
<tr>
<td><strong>Operating Costs, Billions of Dollars</strong></td>
<td>$24.3</td>
<td>$21.9</td>
<td>$20.1</td>
<td>$18.6</td>
<td>$21.8</td>
</tr>
<tr>
<td><strong>Cost Per Barrel</strong></td>
<td>$33.9</td>
<td>$25.1</td>
<td>$22.8</td>
<td>$19.0</td>
<td>$20.5</td>
</tr>
</tbody>
</table>

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

Source: CAPP Crude Oil Forecast April 2020
## New Pipelines – Perhaps...

<table>
<thead>
<tr>
<th>Name</th>
<th>Distance Km</th>
<th>In Service</th>
<th>Capacity B/D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enbridge Line 3</td>
<td>1,659</td>
<td>2021</td>
<td>370,000</td>
</tr>
<tr>
<td>Trans Mountain</td>
<td>1,184</td>
<td>2022</td>
<td>590,000</td>
</tr>
<tr>
<td>Keystone XL</td>
<td>1,897</td>
<td>202?</td>
<td>830,000</td>
</tr>
</tbody>
</table>

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

CAPP: 2019 Oil Markets Forecast
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

<table>
<thead>
<tr>
<th>Country</th>
<th>GJ</th>
<th>toe</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>285</td>
<td>6.8</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>268</td>
<td>6.3</td>
</tr>
<tr>
<td>Russia</td>
<td>218</td>
<td>5.3</td>
</tr>
<tr>
<td>Australia</td>
<td>214</td>
<td>5.1</td>
</tr>
<tr>
<td>OECD Average</td>
<td>173</td>
<td>4.2</td>
</tr>
<tr>
<td>China</td>
<td>93</td>
<td>2.3</td>
</tr>
<tr>
<td>World</td>
<td>72</td>
<td>1.7</td>
</tr>
<tr>
<td>Brazil</td>
<td>58</td>
<td>1.4</td>
</tr>
<tr>
<td>Non-OECD Average</td>
<td>51</td>
<td>1.2</td>
</tr>
<tr>
<td>India</td>
<td>29</td>
<td>0.7</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>16</td>
<td>0.4</td>
</tr>
</tbody>
</table>

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

**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

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

- 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
FROM MIRACLE TO MENACE
Alberta, A Carbon Story

• Alberta
• Our industry
• Climate change
• Our future

www.miracletomenace.ca