

Fighting Climate Change: Can We Humans Regulate Earth's Climate? A Summary Of The Current Situation

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Canadians for Sensible Climate Policy

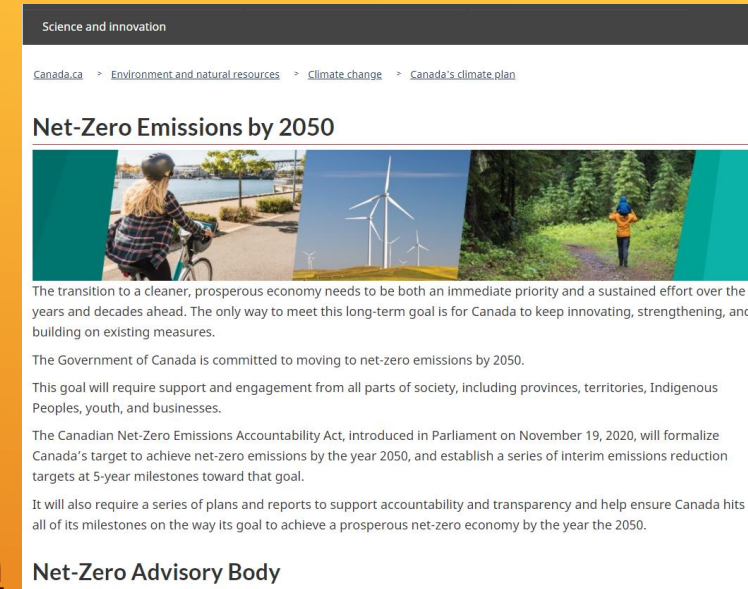
CSCP-CPCR

Canadiens pour une politique climatique raisonnable



CANADA'S QUEST TO BE A CLIMATE LEADER

- ▶ Canada has made a Net Zero 2050 commitment.
- ▶ Recent federal legislation has been imposed without cost-benefit analysis or due diligence on current climate science knowledge.
 - ▶ Canadian government introduced the Greenhouse Gas Pollution Pricing Act of Canada (2018-06-21) ("GHG Act").
 - ▶ As the GHG Act was part 5 of the Budget Implementation ACT, 2018 No.1 the economic and scientific justification was not fully debated in the House of Commons.
 - ▶ Canadian government adopted the Canadian Net-Zero Emissions Accountability Act (Bill C-12) on November 19, 2020, which defined what previously had become law by default



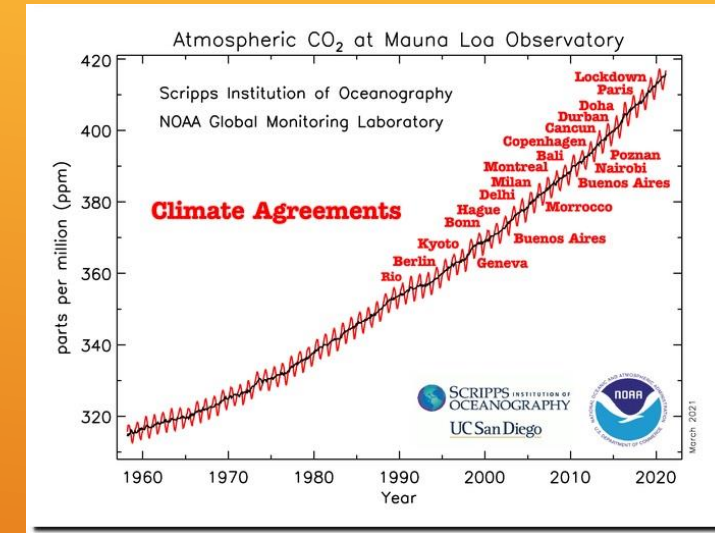
NET ZERO – WHAT DOES IT MEAN?



- ▶ “Net Zero” - carbon dioxide (CO₂) component of GHGs released from fossil fuel use and human activity must be removed to stop global warming and to prevent extreme weather.
- ▶ Carbon taxes and carbon trading markets are presented as a means to offset the continued use of fossil fuels, while applying emissions limits (caps) on certain industries.
- ▶ Industries that emit below their cap or services that provide a carbon “sink” (e.g. newly “protected” old growth forest) can then sell their “excess” to capped industries until that industry has time to implement its own net zero technology.
- ▶ To make this viable, a price on carbon must be established.
- ▶ The tax creates a penalty to the large emitter to force them into carbon trading, and offers a financial benefit to a low emitter.

WHAT IS THE PAST PROGRESS ON EMISSIONS REDUCTIONS?

- ▶ Almost 30 years ago the United Nations Framework Convention on Climate Change (UNFCCC) was established.
- ▶ At that time the rate of temperature rise and the rate of carbon dioxide emissions from human industrial activity appeared to have been moving in lockstep rise since the 1970s.
- ▶ The UNFCCC was formed to have unified global action to enact national policies to create a *“stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”* That was the assumption at the time.
- ▶ The main greenhouse gas seen as the problem was carbon dioxide (CO₂ – referred to as ‘carbon’ today). The main source was seen as industrial activity and the burning of fossil fuels.
- ▶ 30 years and 25 “COP” – Conference of the Parties” meetings later, emissions continue to rise.



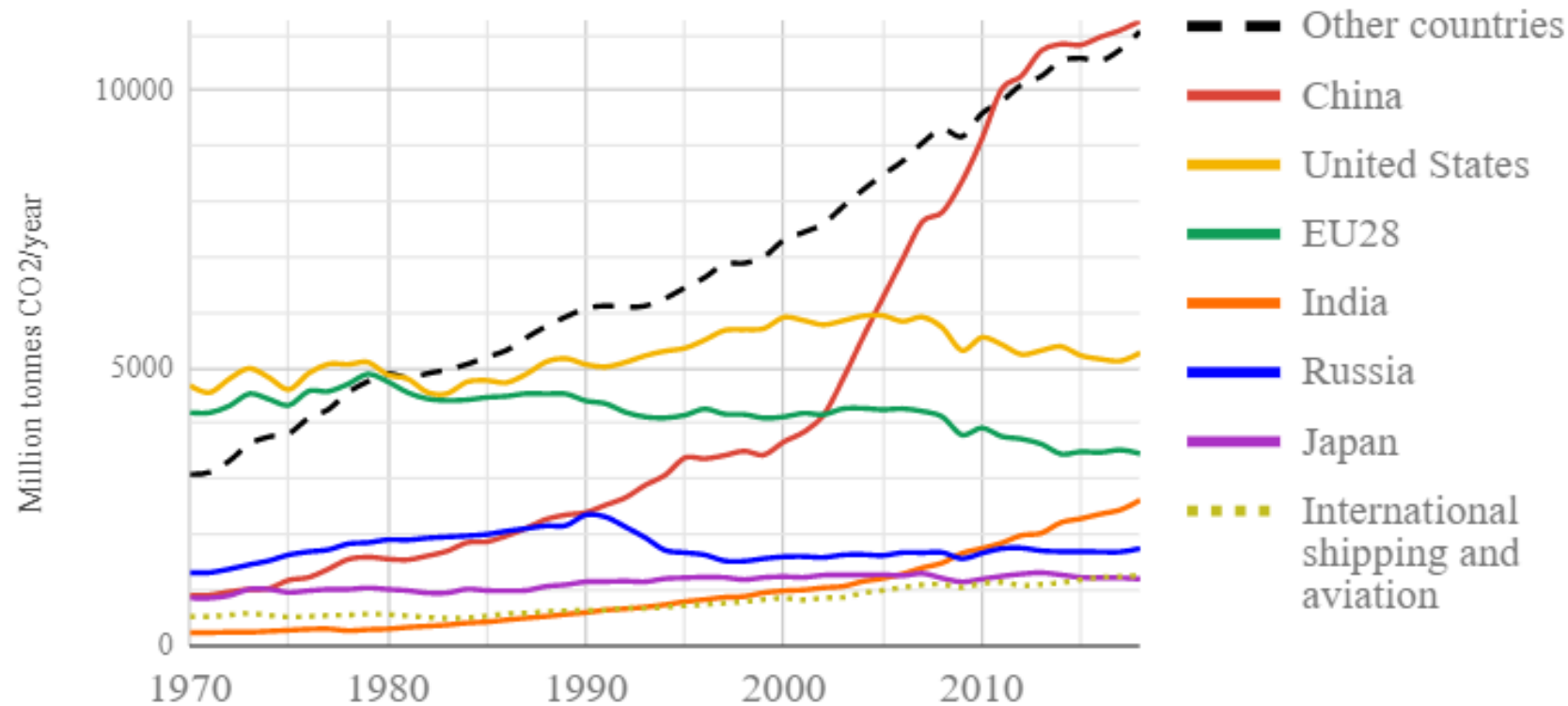
4540 YEARS OF GLOBAL TEMPERATURE CYCLES

EVIDENCE THAT CLIMATE AFFECTS CIVILIZATIONS



THE LARGEST EMITTERS ARE: CHINA, USA, EU28, AND INDIA

World fossil carbon dioxide emission 1970-2018



Canadian GHG emissions constitute a tiny part of global GHG emissions

In 2019, Canada carbon dioxide (CO₂) emissions were 556 megatonnes (Mt) which is equal to 1.6 per cent of global emissions.

China's CO₂ emissions in 2019 were 9,826 Mt (according to British Petroleum data). In other words, China emits in one month (819 Mt/month) about what Canada emits in one and a half years. The average growth in emissions in China over the past decade is 212 Mt per year. Thus, Canada's annual CO₂ emissions represent only 2.6 times China's emissions *growth*. **If someone could instantaneously wipe Canada off the map, so that it produced zero emissions forever after, this would have a modest-to-negligible effect on global carbon dioxide concentrations in the atmosphere in 2100, and it would make no difference whatsoever as to whether the IPCC emissions reduction targets (i.e. 1.5 degrees or 2 degrees C.) were met.**

Let that sink in.



CHINA EMITS IN ONE MONTH (819 MT/MONTH)

ABOUT WHAT CANADA EMITS IN ONE AND A HALF YEARS



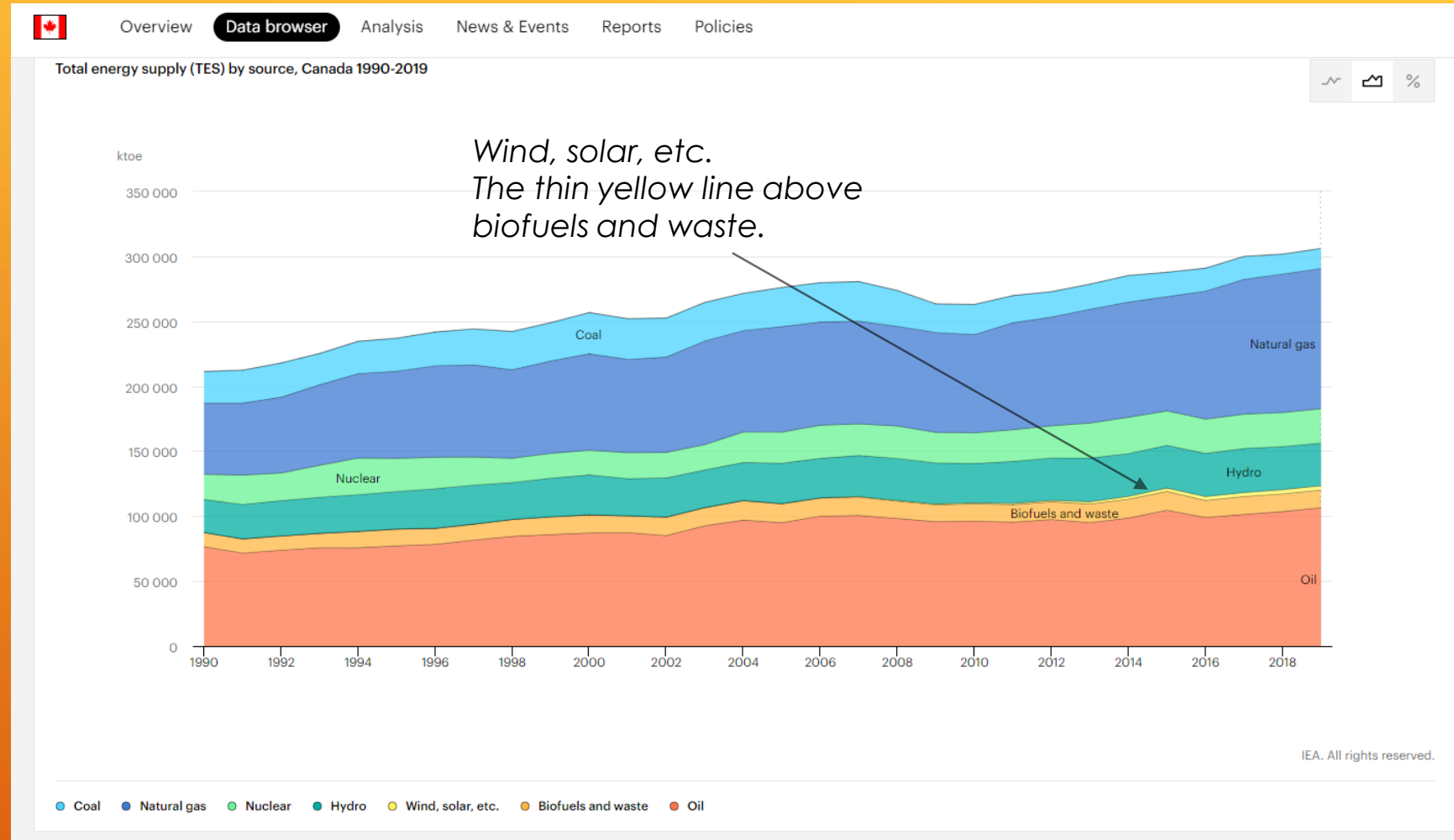
CONFLICTING GOALS ON CLIMATE AND IMMIGRATION

- ▶ Climate activists constantly denounce Canada for missing targets while simultaneously calling for 'climate justice' for the people of the world, especially immigrants.
- ▶ Canada's fertility rate is only 1.4 children per female (this is below replacement level).
- ▶ Immigrants from tropical or temperate low per-capita emissions countries like India, China and the Philippines, become high per-capita emissions citizens in Canada.
- ▶ According to the World Bank, per capita CO₂ emissions in Canada from 2009 to 2018 have been between 15 and 16 tonnes. Canada has embarked on the "Century Initiative" to add another 63 million people to our population.



CANADA – NET ZERO BY 2050?

- ▶ NetZero would mean phasing out all coal, natural gas and oil, and replacing it within 29 years with electrification by wind and solar; or hydrogen, geothermal, or tidal power, none of which are market ready or have suitable infrastructure.

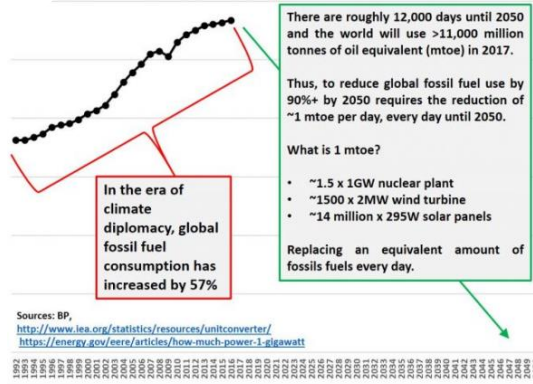


- ▶ Past transitions from wood-coal, coal-natural gas, etc., have taken 70-100 years. Wind and solar are ancient technologies, formerly abandoned in favour of high energy-dense, portable + transportable fossil fuel energy

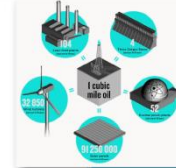
CAN THE WORLD ACHIEVE NET ZERO BY 2050?

► <https://blog.friendsofscience.org/wp-content/uploads/2020/06/WHY-RENEWABLE-ENERGY-CANNOT-REPLACE-FOSSIL-FUELS-BY-2050-FINAL-2.pdf>

Global Fossil Fuel Consumption



Why Renewable Energy Cannot Replace Fossil Fuels By 2050



Robert Lyman
 @Friends of Science Society (R) 020100
 6/18/2020

To produce this number of panels, it would take 929 years, assuming they could be built at the rate of one per second. The estimated cost of this, including the costs of the panels, the battery modules, the materials, electronic controls and transformers, land acquisition and equipment changes over 20 years is U.S. \$15.93 trillion.

Robert Lyman

To Get Wind Power You Need Oil

Each wind turbine embodies a whole lot of petrochemicals and fossil-fuel energy

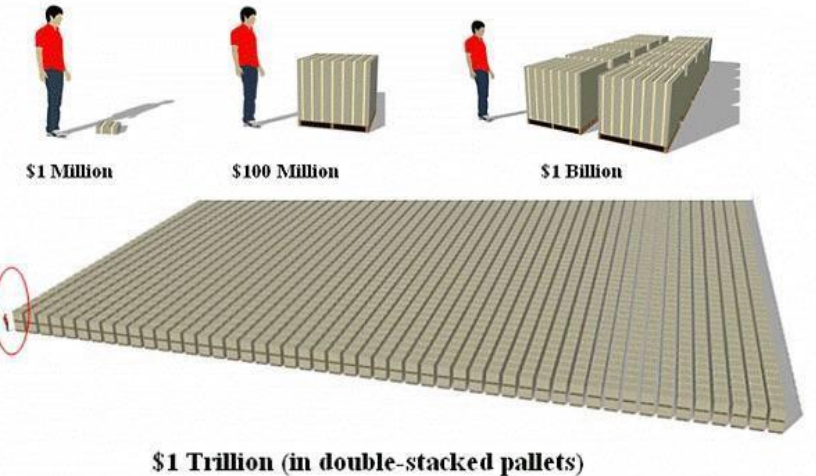
By Vasek Smil



Illustration: David Page

Wind turbines are the most visible symbols of the quest for renewable electricity generation. And yet, although they exploit the wind, which is as free and as green as energy can be, the machines themselves are pure embodiments of fossil fuels.

Large trucks bring steel and other raw materials to the site, earth-moving equipment beats a path to otherwise inaccessible high ground, large cranes erect the structures, and all these machines burn diesel fuel. So do the freight trains and cargo ships that convey the materials needed for the production of cement, steel, and plastics. For a 5-megawatt turbine, the steel alone averages [pdf] 150 metric tons for the reinforced concrete foundations, 250 metric tons for the rotor hubs & nacelles (which house the gearbox and generator), and 500 metric tons for the towers.



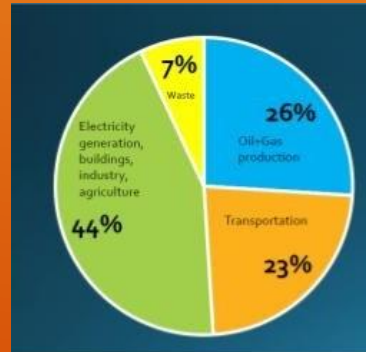
SOCIAL AND ECONOMIC FACTORS

Will the Paris Climate Accord Work?

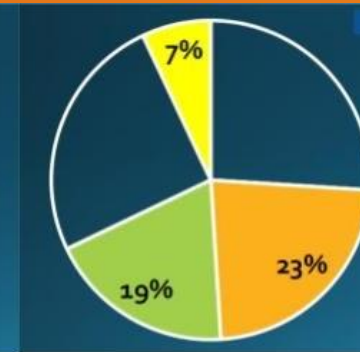
- ▶ The world's largest greenhouse gas (GHG) emitters are now the developing nations, and they are far more interested in making reliable and affordable energy available to their citizens than in "saving the world from climate change." It is only the OECD countries (Canada, the US, the UK, Australia, New Zealand, and the European Union) who seem intent on committing economic suicide.

Is Net Zero Possible?

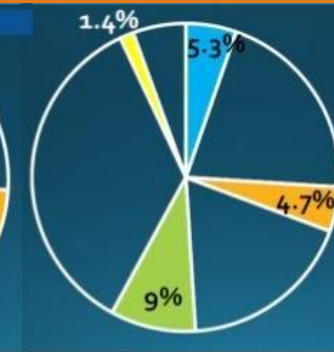
- ▶ The goal of achieving "net zero" is not achievable in Canada with any current or on-the-horizon technology unless Canadians sacrifice their social and economic well-being.



2014 ratios of emissions and sources in Canada



Canadian gov't committed to attain a 50% reduction from 2005 level by 2050



Canadian gov't notionally committed to an 80% reduction in GHGs



The result? The end of Canada as we know it today. Back to the Future 1930s.

DECARBONIZE TO STOP CLIMATE CHANGE?

Can Electricity Replace Fossil Fuels?

- ▶ *The technologies to replace fossil fuels with reliable and affordable electricity do not yet exist. The conversion of heating, cooking, transportation, and industrial systems from fossil fuels to electricity would require truly enormous investments by homeowners, businesses, and taxpayers. Hydrogen can play a role in niche applications, but its physical characteristics make it wholly unsuitable as a replacement for natural gas or petroleum products*

Can We Succeed In Fighting Climate Change?

- ▶ *Climate change is affected by powerful, unpredictable natural factors; though human emissions and activity contribute to climate change, we are a small part of a complex climate picture. Earth's climate has been changing for many millions of years and it will continue to change even if we stop burning fossil fuels. What we can do is adapt to extreme weather as we have successfully done to date (central heating, grid-scale electricity, insulated homes, dams etc.).*

SHOULD ACTIVISTS OR REALISTS LEAD THE WAY?

Should We Let Climate Activists Hijack Capitalism?

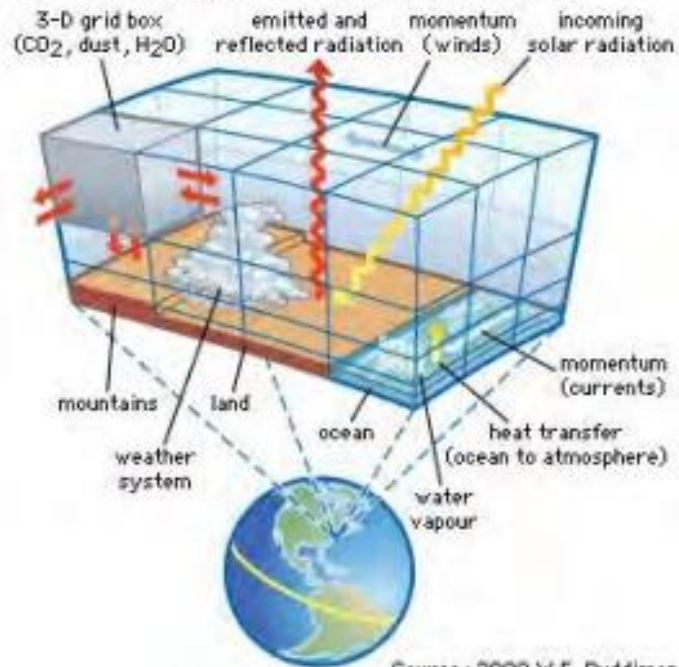
- ▶ *There is no reason whatsoever to suppose that governments and unelected bureaucrats can design, build, and operate Canada's existing and future energy systems (through tax-subsidized schemes, incentives, bureaucratic agencies or Crown Corporations) more economically or more reliably than the private sector can.*

Conclusions about Economic and Social Factors

- ▶ *We show that the aspirational slogans, like Net Zero 2050, advocated by the Environmental Interventionists are unachievable in the demanded timeframe. The proponents claim their policies mitigate against extreme climate/weather but have not demonstrated that such action is necessary or effective. On behalf of their citizens, political leaders in the OECD countries have a duty to re-examine the climate science in open debate.*

The entire premise relies on the theory that human-made carbon dioxide causes significant and dangerous global warming. That means, if carbon dioxide goes up, so should global temperatures.

Concept diagram of climate modeling



UNFCCC WAS FORMED 30 YEARS AGO

Our understanding of climate science has changed a lot in that time but we still rely on outdated science.

Climate 'models' (computer simulations) are used to project future temperatures; climate policies, like carbon taxes are set based on these models.

Even the IPCC says long-term prediction of climate is not possible.

"In climate research and modelling, we should recognize that we are dealing with a coupled non-linear chaotic system, and therefore that long-term prediction of future climate states is not possible."

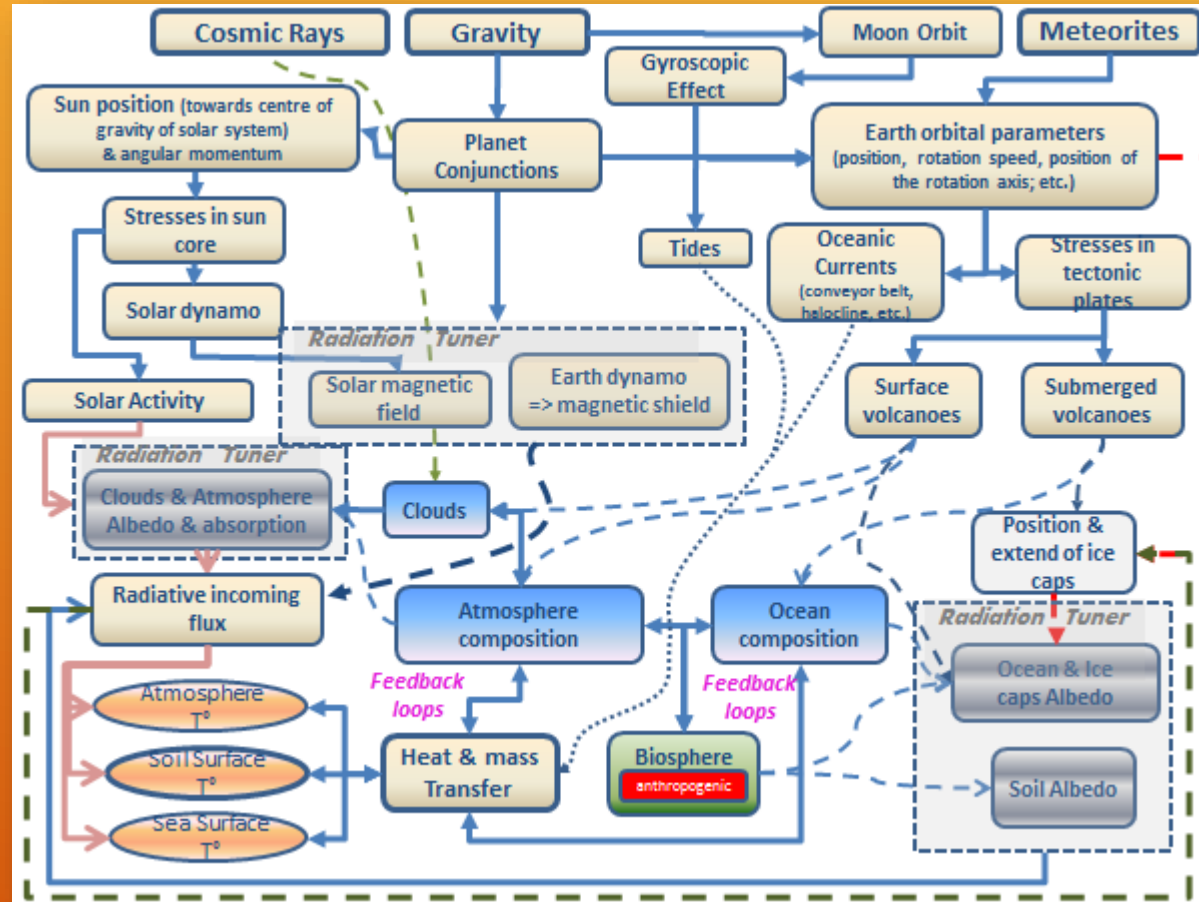
~ The Intergovernmental Panel on Climate Change ~
(IPCC)

Third Assessment Report (2001)
Section 14.2.2.2, page 774

A COUPLED NON-LINEAR CHAOTIC SYSTEM

Henri Masson

<https://www.portoconference2018.org/>



LET'S REVIEW THE CLIMATE SCIENCE



Can Carbon Taxes Control Weather and Climate?

- ▶ Fuel use is essential for modern society and therefore 'inelastic' – a carbon-tax driven price increase does not reduce consumption. Carbon dioxide (CO₂) is only one small element in the extremely complex climate system and is not the singular 'control knob' on climate.



Is Climate Science Settled and No Further Debate is Necessary?

- ▶ Climate scientists with dissenting views have been shut out of the media. Recent research reveals that most alarmist peer-reviewed climate studies rely on an implausible emissions scenario and outdated science. The most advanced climate models (simulations) run far 'too hot', that is, they exaggerate the effect of carbon dioxide on temperature. Something is wrong with the models. Likewise, research into the Sun's role in climate has progressed, showing it to be a more influential factor than carbon dioxide.

Columbia Journalism Review runs the "Covering Climate Now" project where 400 media outlets reaching 2 bn people report only on climate catastrophe themes.



CARBON DIOXIDE LEVELS ARE LOW – NET ZERO POLICIES ARE UNSCIENTIFIC

Can we live without CO₂?

- ▶ *If the level of atmospheric CO₂ were to fall below 150 ppm (~38% of present day), all terrestrial plants would die. All terrestrial life would follow soon thereafter.*



Is CO₂ Causing Extreme Weather Events or Rising Sea Levels?

- ▶ *While there are credible theoretical and observational studies showing that human CO₂ emissions have contributed to a slight warming of the planet since the mid-1800s, there is no credible link between those emissions and extreme weather or rising sea levels.*



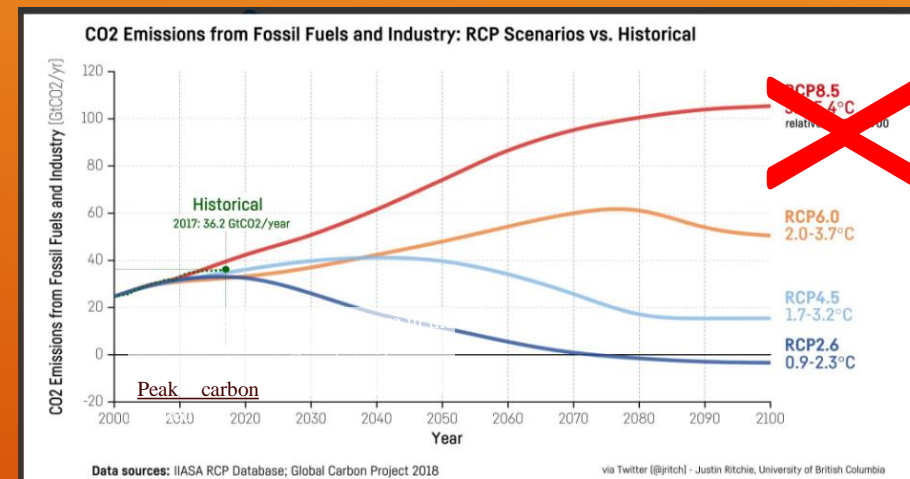
CLIMATE EMERGENCY IS OVER - WE DO HAVE TIME

Lack of Scientific Rigour

- ▶ A recent study shows that the IPCC did not properly account for the Total Solar Irradiance (TSI) effect on northern hemisphere temperatures.
- ▶ The IPCC mandate is to assess human-caused climate change so natural factors like solar influence are given short shrift in their reports.
- ▶ Dr. Richard Lindzen, one of the world's most foremost climatologists, points out that assigning CO₂ the lead role in climate change creates an oversimplified picture of a complex system
- ▶ The sensible environmentalist, Patrick Moore, co-founder of Greenpeace and now outspoken advocate for common sense on climate and energy policies, says that the biggest danger is running out of CO₂.

Implausible Scenario Drives “Climate Emergency” Claims

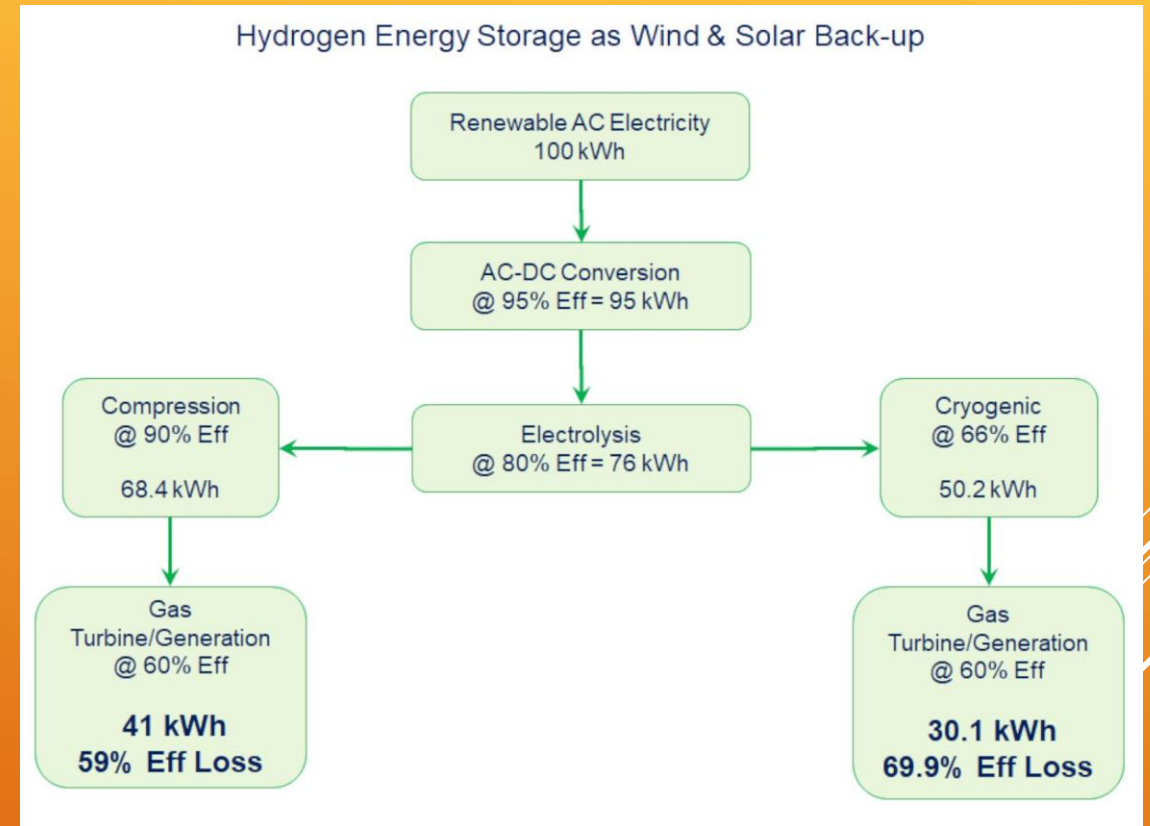
- ▶ The COP conferences are mired in understandings that rely on outdated science as recently discovered by Roger Pielke, Jr. and Justin Ritchie. This is why open, civil debate on these matters is crucial, yet it is not happening. Climate laws and policies are being made based on outdated science and global demographics and geopolitics.



WHAT OF NEW CLEAN TECHNOLOGIES?

Hydrogen

- ▶ Hydrogen is touted almost universally in Net Zero 2050 plans as the replacement for natural gas, gasoline, and even jet fuel.
- ▶ Hydrogen can be produced through electrolysis processes which many believe can be powered by wind and solar, and through the production of hydrogen, it thus becomes 'the battery'. This is unproven at any great scale and the processes involve 30-70% repetitive energy losses.
- ▶ Though the most common element on earth, hydrogen (H_2) is the smallest molecule, it readily leaks from containment vessels, is highly explosive and easily ignited by static electricity alone.



To produce hydrogen, large amounts of energy must be used to convert/capture and compress it, leading to some 30-70% energy losses.

This is not sustainable for a modern industrialized society.

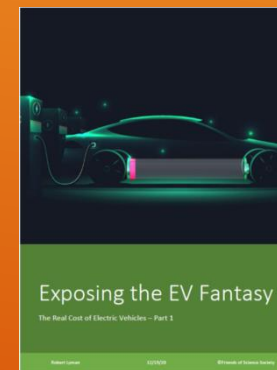
ELECTRIC VEHICLES? EAST-WEST POWER GRID?

Electric Vehicles

- ▶ EV penetration in North America is nominal (3% of Canada's light vehicle sales; 2% of US) and will continue to be so, largely due to vast distances, extreme weather conditions
- ▶ In Canada, other than hybrid vehicles, Battery Electric Vehicles (BEV) face challenges of vast distances, a limited network of chargers, and temperature extremes.
- ▶ An energy conversion analysis vis a vis vehicle use to electric power requirements and found that Canada would need to build 10,000 MW of additional power generation to serve the EV policy of 2019. (approx. 8-10 additional Site C or Muskrat Falls dams.
- ▶ Both are years behind in completion and billions of dollars over budget.
- ▶ To build **just one such project a time horizon of 20-30 years is required.** There is not one new major power generation project on the table at present in Canada.

East-West Power Grid

- ▶ In addition to the power plants, related infrastructure like high voltage transmission lines, large custom built sub-station transformers, and related integration technologies would be required.
- ▶ Land acquisition for rights-of-way for high voltage power lines can take decades. Likewise, in terms of public resistance, **the only thing that activists hate more than pipelines is power lines.**

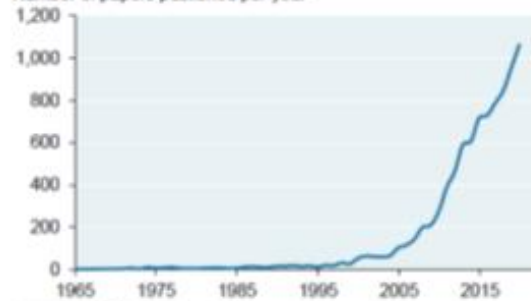


CARBON CAPTURE AND STORAGE AND DIRECT AIR CARBON CAPTURE?

Carbon Capture and Storage

- ▶ After 20 years of planning, subsidies, and political promotion, by the end of 2020 carbon capture and storage facilities stored just 0.1% of global CO₂ emissions.

Academic papers on carbon capture
Number of papers published per year



Source: PubMed, 2020.

Princeton CCS proposal for the US

Buildout = 850 million tonnes of CO₂ stored per year via 65,000 miles of pipeline infrastructure
Supercritical CO₂ storage = 800 kg/m³
Supercritical CO₂ stored per year = 1.1 billion m³
US annual oil production
2019 = 746 million tonnes distributed and refined across 190,000 miles of pipelines
Density of oil = 1.15 m³ per tonne
US annual oil production = 858 million m³

It should be noted that, after 20 years of planning, subsidies, and political promotion, by the end of 2020 carbon capture and storage facilities stored just 0.1% of global CO₂ emissions.

Direct Air Carbon Capture

- ▶ Electrolysis required to produce the caustic soda (NaOH) would consume 25%-40% of world electricity, and hydroxide regeneration (used to reduce NaOH requirements by regenerating and reusing most of the reactant) would claim another 11%-17% of global primary energy.
- ▶ Putting both pieces together, NaOH electrolysis plus regeneration would require 15%-24% of global primary energy to capture 25% of CO₂ emissions.
- ▶ A last nail in the coffin: 2,400 – 3,800 kWh per tonne of captured CO₂ via DACC would be needed before whatever energy is required to actually store the CO₂ underground; DACC energy needs appear to be 6x10x higher than traditional CCS energy estimates, a process which itself is stuck in neutral."

ELECTRIFY INDUSTRIAL PROCESSES?

Decarbonize Industry

- ▶ The central issue is cost.
- ▶ The industries that do not rely primarily on process heat use two and half times as much energy as the ones that do. J.P. Morgan estimates that, in addition to upfront switching costs, industrial companies would face costs per unit that are three to six times higher for electricity than for natural gas.
- ▶ Companies in the OECD, if forced to assume these costs, would almost certainly move their operations elsewhere

Making Companies Uncompetitive

Industrial sectors with high electrification potential

Sector	Heat requirement	Fuel consumption shares:		
		HVAC	Heat	CHP
Primary metals ex. steel	1200°C	6%	75%	7%
Fabricated metal	430°C-680°C	20%	61%	7%
Machinery	730°C	46%	39%	4%
Secondary steel	1425°C-1540°C	4%	87%	0%
Wood products	180°C	10%	50%	14%
Vehicle parts (drying)	150°C	31%	33%	12%
Plastics and rubber	260°C	20%	33%	24%

Source: LBNL, "Electrification of buildings and industry", March 2018.

Industrial sectors with medium/low electrification potential

Sector	Heat requirement	Fuel consumption shares:		
		HVAC	Heat	CHP
Food/beverages	120°C-500°C	4%	25%	40%
Chemicals	100°C-850°C	1%	32%	43%
Pulp and paper	650°C	2%	21%	63%
Non-metallic minerals	870°C-1600°C	3%	90%	1%
Oil/coal products	220°C-540°C	0%	58%	22%

Source: LBNL, "Electrification of buildings and industry", March 2018.

The challenge: low/medium electrification potential sectors use 2.5x the energy as high potential sectors. Even if we assume that all sectors are eventually electrified using new technologies²⁶, there's still a large increase in cost. In addition to upfront switching costs, industrial companies would face costs per unit of energy that are **3x-6x higher for electricity than for direct natural gas**. Electric heating efficiency gains vs combustion could offset part of this cost, but not all of it.

CANADA IS A CLIMATE “LEADER” WITH NO FOLLOWERS NET ZERO 2050 – NOT POSSIBLE

Promises vs Performance

The Top 10 plus EU

Table 1 lists the countries that are the ten largest carbon dioxide emitters in the world, as well as the European Union, whose members tend to set joint policy on emissions reduction, along with data showing trends over the past decade. The emissions are listed in terms of megatonnes (Mt):

Table 1
Carbon Dioxide Emissions Trends

<u>Country/Group</u>	<u>2008(Mt)</u>	<u>2018(Mt)</u>	<u>Change (Mt)</u>	<u>Change (%)</u>
China	7379	9429	2050	28
USA	5676	5145	-531	-9
European Union	4149	3479	-670	-16
India	1467	2479	1021	69
Russia	1554	1551	-3	-0.2
Japan	1275	1148	-127	-10
South Korea	558	698	140	25
Iran	504	656	152	30
Saudi Arabia	424	571	147	35
Canada	545	550	5	1
World	30,337	33,891	3554	12

Source: BP Statistical Review of World Energy 2019

AP China, India miss UN deadline to ... Hurricane Ida Afghanistan Coronavirus pandemic Politics Sports Entertainment
China, India miss UN deadline to update emissions targets
By FRANK JORDANS July 31, 2021



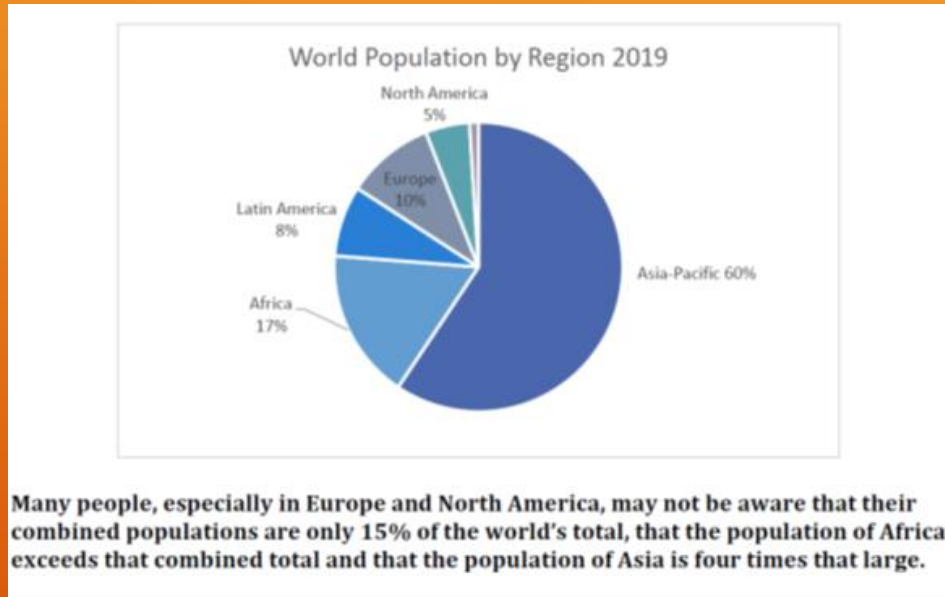
China / Diplomacy
China ‘tells US envoy John Kerry it will follow its own climate road map’
• Source says the two sides failed to reach agreement and China has its own plans on climate matters
• Beijing describes discussions about addressing climate change as ‘candid, in-depth and pragmatic’
Catherine Wong Published: 11:51pm, 3 Sep, 2021



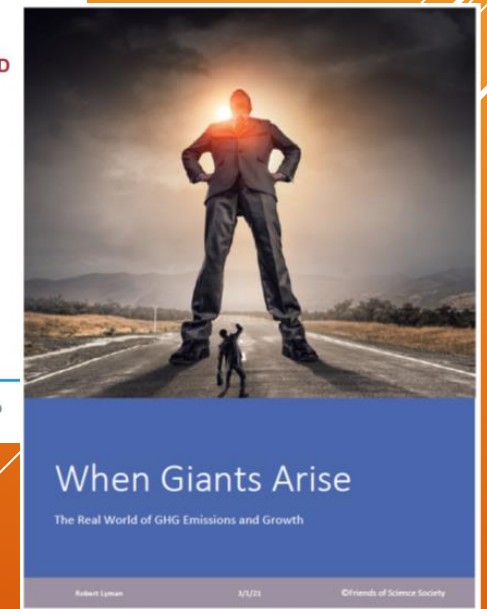
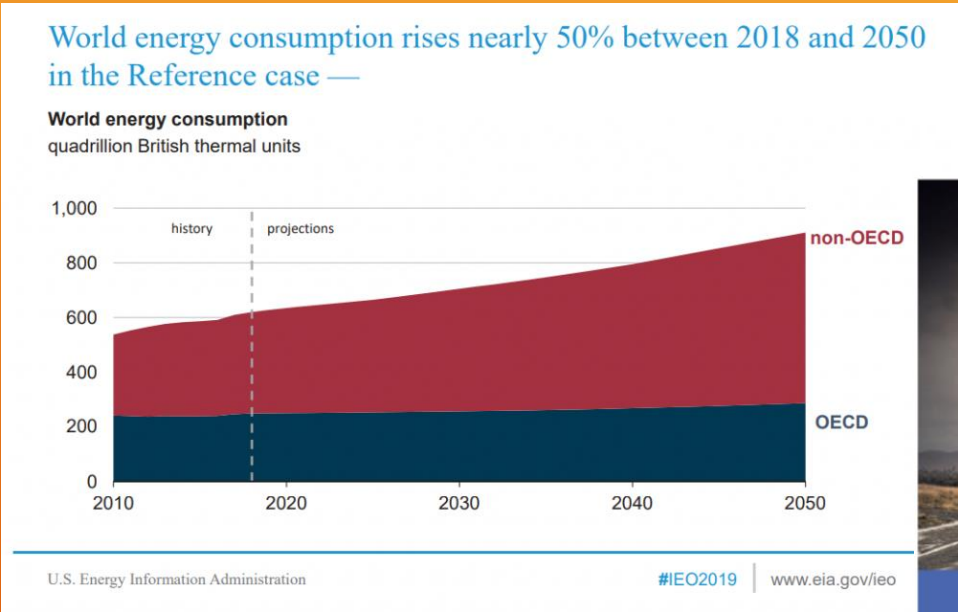
GLOBAL REALITIES

EMERGING NATIONS WILL NOT SACRIFICE FUTURE GROWTH

Population of Climate-addled West is Outnumbered by Emerging Nations



Energy Demand will Continue to Rise in Emerging Nations – OECD Demand has Flatlined for Decades



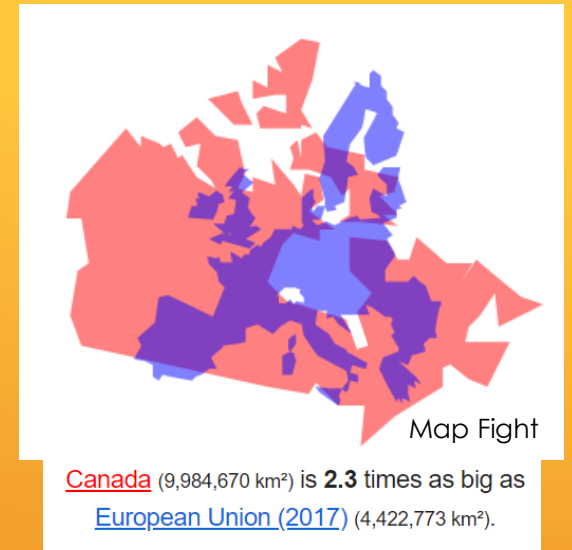
A MADE-IN-CANADA PROPOSAL FOR A PRUDENT WAY FORWARD

Net Zero is a Global Plan

- ▶ As shown, no reasonable cost-benefit analysis, actuarial loss assessment, or probability analysis has been done on the Net Zero 2050 plans – though the various numbers shared in this report make it clear that Net Zero 2050 will be devastating to the Canadian economy and other OECD countries.
- ▶ These plans will turn citizens' lives upside down – for no benefit to the climate, the environment or any economy.
- ▶ It is clear that reducing carbon dioxide (CO₂) will not 'stop climate change' and may harm life itself.
- ▶ Canada is a nation rich in resources and potential.
- ▶ Net Zero 2050 climate policies will destroy us.

Canada has Unique Challenges

- ▶ As Canadians have done for decades, adaptation to climate and weather events will be the key to addressing either global warming or global cooling. S.M.A.R.T. – Specific, Measurable, Achievable, Realistic and Timely plans can be made on this basis with measurable results and tangible outcomes, rather than NetZero ideologies that are unrealistic and cannot be achieved, certainly not by 2050.
- ▶ Professor Ross McKittrick has outlined an interesting means of assessing climate mitigation measures that would be triggered by temperature change. Read the report.



FIGHTING CLIMATE CHANGE: CAN WE HUMANS REGULATE EARTH'S CLIMATE?

<https://blog.friendsofscience.org/2021/09/07/fighting-climate-change-can-we-humans-regulate-earths-climate/>

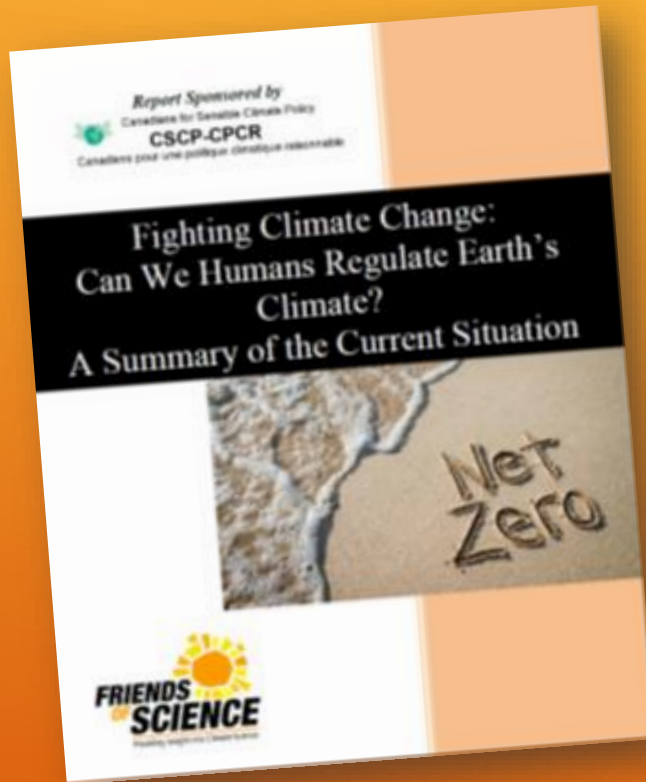
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Friends of Science Society 18th Annual Climate Science Event

Politicians Can't Stop Climate Change



Dr. Guus Berkhout
President CLINTEL

**Climate Science:
Let the Data Speak**

**October 2, 2021
10:00AM MDT**



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► **About**

- Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens that is celebrating its 19th year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO₂).

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