A Brief to the Standing Senate Committee on Energy, the Environment and Natural Resources Regarding the Causes and Consequences of Bill C-69

By: E. David Day, Ph.D., MBA
5633 Dalcastle Hill NW
Calgary, AB T3A 2A2
Ph: 403-288-5460
E-mail: davidday@telus.net

Summary of Main Points:

1. The Bill C-69 is a response to concern for cataclysmic consequences of Man-made Climate Change, primarily Global Warming, attributed to carbon dioxide.

2. Through photosynthesis and the Carbon Cycle, carbon dioxide is responsible for our entire food supply (animal and vegetable) and the re-supply of "new"/replacement oxygen that we need to breathe. Carbon dioxide is not a pollutant.

3. As every consumer of carbonated drinks knows, carbon dioxide (an acid gas) dissolves in water. The solubility decreases as the water temperature rises ("elementary solution chemistry"). With rising global temperatures, the carbon dioxide holding capacity of the World’s oceans is reduced.

4. According to the US government, the World’s oceans contain 60 times as much dissolved carbon dioxide as there is in the atmosphere, in dynamic exchange with the atmosphere ("equilibration"). The consequence of this is that only 1/60th of additions (man-made or otherwise) to the atmosphere remain in the atmosphere, the rest is dissolved in ocean waters ("Nature’s Carbon Capture").

5. Organisms in the oceans utilize the dissolved carbon dioxide to form clam shells, exoskeletons of crustaceans, corals, fish bones, etc. (Natural “Sequestration”). Paleolithic evidence of this sequestration is in the limestone (calcium carbonate) of the Rocky Mountains, dolomites of the Western Sedimentary Basin (magnesium carbonate), the Austin Chalks, the White Cliff of Dover, etc.

6. It is consistent with "elementary" solution chemistry that warming oceans release more carbon dioxide into the atmosphere, i.e., Global Warming results in elevated levels of carbon dioxide in the atmosphere, not that carbon dioxide "causes" Global Warming. It can be shown (by me) that all the increase in atmospheric carbon dioxide from 1957 to 2018 can be accounted for by an increase in average ocean water temperature by +0.16 deg. C (without reference to human causes).

7. Reduced concentrations of an “acid” gas in the World’s oceans should be expected to result in less acid water, not more acid (as claimed by Alarmists).

8. Both polar bears and humans have survived the Medieval Warm Period and the earlier times when Greenland was actually "green" (no ice cover), without any reference to man-made causes. In Calgary, we experience temperatures from
minus 30 C (winter) to plus 30 C (summer), which seasonality is reasonably attributed to the Sun.

9. It would appear (to a Physical Chemist), that the Man-made Climate Change concerns motivating Bill C-69 are based upon false premises.

10. As the ex Manager of Economic Planning at Foothills Pipe Lines (Yukon) Ltd., and subsequent involvement with financial services companies and private investing, it is very clear that investors are greatly risk averse. Bill C-69 diminishes the demonstrated expertise of the National Energy Board in cost/benefit analyses and places their good work (and investor money) at the mercy of the Minister of Environment and Climate Change.

11. If such a bill had been in place during the early days of this Country, there would be neither a TransCanada Pipeline nor a cross country railroad.

12. I ask that this Standing Senate Committee on Energy, the Environment and Natural Resources take all the time necessary to become “fully informed” on the science, logic, and consequences of Bill C-69, for the sake of all Canadian children and grandchildren.
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The Science of Carbon Dioxide

As part of the “Carbon Cycle”, through photosynthesis, atmospheric carbon dioxide is the sole source of new/replacement oxygen that we need to breathe (one molecule of CO$_2$ produces one molecule of O$_2$). Similarly, through photosynthesis, our entire food supply (animal and vegetable) is dependent upon carbon dioxide. Needless to say, carbon dioxide is essential to our survival.

In Calgary, Alberta, we accommodate “seasonal” temperature changes from, say, +30 C (summer) to -30 C (winter) for a 60 C temperature range, which is due to the Sun. The +2 C “drift” in “average” global temperatures is attributed, by alarmists, to carbon dioxide (currently a “trace” gas at 411.75 ppm, parts-per-million, by volume in the atmosphere). Carbon dioxide is a much poorer “green house gas” than water vapour (by a factor of ~160; see thermodynamic analysis: http://www.biocab.org/HeatStored.html). Water vapour (at 1% or 10,000 ppm, by volume in the atmosphere) is particularly prevalent over the oceans that cover three-quarters of the surface of our planet.

A recent publication by NASA suggests that carbon dioxide actually contributes to “Global Cooling”:


There are fossils of palm trees in the high Arctic and evidence of a previous Ice Age that had little to do with the activities of Man.

Meaningful, unbiased/objective, “hard” sources of global data regarding sources of carbon dioxide can be difficult to find in a format suitable for comparison purposes. The site http://www.planetseed.com/relatedarticle/carbon-dioxide-sources provides an excellent list of “sources”, but ignores the contribution of “natural” forest and grass fires. A more complete list is as follows:

"Natural" Sources of Carbon Dioxide

1. Respiration (plant and animal, unquantified)
2. Decay (plant and animal, unquantified)
4. Forest & grass fires (unquantified)
5. Increase/decrease of carbon dioxide dissolved in ocean water (see analysis below).

"Man-made" Sources of Carbon Dioxide

6. Fossil fuel combustion (natural gas, petroleum, and coal: see IPCC estimates)
7. Cement production (calcination of limestone, may be included in 6.)
8. Wood combustion (deforestation and fuel wood, unquantified)

According to the US National Oceanic and Atmospheric Administration-Earth System Research Laboratory (NOAA-ESRL), the concentration of CO₂ in the atmosphere (Mauna Loa Observatory), is 411.75 ppm (February 2019), up from 408.32 ppm (February 2018) for an increase of 3.43 ppm or 27 Gtonnes. The decade (2005-2014) showed an average annual increase of 2.1 ppm (16 Gtonnes) per year. The average for the prior decade (1995-2004) was 1.9 ppm (15 Gtonnes) per year. These numbers represent the "real" measured "net" result of all annual contributions (sources and sinks), listed or otherwise. At a total atmospheric concentration of 412 ppm, a 3.5 ppm increase per year represents 0.85% net increase per year, from all sources and sinks.

In the din of shrill, alarmist "Green" rhetoric, real science gets lost in the background and ignored by the media (and now the Government of Canada).

It takes courage to run against the current of "religious" dogma of "Anthropogenic Global Warming", but the real evidence is incontrovertible. Al Gore, David Suzuki, the IPCC, etc., etc. have it exactly backwards, elevated levels of carbon dioxide in the atmosphere are more likely the result of global warming, not the cause. The release of carbon dioxide (man-made) by combustion of hydrocarbons is negligible compared with the potential (and probably actual) release of carbon dioxide from warming oceans. Cause and effect have been "converted" for ideological reasons or just plain ignorance. Any form of "carbon tax", or other related economically damaging policy, is "consequential" damage.

Of the three major "sinks" for carbon dioxide (photosynthesis, dissolving in water bodies, and natural sequestration), the oceans are the largest reservoir of dissolved carbon dioxide on the planet (40 to 60 times the quantity of atmospheric carbon dioxide, i.e., Nature's own "carbon capture"). This enormous carbon dioxide absorptive capacity of the oceans, in active exchange with the atmosphere, means that very little (approximately 1/40th to 1/60th) of any additions to atmospheric carbon dioxide (including "man-made") accumulate in the air to contribute to any "Climate Change". Ocean organisms "sequester" some of the dissolved CO₂ into seashells, corals, exoskeletons of crustaceans (paleolithic evidence in the White Cliffs of Dover, carbonates of the Western Sedimentary Basin, the Austin Chalks, and Rocky Mountains, etc.). When ocean temperatures rise, CO₂ is released into the atmosphere like a carbonated drink going "flat".

The evidence:
1. Background: CO₂ in sea water:
2. (a) Atmospheric CO₂ "lags" Global Warming:
   http://hockeyschtick.blogspot.ca/2013/06/climate-scientist-dr-murry-salby.html
   (b) http://hockeyschtick.blogspot.ca/2013/07/swedish-scientist-replicates-dr-murry.html
3. Spreadsheets to explain current volumes and "lag" can be provided on request.
The spreadsheets are an exercise in "elementary physical chemistry". It is well known (within established science) that the solubility of gases in water (including sea water) decreases with increasing water temperature. The issue then is to determine the release (not rate) of carbon dioxide from sea water with increasing sea water temperatures (average). The rates of release would be dependent upon the mixing efficiency of ocean currents, amongst other dynamic factors (atmospheric and otherwise). The mechanism of point 3 is not to minimize the complexity of the "open system" dynamics, but an exercise of Occam's Razor to simplify the analysis. Refinements can be made later (if and when desired, for rigour). All formulae are accessible so that math can be checked.

If Global Warming/Climate Change is not attributable to accumulating "man-made" atmospheric carbon dioxide, then no amount of effort directed to "control" of man-made carbon dioxide will have any effect whatsoever. Variable output from the Sun acting on atmospheric water vapour and clouds has been identified as a much more likely explanation/driver for Climate Change (variations of "average" global temperatures), due to the enormous absorbed heat of vaporization (phase change) of the liquid/solid water in dissipating clouds. There is no corresponding thermodynamic explanation available to carbon dioxide (no phase changes).

The Reinhold Niebuhr prayer comes to mind:

"God, grant me the serenity to accept the things I cannot change, the courage to change the things I can, and the wisdom to know the difference."
Appendix

CARBON DIOXIDE DISSOLVED (OCEAN)

http://www.soest.hawaii.edu/oceanography/faculty/zeebe_files/Publications/ZeebeWolfE
nclp07.pdf

Solubility of Carbon Dioxide - $CO_2$ - in Water

![Solubility Graph](http://www.engineeringtoolbox.com/)

Terrestrial Atmosphere

Surface pressure: 1014 mb
Surface density: 1.217 kg/m³
Scale height: 8.5 km
Total mass of atmosphere: $5.1 \times 10^{18}$ kg
Total mass of hydrosphere: $1.4 \times 10^{21}$ kg
Average temperature: 288 K (15°C)
Diurnal temperature range: 283 K to 293 K (10 to 20°C)
Wind speeds: 0 to 100 m/s
Mean molecular weight: 28.97 g/mole
Atmospheric composition (by volume, dry air):
  - Major: 78.08% Nitrogen ($N_2$), 20.95% Oxygen ($O_2$),
  - Minor (ppm): Argon (Ar) - 9340; Carbon Dioxide ($CO_2$) - 400
    Neon (Ne) - 18.18; Helium (He) - 5.24; $CH_4$ - 1.7
Krypton (Kr) - 1.14; Hydrogen (H₂) - 0.55
Numbers do not add up to exactly 100% due to roundoff and uncertainty
Water is highly variable, typically makes up about 1%

http://nssdc.gsfc.nasa.gov/planetary/factsheet/earthfact.html
Mass of the Oceans

The Physics Factbook
Edited by Glenn Elert -- Written by his students
An educational, Fair Use website

topic index | author index | special index

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<td>&quot;Area of world oceans 361 \times 10^6 \text{ km}^2 Mean depth of world oceans 3794 \text{ m}&quot;</td>
<td>1.37 \times 10^{21} \text{ kg}</td>
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Four-fifths of the southern hemisphere and the more than three-fifths of the northern hemisphere are under water. The Pacific, 70 million square miles in area, is almost circular in shape and covers nearly half the earth's surface. The Atlantic, at 36.3 million square miles, forms a broad S with the two sides almost matching. The Indian Ocean forms a large triangle with the Indian peninsula protruding through the upper apex. The Arctic Ocean, with its cover of floating ice, has an area of only 3.7 million squares miles and is almost surrounded by land.
This is a simple temperature-depth ocean water profile. You can see temperature decreases with increasing depth. The thermocline are layers of water where the temperature changes rapidly with depth. This temperature-depth profile is what you might expect to find in low to middle latitudes.

Click on image for full size

Windows to the Universe original image

http://www.windows2universe.org/earth/Water/temp.html
This image shows a generalized salinity-depth profile for the South Atlantic Ocean. Click on image for full size

http://www.windows2universe.org/earth/Water/salinity_depth.html

Water Vapor Confirmed as Major Player in Climate Change
11.17.08

The distribution of atmospheric water vapor, a significant greenhouse gas, varies across the globe. During the summer and fall of 2005, this visualization shows that most vapor collects at tropical latitudes, particularly over south Asia, where monsoon thunderstorms swept the gas some 2 miles above the land.

Credit: NASA
> Watch video

Water vapor is known to be Earth’s most abundant greenhouse gas, but the extent of its contribution to global warming has been debated. Using recent NASA satellite data,
researchers have estimated more precisely than ever the heat-trapping effect of water in the air, validating the role of the gas as a critical component of climate change.

Andrew Dessler and colleagues from Texas A&M University in College Station confirmed that the heat-amplifying effect of water vapor is potent enough to double the climate warming caused by increased levels of carbon dioxide in the atmosphere.

With new observations, the scientists confirmed experimentally what existing climate models had anticipated theoretically. The research team used novel data from the Atmospheric Infrared Sounder (AIRS) on NASA’s Aqua satellite to measure precisely the humidity throughout the lowest 10 miles of the atmosphere. That information was combined with global observations of shifts in temperature, allowing researchers to build a comprehensive picture of the interplay between water vapor, carbon dioxide, and other atmosphere-warming gases. The NASA-funded research was published recently in the American Geophysical Union's Geophysical Research Letters.

http://www.nasa.gov/topics/earth/features/vapor_warming.html

A weak short-term correlation between CO₂ and temperature proves nothing about causation. Proponents of the notion that increases in the air’s CO₂ content lead to global warming point to the past century’s weak correlation between atmospheric CO₂ concentration and global air temperature as proof of their contention. However, they typically gloss over the fact that correlation does not imply causation, and that a hundred years is not enough time to establish the validity of such a relationship when it comes to earth’s temperature history.

The observation that two things have risen together for a period of time says nothing about one trend being the cause of the other. To establish a causal relationship it must be demonstrated that the presumed cause precedes the presumed effect. Furthermore, this relationship should be demonstrable over several cycles of increases and decreases in both parameters. And even when these criteria are met, as in the case of solar/climate relationships, many people are unwilling to acknowledge that variations in the presumed cause truly produced the observed analogous variations in the presumed effect.

In thus considering the seven greatest temperature transitions of the past half-million years - three glacial terminations and four glacial inceptions - we note that increases and decreases in atmospheric CO₂ concentration not only did not precede the changes in air temperature, they followed them, and by hundreds to thousands of years! There were also long periods of time when atmospheric CO₂ remained unchanged, while air temperature dropped, as well as times when the air’s CO₂ content dropped, while air temperature remained unchanged or actually rose. Hence, the climate history of the past half-million years provides absolutely no evidence to suggest that the ongoing rise in the air’s CO₂ concentration will lead to significant global warming.

http://www.co2science.org/about/position/globalwarming.php
It’s Water Vapor, Not the CO₂

ACS Climate Science Toolkit | Narratives

Remark: “The Earth has certainly been warming since we have added so much CO₂ to the atmosphere from fossil fuel burning.”

Reply: “Forget the CO₂. Water vapor is the most important greenhouse gas. It controls the Earth’s temperature.”

It’s true that water vapor is the largest contributor to the Earth’s greenhouse effect. On average, it probably accounts for about 60% of the warming effect. However, water vapor does not control the Earth’s temperature, but is instead controlled by the temperature. This is because the temperature of the surrounding atmosphere limits the maximum amount of water vapor the atmosphere can contain. If a volume of air contains its maximum amount of water vapor and the temperature is decreased, some of the water vapor will condense to form liquid water. This is why clouds form as warm air containing water vapor rises and cools at higher altitudes where the water condenses to the tiny droplets that make up clouds.

http://www.acs.org/content/acs/en/climatescience/climatesciencenarratives/its-water-vapor-not-the-co2.html

If you can't explain the 'pause', you can't explain the cause...

Monday, June 10, 2013

Climate scientist Dr. Murry Salby explains why man-made CO2 does not drive climate change

Climate scientist Dr. Murry Salby, Professor and Climate Chair at Macquarie University, Australia explains in a recent, highly-recommended lecture presented at Helmut Schmidt University, Hamburg, Germany, why man-made CO2 is not the driver of atmospheric CO2 or climate change. Dr. Salby demonstrates:

- CO2 lags temperature on both short [~1-2 year] and long [~1000 year] time scales
- The IPCC claim that "All of the increases [in CO2 concentrations since pre-industrial times] are caused by human activity" is impossible
- "Man-made emissions of CO2 are clearly not the source of atmospheric CO2 levels"

- Satellite observations show the highest levels of CO2 are present over non-industrialized regions, e.g. the Amazon, not over industrialized regions
- 96% of CO2 emissions are from natural sources, only 4% is man-made
- Net global emissions from all sources correlate almost perfectly with short-term temperature changes \( R^2 = .93 \) rather than man-made emissions
- Methane levels are also controlled by temperature, not man-made emissions
- Climate model predictions track only a single independent variable - CO2 - and disregard all the other, much more important independent variables including clouds and water vapor.
- The 1% of the global energy budget controlled by CO2 cannot wag the other 99%
- Climate models have been falsified by observations over the past 15+ years
- Climate models have no predictive value
- **Feynman’s quote** "It doesn’t matter how beautiful your theory is, it doesn’t matter how smart you are. If it doesn’t agree with the data, it’s wrong” applies to the theory of man-made global warming.

http://hockeyschtick.blogspot.ca/2013/06/climate-scientist-dr-murry-salby.html