McKITRICK ON CLIMATE CHANGE

THE "PAUSE" IN GLOBAL WARMING.
THE FLAWS IN CLIMATE MODELS.

FRIENDS OF SCIENCE
Providing Insight into Climate Science

February 2015

This is intended as a layman's guide to understanding how governments, policy-makers and environmental groups come up with the "Social Costs of Carbon." This is a companion guide to a series of short video clips:
https://www.youtube.com/watch?v=g30JfQIK6GA&list=PLZcRTdbkGEnHfU8-dkQfGnO67K6p1m8rh

Friends of Science Society gratefully acknowledges the assistance of Dr. Ross McKitrick, professor of economics, University of Guelph.

Ross McKitrick's quotes are from the related series of video vignettes and are included to highlight some of the complicating factors about the "Social Costs of Carbon." The content material otherwise has been compiled from existing sources by Friends of Science Society.

What are the Social Costs and Benefits of

Power to the People?

THE "PAUSE" IN GLOBAL WARMING.
THE FLAWS IN CLIMATE MODELS.

ECONOMIST AND AUTHOR DR. ROSS MCKITRICK ON CLIMATE POLICY IMPLICATIONS AND THE SOCIAL COSTS OF CARBON

For the past ...15 to 20 years in the surface temperature record there hasn't been an increase – so temperatures are more or less back where they were in the late 1990's.

Ross McKitrick,
Professor of Economics,
University of Guelph

"Social Costs of Carbon" are Based on Faulty Climate Models

Dr. Ross McKitrick, speaking at the Friends of Science Annual Luncheon in May 2014, showed how damages from the use of fossil fuels/hydrocarbons, are assessed as the "Social Cost of Carbon" (SCC) — using Integrated Assessment Models (IAMs). However, the SCC are often wildly exaggerated. Why? They are based on flawed climate models that, on average, incorrectly predicted a surface global warming trend from 1998 that was four times the observed data. McKitrick cited American economist Robert Pindyck (2013) who said of Social Costs of Carbon economic models that:

"[The] models are so deeply flawed as to be close to useless as tools for policy analysis. Worse yet, their use suggests a level of knowledge and precision that is simply illusory, and can be highly misleading."

Social Costs of Carbon are predictive judgments that attempt to put a value on the negative impact of using fossil fuels. Taxpayers and mid-level policy makers are likely unaware that climate policy decisions are made, based on skewed, but "precise-looking," mathematical results of IAMs calibrated to faulty climate models, to arrive at the "Social Costs of Carbon" - the price a 'polluter pays.' Due to these "flaws" McKitrick advises policymakers to **wait 2-4 years before implementing any new policies**.

For instance, some activist groups allege that using coal-fired power plants (carbon) causes "X" number of deaths per year, or "X" number of hospital admissions and related medical costs for treating asthma (social costs). However, these claims refer to carbon particles (soot) which are already heavily regulated. New regulations or fees on carbon dioxide (CO2) won't have any effect on asthma, lung disease etc. because CO2 is a natural and harmless part of the air already. The only reason people say it is harmful is that computer climate models say it is causing dangerous heating of the planet. But these models are known to have predicted about 4 times too much warming than has been observed over the past 15 year period to 2012.

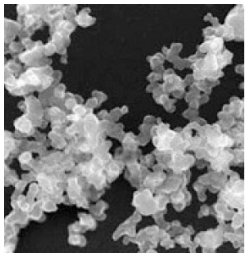
What is "Carbon"? What Does Social Cost mean?

"Carbon" is a misnomer in this context and is scientifically incorrect, but commonly used. Carbon is the fourth most common element in the universe and is literally 'everywhere.' Humans are carbon based beings. Likewise carbon molecules are the essence of the softest substance, graphite, and the hardest, diamond. The difference is in how the molecules bond.

In the context of climate change, 'carbon' has become short-hand for carbon dioxide, but this is scientifically incorrect.

Here is an image of a microscopic particle of carbon - soot.

This is what makes the dirty black smoke of wildfires, diesel engines, smoldering remains. This microscopic fine particulate matter is called PM2.5, smaller than 2.5 microns. Small particles like these trigger asthma and cause other health issues, but there are many sources of PM2.5 emissions.



A microscopic image of PM2.5 carbon particles, or soot.

Alberta wildfire

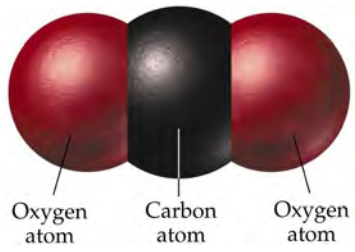
Slave Lake fire aftermath 2011, Alberta

Soot-filled emissions in China, from plants that do not have modern emissions scrubbers and filters.

In China, much of the pollution comes from industrial activity, though emissions management is rapidly improving. However billions of Chinese and other 3rd world citizens, are 'subsistence peasants' who rely on dung, wood or open, unfiltered burning of coal in home cooking pits or stoves. This is a significant cause of local and global pollution, and serious health consequences.

Carbon Dioxide is an invisible gas, not a particle of soot

The theory of Catastrophic Anthropogenic Global Warming holds that an increase in carbon dioxide will cause global warming. Thus the term 'carbon' has been adopted as a short-hand, but in fact carbon dioxide is a colorless, tasteless, odorless gas that you breathe out at 40,000 parts per million (ppm) with every breath.



http://becuo.com/carbon-dioxide-molecule

Carbon dioxide is essential for life itself. Plants synthesize it and release oxygen which is vital for human existence.

Carbon dioxide is one of several 'Greenhouse Gases' that are produced from the burning of fossil fuels. All Greenhouse Gases are considered to have some kind of effect on climate - so the term "CO2e" was created to mean "CO2 equivalent" impact.

Why is there said to be a cost to carbon?

Humans use fossil fuels in cars, trucks, airplanes, trains; to power electrical generation; to heat homes; for cooking and directly or indirectly for all manufacturing processes. The emissions from these activities have been calculated as having present and future 'costs' in terms of how the soot and aerosols affect the air quality and human health, and in terms of environmental damage, present and future. This could include health impacts from pollution, destruction of wild landscapes due to mining and extraction - but since about 1998 the concern has been about climate change. How much will the CO2e emissions warm the earth? What will those potential consequences be? Various groups have made forecasts.

"EPA and other federal agencies use the social cost of carbon (SCC) to estimate the climate benefits of rulemakings. The SCC is an estimate of the economic damages associated with a small increase in carbon dioxide (CO2) emissions, conventionally one metric ton, in a given year. This dollar figure also represents the value of damages avoided for a small emission reduction (i.e. the benefit of a CO2 reduction). The SCC is meant to be a comprehensive estimate of climate change damages and includes, among other things, changes in net agricultural productivity, human health, and property damages from increased flood risk. However, it does not currently include all important damages." (US EPA) http://www.epa.gov/climatechange/Downloads/EPAactivities/scc-fact-sheet.pdf

The challenge in setting a true Social Cost of Carbon is that **we cannot know how society or technology will change in the future, in ways that might reduce or negate industrial emissions**. **We also don't know how natural factors may affect climate change predictions over time.** Despite these huge variables, many confident, predictive statements are made about what those 'costs' will be based on the **existing** situation.

The idea is to have "polluters pay" now - for future damages. Those industries that emit the most CO2e (carbon) will pay a penalty - either as a carbon tax, or they will be required to 'offset' their emissions by acquiring 'carbon credits' from a less polluting factory or more innovative industry. The intent is that this penalty, will both force innovation and a reduction in 'carbon pollution' because of these additional costs. That's the theory. But in reality there's a problem.

There are problems in estimating future 'damages.' Since CO2 itself is harmless, the social costs are all based on forecasts by climate models of changes in the weather patterns many decades in the future. But there is no way to tell if these forecasts are at all accurate. We can, however, look at how the same models would have predicted today's weather patterns if they were run several decades in the past. These tests show the models are way off the mark and consistently predict far more warming - on average about 4 times too much - compared to what has actually happened during the 15 years from 1998 to 2012.

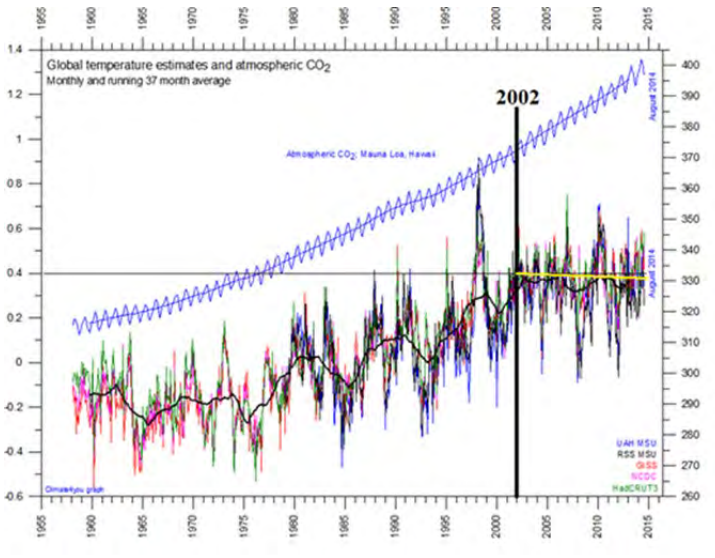
How accurate and useful can "Social Costs of Carbon" predictions be, if they are based on faulty climate models that consistently exaggerate the effects of CO2 emissions? And as evidence of model flaws grows, shouldn't climate policies based on the same models be adjusted?

It's not the pause…it's the flaws

It's not the pause, it's the flaws. What this pause is revealing is that there are flaws in the climate models. ...**now we are in an interval when the models say <u>there should be an increase and there is no increase</u>**.

What is "the Pause" in Global Warming?

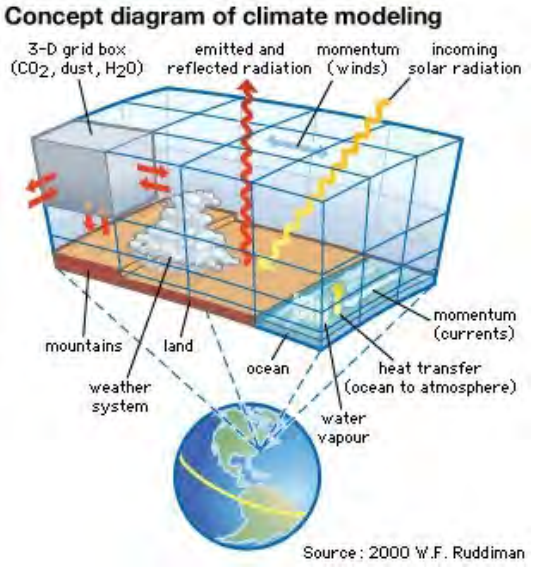
The adjacent graph shows an upward line in blue, that represents a rising level of carbon dioxide (CO2) in the atmosphere. The Anthropogenic Global Warming theory says that ***human-made carbon dioxide causes global warming.*** The criss-crossed jagged colored lines in the graph represent the data from five recognized international global temperature measurements which, since 2002 show a flat-line highlighted in yellow – representing "the Pause," while above them the ratio of carbon dioxide continues to rise – but temperatures do not. This suggests that climate models have exaggerated the effect of carbon dioxide on climate change.

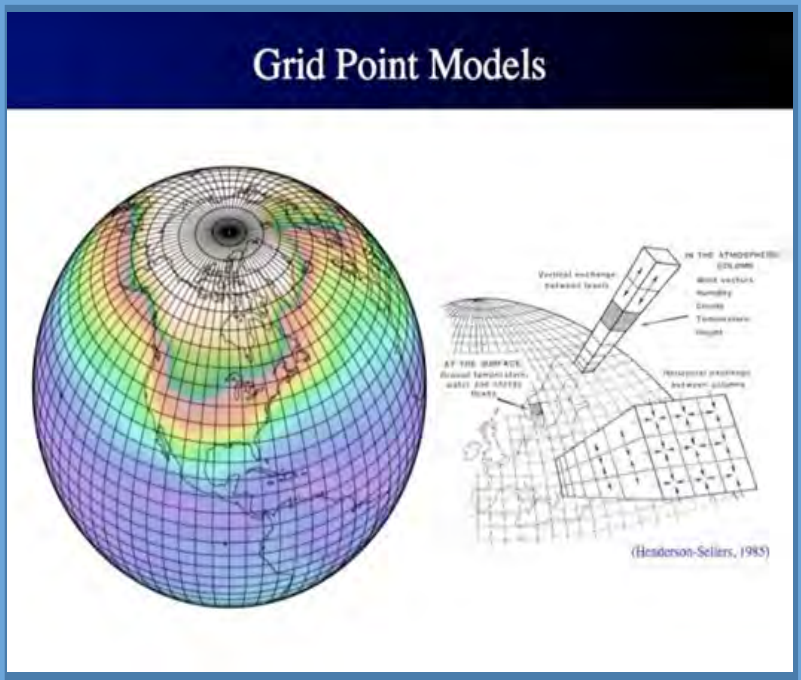


What is a Climate Model?

In a climate model, the globe is assessed via grid formation and relevant climate factors are inputted, then forward simulations are run on banks of very advanced computers. These form the basis of assessments of future climate predictions by the Intergovernmental Panel on Climate Change (IPCC) that issues reports for policy makers (i.e. governments). Governments make climate change policies based on this climate model information. These policies directly affect citizens in the form of taxes, laws (i.e. no idling), and energy initiatives such as implementing or subsidizing 'low-carbon' technologies like wind or solar, phasing out coal-fired power generation, raising power prices to force reduced consumption, instituting a carbon tax, etc.

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.

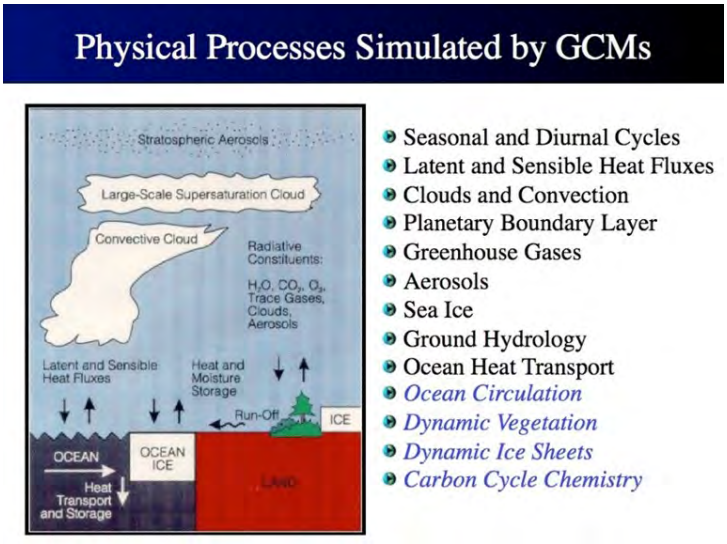


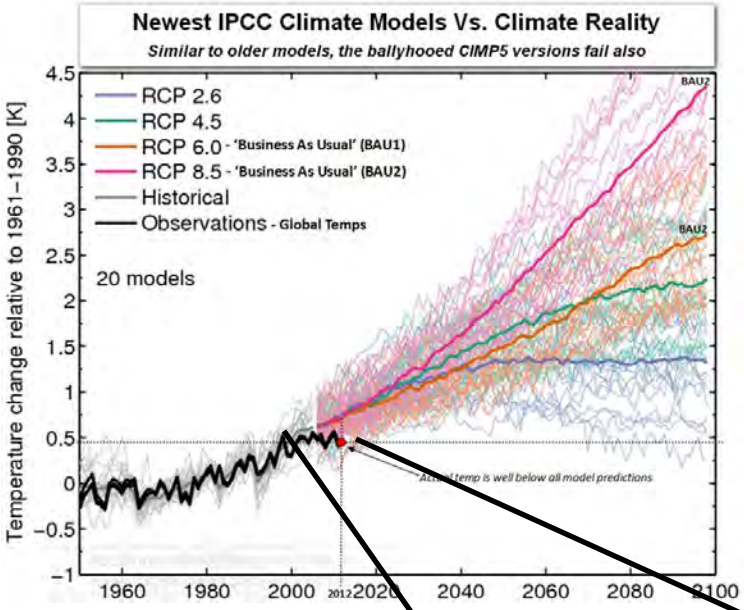


CLIMATE MODELS

Climate models are extremely complex mathematical representations that use preset equations to try to simulate future climate trends. However there are many subjective elements included in General Circulation Models (GCMs), and there are many processes of nature that are not well understood, or that cannot be modeled.

Many physical processes are simulated by the general climate models.





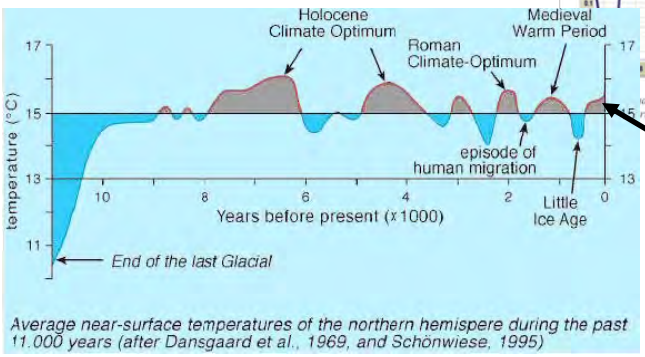
There are about 2 dozen major climate models around the world and they generated over 100 simulated projections for the recent IPCC report, based on different assumptions and technical details. The modelers had observed temperatures only up to about the year 2000 to check their predictions against. After that they have to forecast.

The colored lines in the adjacent graph represent the many different model simulations.

The black line represents observed temperatures. All IPCC models predicted on-going global warming; however, evidence shows 'a pause' - or flat lined *trend* that none of the colored models simulated.

ares linear-regression trend on the RSS satellite monthly global mean surface temperature anomaly dataset shows rming for 18 years 2 months since October 1996. Source: Data from Remote Sensing Systems.

Satellite data of the near-surface air temperature from Remote Sensing Systems show no warming trend over past 18 years.



Average near-surface temperatures of the northern hemispere during the past 11.000 years (after Dansgaard et al., 1969, and Schönwiese, 1995)

Current Warm Period.

Geologic data and human histories record several previous natural warm cycles include the Minoan, Roman and Medieval Warm Periods.

International scientists express concern over climate models

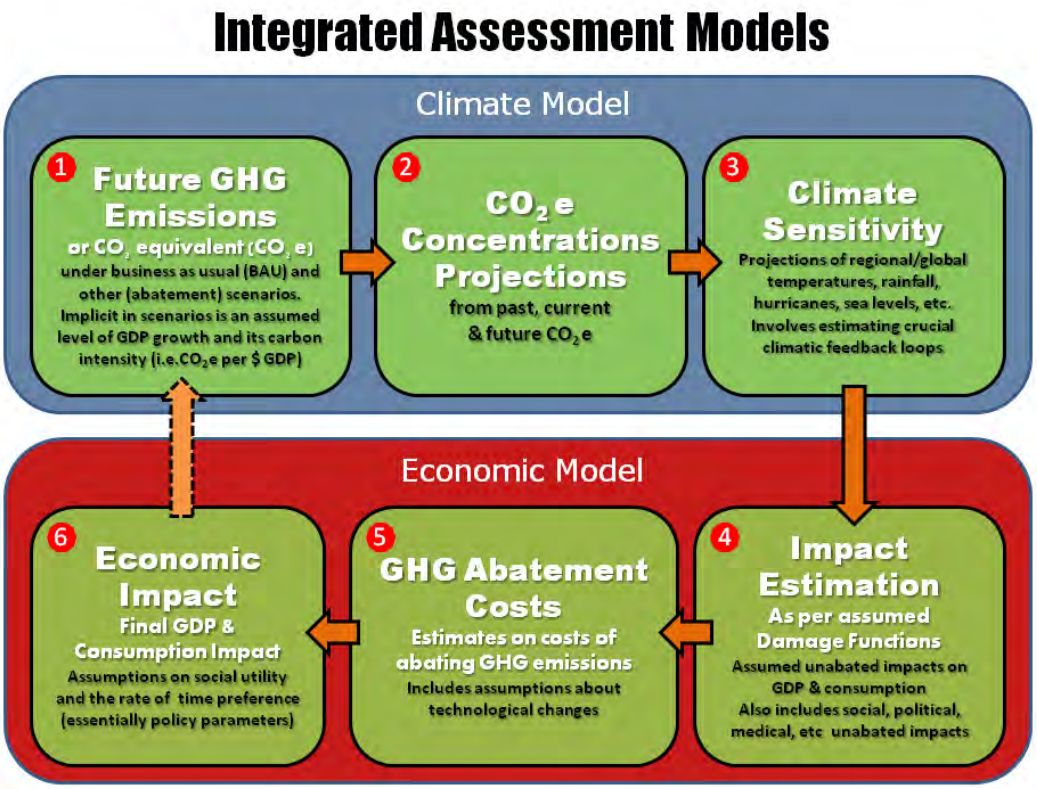
> The PAUSE…indicates there is some kind of flaw in the models and one of the biggest candidates and probably the simplest is that the models have built in too much sensitivity to rising greenhouse gas levels...because there's been a rise of about 15% of CO2 in the past couple of decades .. all the models say you ***should*** have had a lot of warming as a result of that.

Until September 2013, the prevailing thought amongst policy-makers was that global warming was in full swing and catastrophic results might be in progress, or imminent. The September 2013 IPCC report stated there had been a hiatus in global warming of 15 years (to their press deadline).

Scientists had been warily watching temperatures stagnate, not following the modelled predictions of the IPCC, and many, like **Hans von Storch of Germany**, began asking questions about climate models, versus observed evidence. From an interview with Der Spiegel July 2013:

> ***SPIEGEL:*** *What could be wrong with the models?*
>
> ***Storch:*** *There are two conceivable explanations -- and neither is very pleasant for us.* ***The first possibility is that less global warming is occurring than expected because greenhouse gases, especially CO_2, have less of an effect than we have assumed.*** *This wouldn't mean that there is no man-made greenhouse effect, but simply that our effect on climate events is not as great as we have believed. The other possibility is that, in our simulations, we have underestimated how much* ***the climate fluctuates owing to natural causes****.*
>
> ***SPIEGEL:*** *That sounds quite embarrassing for your profession, if you have to go back and adjust your models to fit with reality…*
>
> ***Storch:*** *Why? That's how the process of scientific discovery works.* ***There is no last word in research, and that includes climate research.*** *It's never the truth that we offer, but only our best possible approximation of reality. But that often gets forgotten in the way the public perceives and describes our work.*

What is an Integrated Assessment Model (IAM)?



No Social Benefit Column

Integrated Assessment Models are economic computer models designed to evaluate the social impacts based on the 'cost' of human industrial activity emitting one tonne of carbon dioxide (CO2). This is how economists try to put a 'price on pollution.'

Social impacts include people's health, impacts of changing global temperatures, possible catastrophic weather events, wildfires - **all predictive.** American economist Robert Pindyck is critical of many aspects of Integrated Assessment Models, saying that arbitrary choices about social welfare, climate sensitivity and damage functions - are basically 'made up.' Then these made up costs are entered into a computer, calculating various factors as shown in the flow chart above.

However, once the model elements are entered in the computer and a very precise number for the "Social Cost of Carbon" appears, the mathematical precision makes the Social Cost of Carbon look convincing and very accurate. It's not.

Further, as Ross McKitrick points out - **where is the 'Social Benefit' column**? These models do not include an evaluative function prior to "Impact" that calculates the Social Benefit of Carbon - not just the cost?

What is the Social Benefit of turning on a light powered by fossil-fuel fired electrical power plant, as opposed to powered by undependable and highly variable solar and wind energy?

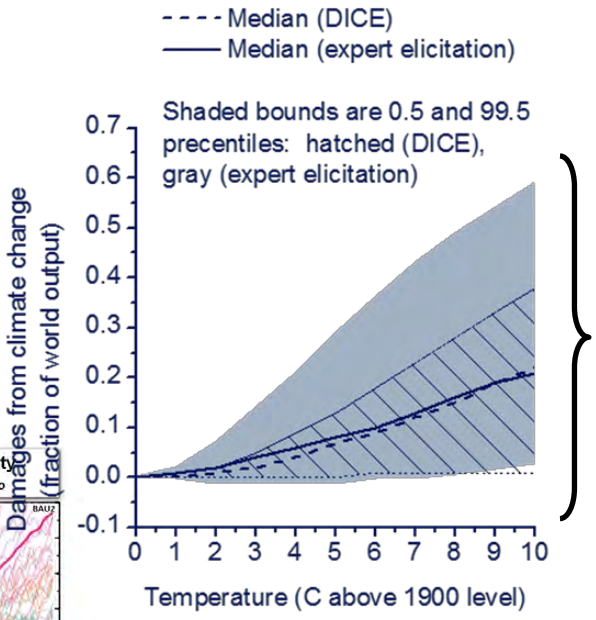
Is there a Social Benefit to coming home from the office to a warm house - as opposed to having to chop wood for an hour for the fire? **What is that value?**

Dynamic Integrated Climate and Economy (DICE) model

So the link between the two models is that the economic models are calibrated to match climate models, not reality. If the climate models are off, the economic models will be off as well.

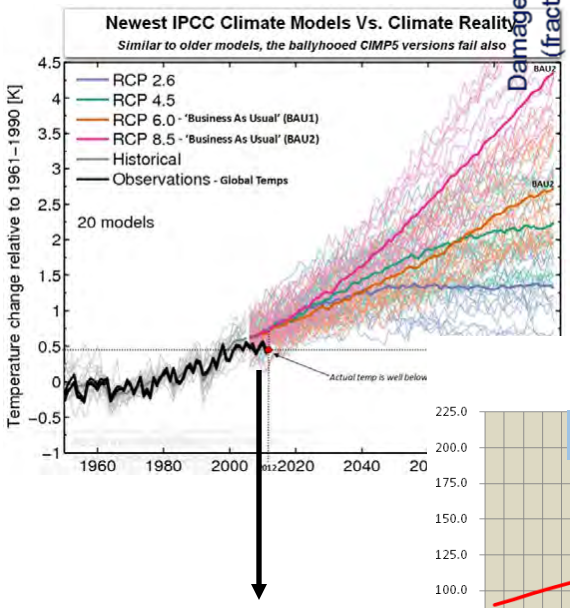
When Integrated Assessment models, like the "DICE" model (Dynamic Integrated Climate-Economy model), which includes many arbitrary factors, are then piggybacked on to climate models that are predicting outcomes that are four fold more than reality, the "Social Cost of Carbon" calculations become virtually meaningless. As Robert Pindyck of the MIT Sloan School of Management says in his 2013 peer-reviewed paper "Climate change policy: What do the models tell us?" **Very little.**

A DICE model example

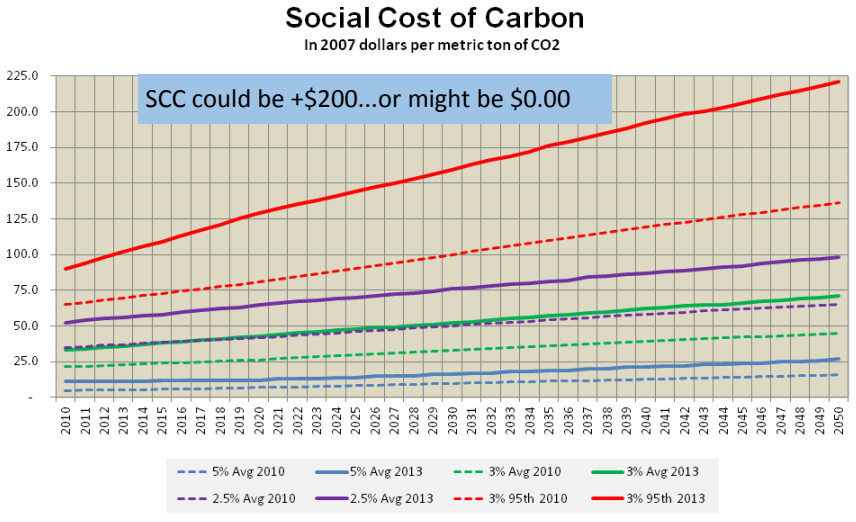


Such a huge range of possible outcomes makes this useless for policy decisions.

A set of climate models. The social cost of carbon models, like the "DICE" Integrated Assessment Model, use these wild estimates for coming up with exaggerated costs.



Colorful climate models spike upward—but in reality temperatures have flat-lined for 18 years.

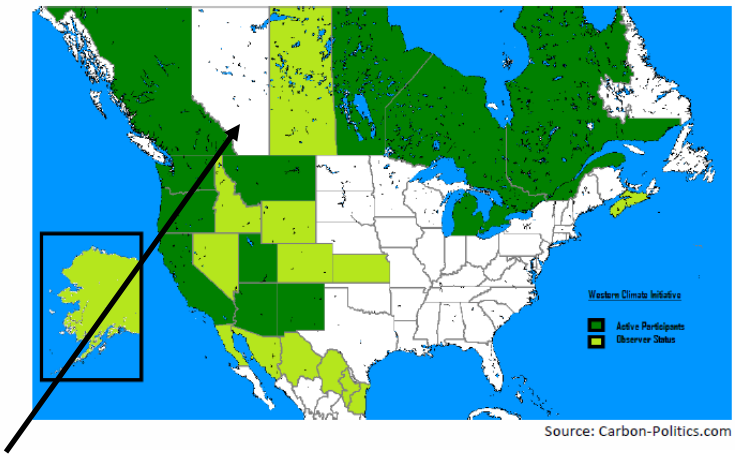


Source: US Interagency Working Group on Social Cost of Carbon 2010 & 2013

The problem then comes when someone publishes a report say 'We've done all the number crunching...we've gone through all these complex calculations we've arrived at social cost of carbon is 32 dollars and 71.6 cents and it sounds like something hugely precise and scientific but it is nothing of the sort. **It's just the endwork of a lot of guesswork.**

In 2006, California passed legislation to establish a carbon market. The final regulation was adopted by the California Air Resources Board in October 2011. This market is intended to become part of a regional greenhouse gas emissions trading system through the Western Climate Initiative (WCI) with other U.S. states and Canadian provinces (including British Columbia, Ontario and Quebec) due to join. The proposed trading system will allow for flexible mechanisms in the form of project-based offsets. The main offset project types are manure management, rural and urban forestry, and destruction of ozone-depleting substances, although alternative methods to reduce greenhouse gas emissions may also be considered.

States and Provinces covered by the Western Climate Initiative (WCI)



Source: Carbon-Politics.com

Source: Interpol
Guide to Carbon Trading Crime

Once "social costs" are established, then carbon trading can begin.

Carbon trading has been described by reporter Mark Schapiro as **"the lack of delivery of an invisible substance to no one."** (Harper's Magazine, Feb. 2010)

Interpol has expressed concerns about the risks of organized crime finding these intangible 'assets' an attractive place for 'doing business' as detailed in their **"Guide to Carbon Trading Crime."**

Alberta has its own carbon system (the first in North America) where large industrial emitters must pay into a provincial R&D fund. The price is presently $15 CAD/tonne. This is almost double the value of European carbon credits, presently at 6 euro, or $8.56 CAD. But with Alberta's oil sands and coal-fired power generation presenting a large 'carbon commodity' market opportunity for carbon speculators, the province is being pressured by various forces to 'fall in' and become part of a wider carbon trading scheme. Carbon prices of $40-$150/tonne have been fielded.

In Europe, carbon prices have ended up effectively only burdening consumers. There has been no discernable benefit to the environment; millions of consumers now face 'heat-or-eat' poverty due to higher power/fuel prices, due to renewables subsidies and carbon taxes.

The European Trading System in carbon credits has been shut down numerous times by Interpol and investigated for fraud. All too often the consumer again lost out as valuable VAT/GST taxes that support public needs were lost when the carbon credits were stolen by hackers and white collar criminals.

YOURENVIRONMENT.CA

Let's say someone wants to close coal-fired power plants because of air pollution. The first thing you should do is say, "What is the air pollution like in our city and how has it changed over the past few decades?" You go to "Your environment.ca" – click on the "Air" button, that takes you to the complete list of communities across Canada, Click on the community name and its right there, you'll see it for yourself. You can decide for yourself. Do we have this crisis that we need to incur all these costs ?

CASE STUDY – Alberta Phase-out Coal Campaign

To test Dr. McKitrick's statements about the Social Costs of Carbon and the evidence related to local air quality, and in order to learn from his experience in watching Ontario make climate policy decisions based on models, not evidence, let us look at the claims of the current "phase-out coal" campaign in Alberta.

SOCIAL COST OF CARBON CLAIM: The Alberta phase-out coal campaign claims that the "Social Costs of Carbon" begin with the likely deaths of some 100 people through asthma/ respiratory illnesses and that $300 million in health care costs could be saved on asthma and related respiratory/health conditions if Alberta closed coal-fired power plants. (See Pembina Institute's "A Costly Diagnosis:…" March 2013)

This is a similar campaign to that which unfolded in Ontario and the same Illness Cost of Air Pollution (ICAP) computer model is used.

Proponents of phasing out coal over the next 10 years (instead of 50 as scheduled by the federal government) also claim that renewable energy like wind and solar could supplement or replace coal-fired power plants.

REGION SELECTED FOR THIS CASE STUDY:
Edmonton, Alberta

RATIONALE: The majority of the coal-fired power plants are located about 1 hour west of Edmonton. Edmonton has a higher rate of asthma than Calgary.

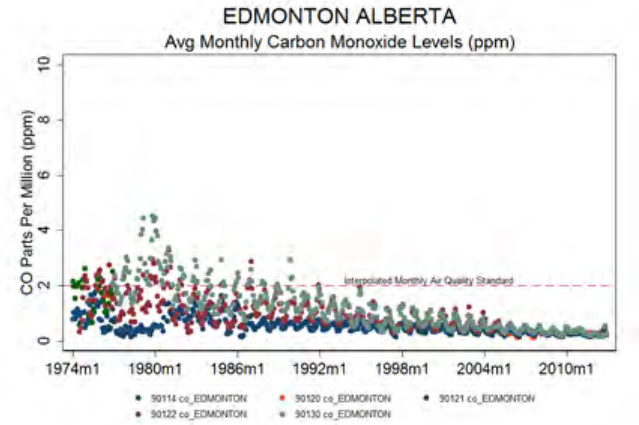
SOCIAL COSTS ASCRIBED TO COAL BY PEMBINA INSTITUTE: *"…this analysis reveals that the health and social costs of coal pollution add at least 3.6 to 5 cents per kilowatt-hour, nearly doubling the cost of electricity production. ..According to the analysis, climate change impacts from coal-fired power range from $1.1 to 4.5 billion annually."*

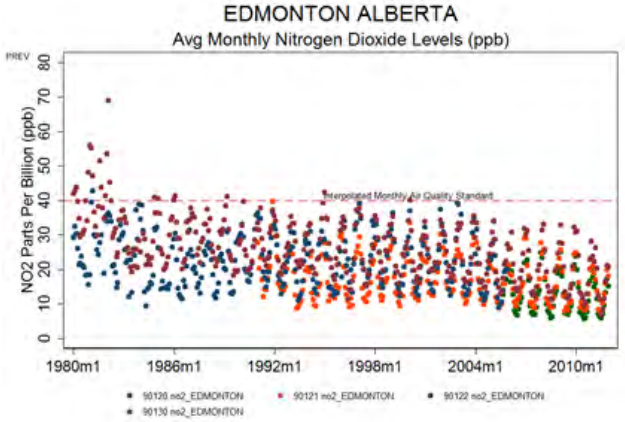
http://www.pembina.org/media-release/2425

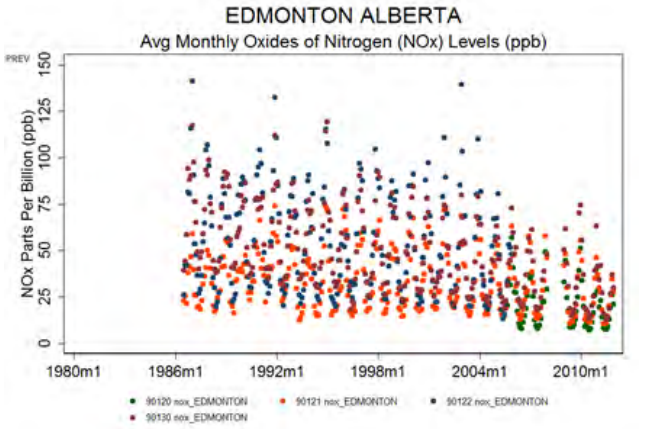
Edmonton Air Quality Trends Evidence From [YourEnvironment.Ca]

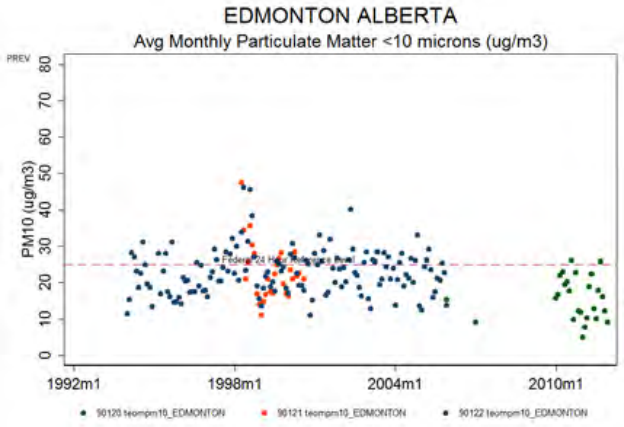
Edmonton has seen a progressive decline in air pollution since the 1970's.

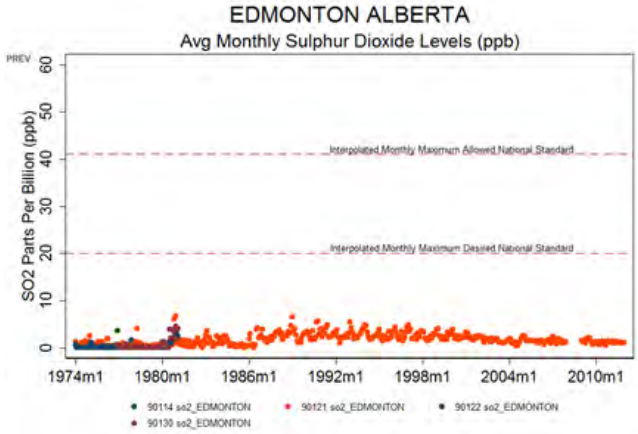
Using Edmonton, Alberta as a common marker, the evidence shows the city has experienced continuous air quality improvement, despite increased regional industrial development.











Ambient Air Quality Standards are rarely exceeded

The 'phase-out coal' campaign attempts to make it sound as if coal-fired power plants are emitting dangerous levels of PM2.5 - when in fact the plants are monitored round the clock and rarely exceed the safe limits set by provincial and federal authorities.

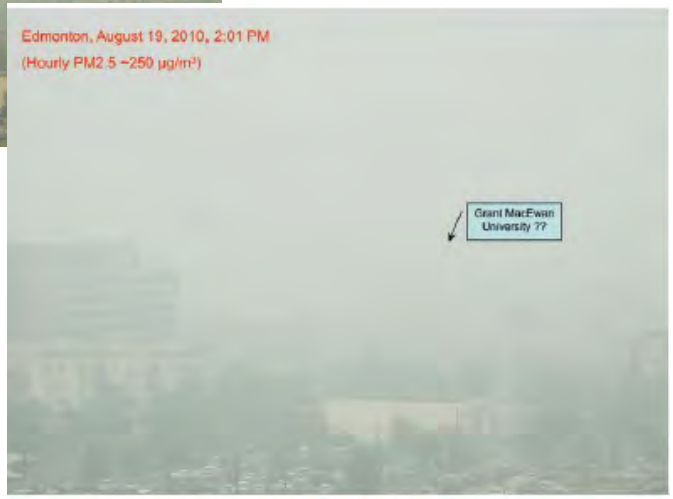
By contrast, a single wildfire can bring in a smoke haze to Alberta with high levels of PM2.5 as in the example below at 250 µg/m3 that may linger for days or weeks.

According to Alberta's Clean Air Strategic Alliance Data Warehouse, the adjacent table shows the number of times that PM2.5 safe emission limits of 30µg/m3 were exceeded in 2011. By contrast, natural sources like wildfire smoke are frequently many times this level and often linger.

Source: CASA Data Warehouse Jan. 1 - Dec. 31, 2011 Parameter and averaging period	PM2.5 over 24 hour period
Objective	**30 µg/m3**
Monitoring Station	
Calgary Central 2	3
Calgary East	0
Calgary Northeast	1
Edmonton Central	7
Edmonton East	3
Edmonton McIntyre	4
Edmonton South	5
Genesee	1
Red Deer - Riverside	14

Edmonton, August 19, 2010 11:35 AM
Hourly PM2.5 ~80 µg/m3

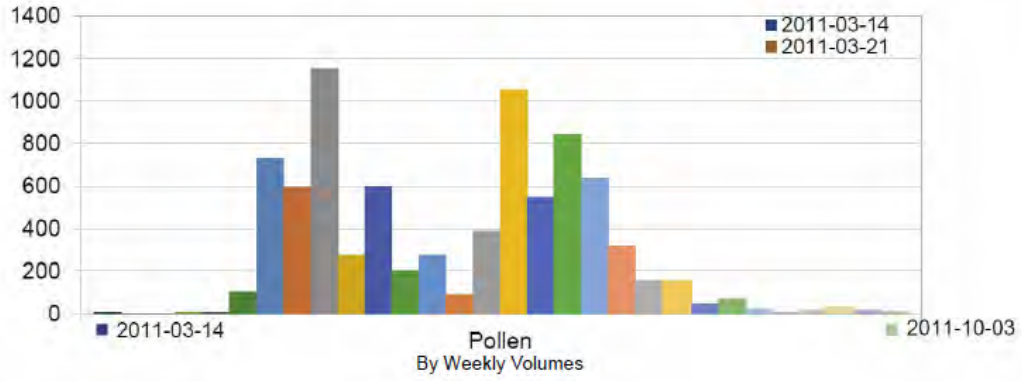
From a clear day to a wildfire smoke haze air quality catastrophe - in just a few hours. Images of the 2010 Cariboo wildfire in B.C. when smoke drifted in to Edmonton.

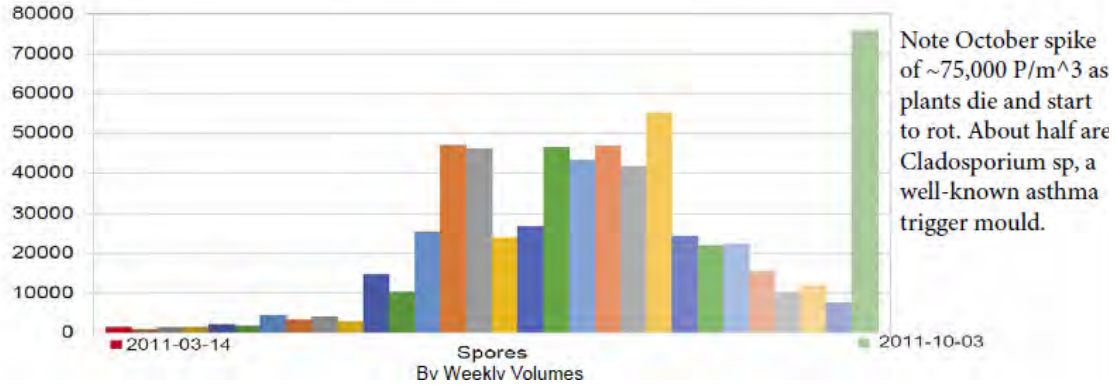


Edmonton, August 19, 2010 2:01 PM
(Hourly PM2.5 ~250 µg/m3)

Natural sources like pollens, spores and moulds can produce very high quantities of microscopic particulates; even small quantities of some may cause extreme reactions, depending on the type. These charts show the diverse weekly releases of natural pollens and spores from 2011. Note the spike in late October.

Source:
Aerobiology Research Lab





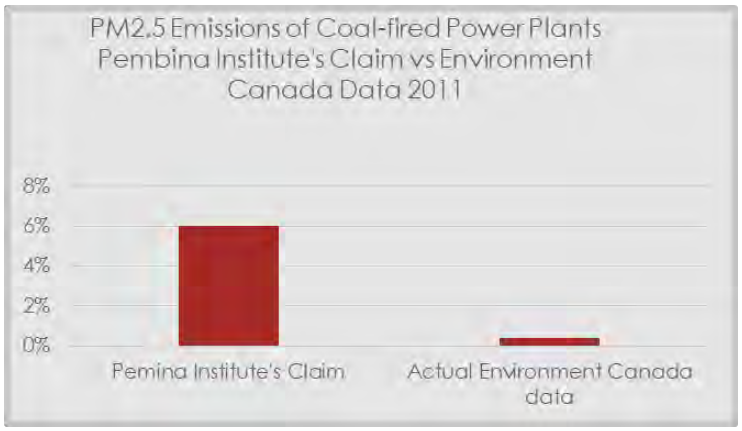
Note October spike of ~75,000 P/m^3 as plants die and start to rot. About half are Cladosporium sp, a well-known asthma trigger mould.

Questionable or Misleading References of the "Alberta Phase-out Coal" campaign

See our Technical Report "Burning Questions" for detailed references:

http://www.friendsofscience.org/assets/documents/FoS_BurningQuestions_Health_Coal_Wildfires_Jan2015.pdf

Skewed statistics.
The Alberta phase-out coal campaign is based on the Pembina Institute's (March 2013) report "A Costly Diagnosis…" that exaggerates the amount of microscopic, fine particulate matter (PM2.5 microns) emissions of coal-fired power plants by 15 fold, claiming the 2011 rate is 6% of human-made emissions. Environment Canada 2011 data shows it is 0.4%. PM2.5 is the parameter used in the Pembina report and the 'phase-out coal' campaign; PM2.5 matter is an asthma trigger and health risk in long-term dose and duration. Therefore we use the same term of reference to PM2.5 and to the year 2011.



Larger sources of PM2.5 omitted from Pembina's report

Larger sources of emissions are omitted. Other sources of particulate matter PM2.5 microns are far greater and some far more mobile. Wildfire and residential wood fires emit semi-combusted, highly carcinogenic matter and gases that may have life-long health effects as shown in recent studies.

Human-caused PM2.5 emissions in Alberta 2011:	
• Coal-fired power plants:	~1,800 tonnes
• Residential fireplaces:	3,400 tonnes
• Agriculture:	15,300 tonnes
• Construction:	129,900 tonnes
• Road Dust:	223,100 tonnes
• Wildfires (2011) *	1,715,000 tonnes

Organic "natural' particles like pollens, spores and molds make up about ***30% of particulate matter in the air*** and along with wildfire smoke are primary drivers of asthma. (Heintzenberg 1989)

Source: Environment Canada

*Wildfire emission estimates based on US FOFEM –First Order Fire Effects Model 20% consumption rate (low) & ESRD wildfire data.

A 2010 peer-reviewed study shows Alberta asthma Emergency Department visits in Non-Urban Municipalities were double the rate of urban visits, despite being far from coal-fired plants.

Possible asthma causes include:

- Ammonia fertilizer -a highly mobile PM2.5 asthma trigger
- Cultivated areas appear to match areas of high density PM2.5.
- Seasonal pollens, spores, molds.
- Wildfire smoke
- Rural Albertans have a higher smoking rates
- **Diesel Emission Particles (DEP)** remain near the ground on transportation routes and cause asthma reactions.
- Weather inversions exacerbate all of these.
- These factors are not mentioned in "A Costly Diagnosis…"

Faulty computer model.

Pembina Institute report relies on a computer health impacts model that was tested over a decade ago and shown to be faulty even then as it predicted *more people died of air pollution than died in total.*

"Ontario did it" – phased-out coal in 10 years; at what cost?

Ontario now has the highest industrial power prices in North America. Ontario hospitals face a rise in power prices of 27% (2012-2013). So, will it be health jobs …or health service cuts?

How would doubling the cost of power inputs with natural gas affect Albertans? 90,000 people employed by Alberta Health Services (AHS); health services are 45% of AB gov't budget; 58% of AHS budget goes to surgeries and power intensive operations like ICU, transplants, cancer diagnostics and treatments

Cost of early phase-out of coal – more than $11 billion.

For Alberta to change from electricity powered by coal to natural gas in 10 years, as proposed by the 'phase-out coal' campaign would cost more than $11 Billion dollars; power costs would immediately double due to the rates for natural gas. Albertans would pay billions more to compensate the coal industry, shareholders and employees for early phase-out of coal.

Albertans only lived to about 50 years old in 1921 when they chopped wood for stoves and fires – and today we live to 80+ years, reportedly in the best health in Canada, in a place that the World Health Organization judges as having some of the best quality air in the world.

Cost vs. Benefit? - Renewables Touted as Replacements

There are lots of examples where policy is brought in and even if it was a cure for what ails us – **the cure is far worse than the disease.** People propose a policy, justify it on the basis that it might somehow reduce CO2 emissions by some miniscule amount which might have some even more miniscule effect on the climate at some distant point in the future – and they will justify any cost no matter how high. **The potential benefit is extremely small.**

Wind and solar, often touted as 'clean' and immediate replacements, cannot provide power on-demand (dispatchable power) and wind power in Alberta typically only produces about 33% of the time – often at night when power is in low demand.

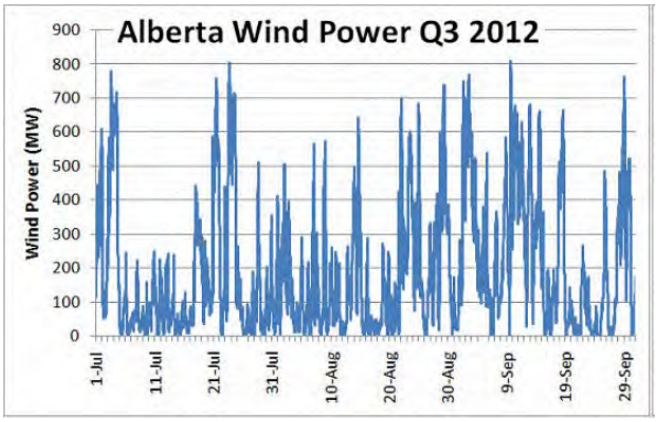
"Renewables" have drastic power fluctuations; they must be backed-up with base-load power 24/7 from coal-fired or natural gas-fired power plants, or hydro (imported to Alberta from British Columbia via the inter-tied power grid).

Adding more wind to the grid may cause serious power quality issues as now being experienced in Europe. A recent editorial in the National Post anticipates a rise in power prices and cautions Albertans to learn from Ontario's catastrophic experience with renewables.

Southern Alberta wind farm
Photo: Clive Schaupmeyer

Wind and solar are volatile power sources that require natural gas 'peaking' power plant back-up that can ramp power up or down quickly.

However this is a more wasteful use of natural gas, resulting in higher costs and more emissions—precisely what renewable energy is supposed to mitigate.

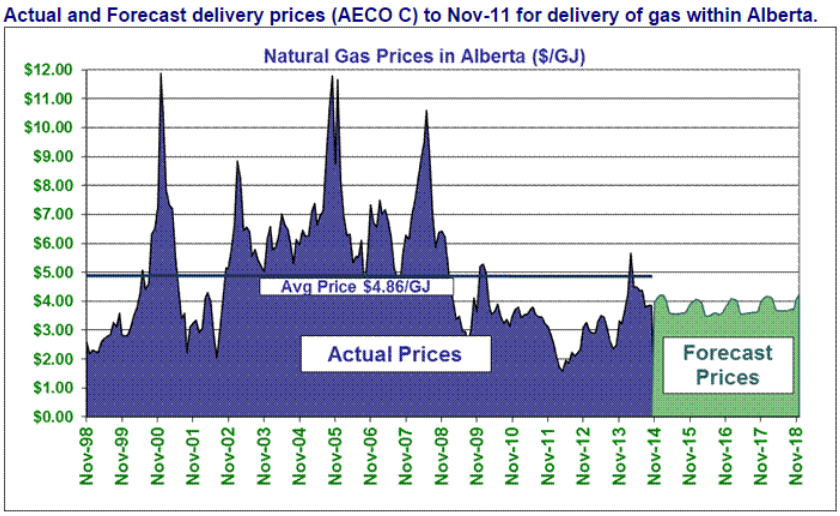


Natural Gas is a Price-Volatile Market Commodity

The only in-province alternative to coal-fired power generation is a conversion to natural gas-fired power plants, which rely on a more expensive, price-volatile commodity. Though natural gas is also abundant in Alberta, its price can fluctuate wildly and purpose-built plants would have to be built at significant cost.

At current prices for coal and Alberta's new 40% efficient* supercritical pulverized coal fired power plants the generating cost from coal is just 2.5 cents/kWh.
Natural gas at today's price is 4.8 cents/kWh

(*Natural Gas (NG) fired Combined cycle plant run at a 55 to 60% efficiency, NG fired peaking plants run a 40% + efficiency and NG fired cogeneration plants ~ 70 to 80% efficiency)



Source: GasAlberta.com http://www.gasalberta.com/pricing-market.htm

However, as reported by Bloomberg Feb. 13, 2014 during times of high demand, such as the unexpected cold snap of that winter, utilities (in the US) returned to the use of coal in order to maintain margins while meeting increased demand. Coal remains the affordable, stable source of power.

Insurance Risk Will Rise

The Allianz annual report – a major global insurer – addresses the issue of grid instability due to added wind and solar.

The AESO has confirmed that there has not been a black out in Alberta due to wind surges. However, the AESO also reported in 2010-2012 that Alberta's power generation system faces transmission constraints in various regions that impair or curtail delivery of available supply, therefore it is difficult to see how early phase-out of Alberta's coal-plants could possibly be in the public interest.

In other jurisdictions, wind power has increased blackout risks. Allianz sees this as an insurance risk. Power quality is a serious factor to consider – surges or "sags" in power can negatively affect sensitive equipment, creating invisible changes (such as lack of proper calibration) that will only be discovered during scheduled maintenance, or worse, after a tragedy.

Inciting Public Alarm Destroys Investor Confidence

Part of the attraction of doing business in Canada and Alberta and investing here, is that our governments generally provide clear policy statements and schedules, thus raising investor confidence and ensuring market stability. Coal is an integral part of Alberta's and Canada's economy.

Business and industry do forward planning and budgeting based on stable market factors and known policies. As noted in the June 27, 2014 Alberta power market report prepared for the Manning Institute and the Independent Power Producers Association of Alberta, by the Toronto offices of London Economics International LLC (LEI), the Alberta power supply side has been established based on a federal decommissioning schedule, not on the whim of enthusiastic wind power activists who are poorly informed about the costs of power generation and market consequences of radical decision-making. A sudden change in policy will damage Alberta's sterling reputation as a place to make good investments. Many businesses will face new uncertainties and risk factors. Electrical power prices, reliability and power quality are **critical** drivers of successful business in an industrialized society.

Here is an excerpt of the LEI report:

Figure 30. Assumptions for 5 year wholesale price outlook for Alberta, 2014-18

Supply

- LEI assumes retirements in Alberta will be primarily driven by the Federal coal-fired power plant retirement regulation
- New entry is synchronized with demand in the long term and tested to be "economic" given modeled conditions
- Entrants are assumed to be gas-fired and wind power plants. Gas fired plants are assumed when economical, while wind power plants are added in fixed increments of 75 MW annually starting in 2018
- By 2040, 6.4 GW of generic gas-fired and 1.7 GW of generic wind generation are assumed to enter the market

Faulty Claims to "Fix the Tar Sands" Reputation

Another claim the 'phase-out coal' proponents make is that early phase-out of coal-fired plants would enhance Alberta's international reputation vis a vis the oil sands and overall GHG emissions.

They are apparently willing to trade off Canada's established rule of law and scheduled decommissioning program, violating shareholder trust and business confidence in the coal-fired generation power industry within Canada, for a cosmetic 'fix' in this 'tar sands' trade war against Canada. Based on international reports of the poor performance of wind farms, this 'fix' may end up driving up production prices or requiring oil sands operators and manufacturers to install their own power generation units to manage grid instability issues, as has been the experience in Germany.

Friends of Science stands up for Alberta's high environmental standards. As Friends of Science have done in our many press releases, we show that wind farms are costly and problematic.

Wind is not Clean, Green or Free

CARBON-POWERED WIND

Advocates of wind power picture it as a source without environmental impact. In fact it is highly CO_2 intensive in terms of its built cement footings for the towers – a non-recyclable material that is in the thousands of tons. To date, no cost-accounting against wind has been made to incorporate the social -cost-of-carbon fact that wind requires conventional thermal, hydro or nuclear back-up power. The fact is, **no alternative energy force is emissions-free** – not in the production of the devices and not in their operation.

LOW POWER DENSITY

Coal-fired power plants have a very small surface footprint compared to wind farms. Because wind turbines only produce at 45% of their capacity, we would need 555 large wind turbines each of 2 MW capacity to produce the same electric energy as the Genesee 3 power plant, so coal is environmentally superior in this regard as well as in terms of land use.

RARE BIRDS AND BATS VICTIMS OF WIND TURBINES

Eagles and other rare species of raptors are attracted to turbine towers – meeting their death. Bats are apparently drawn to wind turbines only to have their lungs fatally damaged by the barometric pressure changes as wind turbine blades rotate. Bats are essential to agriculture and forestry, consuming tonnes of insects that are destructive to crops, forestry stock and humans.

RARE EARTH MINING DISASTER IN CHINA

Wind turbines employ powerful magnets made from rare earth materials, and mining these materials have left a horrible environmental scar in China, while wind activists in Canada pretend it is 'clean and green.'

Social benefits of fossil fuels are difficult to count

The comfort and convenience of power on-demand is so integral to our lives it is easy to forget the social benefits we take for granted.

How many hours of work to gather this much dung for cooking and winter fuel?...

Versus...Flipping a switch or plugging in to power.

China Photo: Clive Schaupmeyer

Stockpiled cattle manure used for heating and cooking. Hailar District, Inner Mongolia Autonomous Region, China.

"Woman Carrying Bundle of Wood, Ethiopia". Licensed under Public Domain via Wikipedia.

Because of their constant exposure to cook fires, women and children are particularly at risk. Indoor air pollution causes 56% of deaths and 80% of the global burden of disease for children under the age of five.

A small boy sits by his mother's traditional wood-fuel stove. Nigeria. https://en.wikipedia.org/wiki/File:Indoor_Woodfire_Stove.jpg

"More than 3 billion people cook with wood fire worldwide. Approximately 60% of African families cook with traditional biomass, a percentage that increases to 90% for Sub-Saharan Africa.[1] Smoke and gaseous emissions pour out of burning wood, animal dung, or crop residues, leading to lung disease and respiratory illnesses in women and children. Traditional biomass fuels release emissions that contain pollutants dangerous to health, such as small particles, carbon monoxide (CO), nitrogen dioxide, butadiene, formaldehyde, and carcinogens such as benzopyrene and benzene. TheWorld Health Organization estimates that more than 4 million people die each year from household air pollution generated by cooking with solid fuels in poorly ventilated spaces." *Wikipedia*

A Changing Climate Means a Change in Policy

January 16, 2014 atmospheric scientist Dr. Judith Curry of Georgia Tech testified to the US Senate committee on Environment and Public Works that:

- the case for human-caused global warming had been weakened by the evidence of (then) 15+ years of 'hiatus' or pause, despite a rise in carbon dioxide,
- the IPCC (Intergovernmental panel on Climate Change) was unable to explain why their theory of Anthropogenic Global Warming was not proving out,
- **carbon dioxide (CO_2) is likely not the 'control knob' of climate variability.**

Dr. Curry has called for the IPCC to be shut down, saying: "the IPCC still has not provided a convincing argument for how much warming in the 20th century has been caused by humans."

The burden of proof about the threat of CO2 is on the climate campaigners making all the wild claims. ***So far we've seen their models are wrong and their predictions are false.***

We have shown that climate models and Integrated Assessment Models of the 'Social Costs of Carbon' are flawed and inaccurate.

We have shown that the case for the 'phase-out coal' campaign in Alberta is flawed as well and not supported by the evidence.

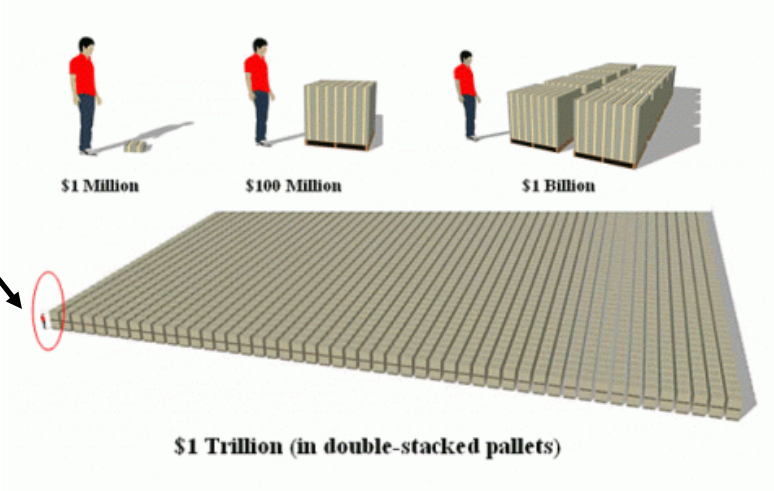
We recommend that policy makers take the advice of Dr. McKitrick—wait 2-4 years before implementing any new policies; climate modellers will likely modify their estimates of the impact of carbon dioxide on climate and warming. This will keep society from making costly climate policy errors.

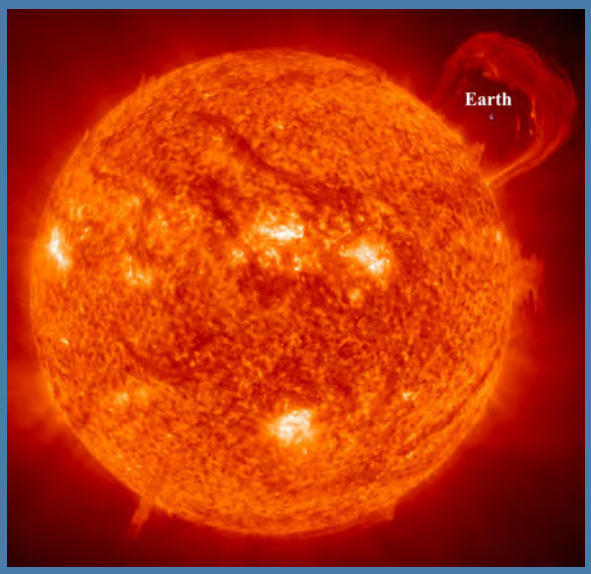
It's time taxpayers and business owners started asking questions about frightening climate projections and expensive policies that are <u>not based on evidence</u>.

*For example: "The International Energy Agency projects that an additional investment of **USD 5 trillion** is required by 2020 for clean energy alone, to limit warming to two degrees Celsius."*

Taxpayers. That's your money.

Global warming stopped naturally over 15 years ago.





THE SUN

Friends of Science Society have spent over 12 years reviewing climate science literature. It is our view that the Sun is the main driver of climate change—and that human activity or carbon dioxide emissions have a limited impact on climate. We do encourage pollution reduction and good management of our environment. This is a separate issue from climate change, as we see it. ***The Sun is the main driver of climate change. Not you. Not CO2.***

FRIENDS OF SCIENCE
Providing Insight into Climate Science

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