



A Report to the City of Calgary Mayor & Council, Auditor, Chamber of Commerce and Alberta Provincial Government

No wind. No power.

26/11/2013



Renewable is NOT so Doable

Review of the Science and Global Experience with Renewable Energy and “Low-Carbon” Economies vis a vis Alberta and Calgary’s GHG Reduction Plan



Friends of Science Society

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Renewable is NOT so Doable - Executive Overview

Review of the Science and Global Experience with Renewable Energy and “Low-Carbon” Economies vis a vis Alberta and Calgary’s GHG Reduction Plan

Friends of Science Society is a group of earth and atmospheric scientists who are experts in climate change science and policyⁱ. We are most concerned that in pushing unreliable, not-on-demand power from ‘renewables’ over conventional fuels, the Calgary GHG Reduction Plan, prepared by the Pembina Instituteⁱⁱ, will cripple the Alberta economy and put citizens into a ‘heat or eat’ crisis, similar to that which bludgeoned the UK during the recent spring cold snap when thousands died.

Pembina Institute’s influence is wide-reaching, having affected climate change policies at all levels of government and in dozens of cities and municipalities across Alberta – indeed across Canadaⁱⁱⁱ.

Renewable was Not Doable in Ontario The evidence is in from Ontario that the “Renewable is Doable” plan that Pembina Institute wrote for that government has led to catastrophic economic and energy issues in Ontario that will last for decades^{iv}. Effectively, their recommendations have bankrupted Ontario and led to fuel poverty for millions – and thousands of rural families have had their health adversely impacted, property values reduced, and lives made unpleasant due to the influx of wind farms^{v vi}.

We do not want this for Alberta.

Alberta is Rich in Inexpensive Reliable Fossil Fuels Alberta is rich in fossil fuels that are inexpensive for consumers. We have excellent environmental management techniques in place to reduce pollution to a minimum. It is absurd for a powerhouse of fossil fuels to submit to policy recommendations that will impoverish taxpayers and destroy the existing, reliable power grid.

No Global Warming in 16 Years^{vii} – Carbon Dioxide “Not guilty” As Friends of Science, we can state with authority that there has been no global warming in 16 years despite a rise in carbon dioxide (CO₂), consequently, the theory that carbon dioxide from fossil fuel use by humans is responsible for “catastrophic climate change” is false; rendering these dubious renewable **energy ‘low-carbon’** projects irrelevant.

The following is a review of the scientific and applied experience of nations and their success or failure with renewable energy options.

“Greener Cities” Leads to More Taxes

In 2009 Calgary signed on to the “Calgary Climate Accord.” As we know today, long-term records show that global warming had stopped 11 years before.

In 2010 Mayor Bronconnier of Calgary attended a “Greener Cities” conference during the 2010 Winter Olympics in Vancouver.^{viii} The premise of this conference was that cities are major greenhouse gas (GHG) producers and therefore to save the planet from global warming, cities needed to reduce their GHGs. Sir Richard Branson was party to this conference.

Carbon War Room is the brainchild of flamboyant entrepreneur/investor Richard Branson. He wants to make “climate wealth” off the global warming ‘crisis.’ He and his colleague Jigar Shah had done some research. They had found that cities did not ‘go green’ because they did not have access to financing to do so.

According to Richard Branson in “Screw Business as Usual” page 294, he claims that his colleagues” Jigar (Shah), Peter and Murati Armoruster catalyzed an innovative financing system that, simply put, gave lenders almost water-tight security by having loans for double-glazing, solar panels, etc. **repaid out of slightly increased property taxes.”**

Enmax Corp. said it is building a 1,200 MW gas-fired power plant in Southern Alberta. Published reports said the \$2 billion (Canadian) plant would boost the provincial grid's reliability after Alberta's expansion into wind energy made it vulnerable to power disruption.

"We now have so much windpower generation that we need to fall back on reliable sources of power," Peter Hunt, an Enmax spokesman was quoted as saying.

In April 2009 Mayor Dave Bronconnier had signed a \$250 million 25 year agreement with EnMax to supply wind power to the city of Calgary.^{ix}

Many Calgarians looked forward to this, **believing that ‘wind is free.’** Thanks to expanding wind power in Alberta 8 years prior, by 2007 EnMax had had to build a \$2 billion gas plant.^x According to EnMax spokesman Peter Hunt, this was necessary **because Alberta’s expanding wind farms** (initiated in 1998) had destabilized the grid. Consequently back-up power that could quickly ramp up or down was required or the grid could collapse. Coal plants, while more cost-efficient, do not have the ability to quickly ramp up and down in power generation.

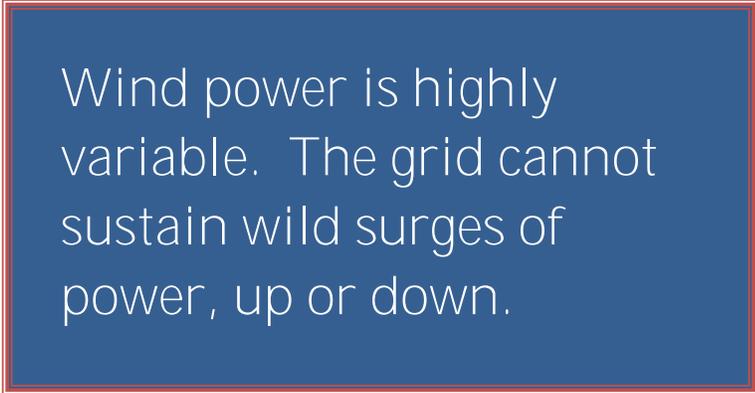
To give one a sense of the exaggerated spin on renewable energy, statements about Calgary’s LRT are laughable today.

“[Calgary’s light-rail transit](#) (LRT) system is one of the continent’s busiest, carrying more than 270,000 passengers every weekday. But the CTrain is known for an even more impressive fact: it’s the **first and only LRT in North America to run on 100 percent renewable energy**.

Powered by 60 turbines from [TransAlta’s Castle River wind farm](#) near Pincher Creek, in southern Alberta, the CTrain’s aptly named **“Ride the Wind”** initiative has eliminated more than 325,000 tonnes of CO₂ emissions since the program began in 2001. “That’s like decreasing the number of private vehicle trips on Calgary’s streets by more than eight million every year,” says Theresa Schroder, Calgary Transit’s communications strategist.^{xi}

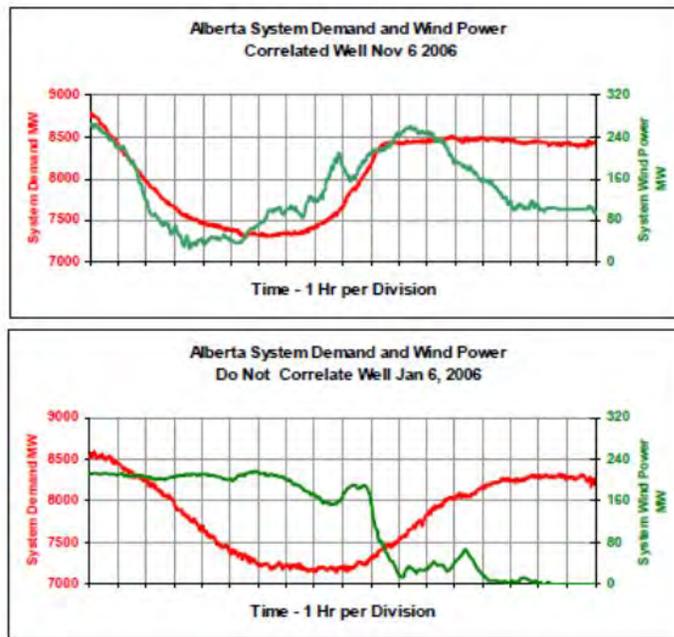
This sounds amazing. And, most people believe that ‘wind is free’ and ‘clean’— so what could be wrong?

However, there is no separate power grid supplying ‘only wind’ power to the LRT. If there was, the LRT ‘running on wind’ would be parked much of the day.



Wind power is highly variable. The grid cannot sustain wild surges of power, up or down.

Implementation of the Market and Operational Framework for Wind Integration



At the extreme, wind power may be at full capacity during light load periods just as other generating units approach their minimum stable operating levels. These studies also illustrated how ramping (20 minute to hours) of wind generation rather than intra-hour variability presented the greatest operational challenges.

Reliable power system operation requires ongoing precise balancing of supply and demand in accordance with minimum operating criteria. The AESO system operator manages supply-demand balance on a minute-to-minute basis considering load forecasts, operating uncertainties (i.e. unit de-rates and outages).

xii

The wind turbine power output is massively sensitive to wind speed. Below its maximum output, power varies as the cube of wind speed, meaning that a small change in speed lead to large variations in actual power generated.

Wind variability results in grid instability that requires expensive grid upgrades. The whole grid and its attendant generation sources have to be built to withstand the worst case, high demand during a cold period and no wind, at considerable extra cost to simply providing the average requirements. In the case of the United Kingdom grid, it has about 70 GW of actual available generation capacity, and yet the average demand is only around 35 GW. Therefore, the UK national grid is operating at 50% capacity factor. The variability of wind power has substantially increased the cost of the grid infrastructure.

The variability of wind requires back-up facilities which must rapidly vary their power output to compensate for the fluctuating wind power, which greatly reduces the conventional power efficiency. A Combined Cycle Gas Turbine plant can have a thermal efficiency of up to 60% if run continuously, but a

back-up power plant that must rapidly vary its power output would have a much lower efficiency, about 35%. Some power stations are 'throttled back' from what they might be producing - and in some countries with a lot of wind turbines, some power stations are operated while generating nothing at all - ready to take up the load at short notice, but are burning fuel without producing power.

Over a certain wind power penetration threshold, adding wind power causes an increase in total fossil fuel usage as the wind variability forces conventional stations to rapidly vary their output, reducing generating efficiency.

And certainly, the building of a \$2 billion gas plant – as EnMax has had to do -to accommodate 'free wind' energy renders that notion invalid.

None-the-less, the 'green engine' took hold at city hall and Calgary chugged along into ever more 'sustainable ventures.'

"Sustainable Calgary" developed a "Citizen's Agenda" in 2005, of which point #5 was: "The City of Calgary should create a 100% renewable energy strategy."^{xiii} The goal for this target was to reach it by 2012 – last year.

Referencing a Pembina Institute report and featuring a prominent image of a wind turbine, the document **claimed**: "According to *Green Power Programs - 2003* produced by the Pembina Institute: "Alberta's portion of electricity production attributable to Green Power Programs in 2003 was leading the country at a total of 296.7 megawatt hours. This represents a meager 1.85% of the total electricity used within our province."¹⁸.

The document claimed: "A broad range of studies of the employment impacts of conventional versus alternative energy investment show that low-impact renewable energy supply provides over twice as many jobs per dollar invested as conventional energy supply."²¹

And further compared: "According to the Pembina Institute, Germany, the country with the largest renewable energy installed capacity has about 30 times the installed capacity of Canada."²²

Today, the evidence shows that renewable energy cannot meet the demands of an industrialized, northern society. None-the-less, the **Citizen's Agenda morphed into "PlanIt"**^{xiv xv} **"PlanIt" then morphed into *imagineCalgary*** and became a driving force within the City of Calgary, with its own website. In fact, it claims to have **became a 'movement.'** But the premises within *imagineCalgary* about renewable energy are faulty and have devastated global economies.

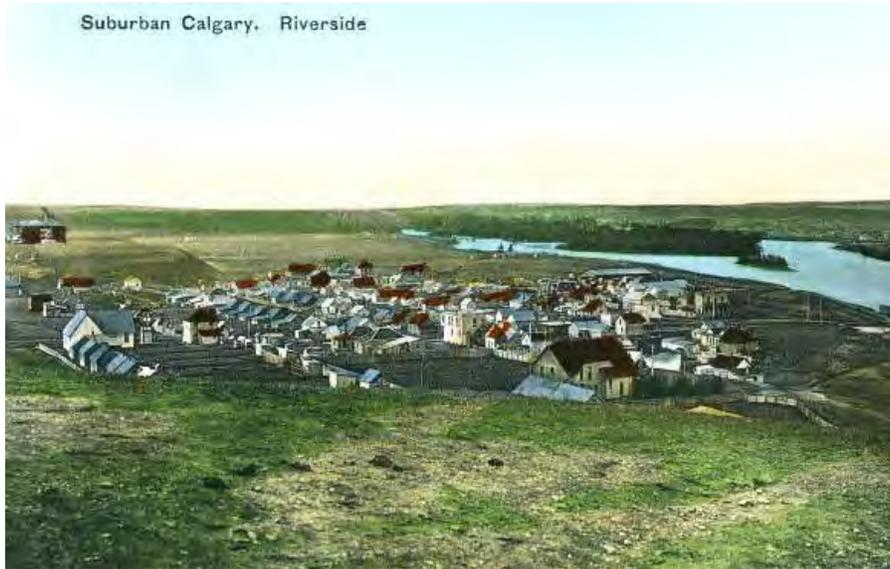
Friends of Science hope to prevent economic and energy grid catastrophe by providing current facts and evidence about renewable energy, climate change and exposing errors in misleading reports about coal.



Imagine Calgary began in 2005 as an alleged citizen initiative to ‘imagine’ Calgary 100 years from now and plan it today.

This is an absurd notion in itself.

Here is Riverside-Bridgeland in 1913.



A view of Calgary 2011.^{xvii}



Could anyone have imagined this 100 years ago?



This ...or this?



None-the-less *imagineCalgary* has taken on a life of its own. The *imagineCalgary* group of 18,000 Calgarians originally set a number of targets and the City of Calgary accepted these low-carbon/renewable targets without further public debate or a cost-benefit analysis. These plans have exceptionally far reaching impact on Calgary.

Explore citizens' – and The City's – plans for the future of Calgary and how you can help:¹

- [*imagineCalgary*](#) (adopted in 2006, 100 year vision, 30 year targets)
- [Municipal Development Plan](#) (adopted in 2009, 60 year vision, 30 year policies)
- [Calgary Transportation Plan](#) (adopted in 2009, 60 year vision, 30 year policies)
- [2020 Sustainability Direction](#) (adopted in 2011, 10 year actions)
- [Council's Fiscal Plan for Calgary](#) (adopted in 2011, 3 year priorities)

An employee of Pembina Institute since 2000 was Steering Committee Chair of *imagineCalgary* from 2007-2009. Pembina Institute documents are frequently referenced to support claims of renewable energy potential for power generation or job creation. The FOIP files received by Canadian Taxpayers Federation in 2013 exposed that the City of Calgary had spent some \$341,000 on consulting fees to Pembina Institute for the city's GHG Reduction plan. These documents made frequent reference to an individual who had also been an integral part of PlanIt and

imagineCalgary. There seems to be significant influence of Pembina Institute's ideology on the City of Calgary, but the global evidence does not support the original premises upon which PlanIt, *imagineCalgary*, Greening the Grid, or Calgary's GHG Reduction Plan were based. Should Calgary proceed with plans that are based on faulty information?

100 Year Goals and Targets

Communications

Target 3

By 2036, Calgarians increase their use of communications technology to support sustainability.

23 years from now

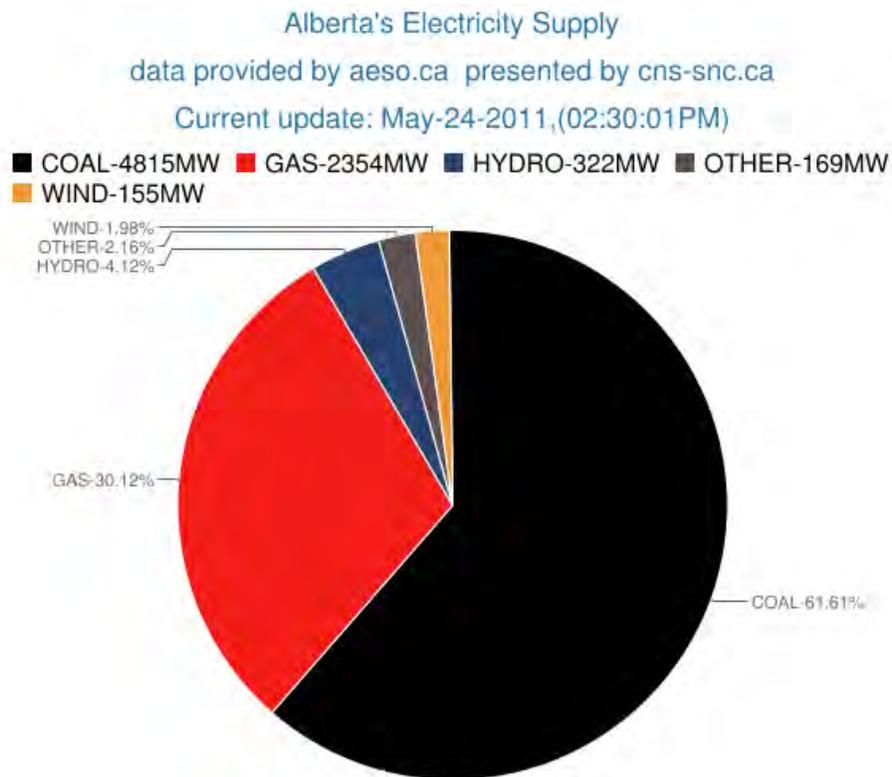
Target 5

By 2036, 30 per cent of Calgary's energy derives from low-impact renewable sources.

Target 6

By 2036, all new and retrofitted communities, buildings, vehicles, equipment and processes are built to be within five per cent of the highest energy-

But is 'renewable' so doable?



Based on the above graph of actual energy sources, it does not seem at all likely that Calgary can meet an *imagineCalgary* target of 30% 'low impact renewable energy sources' by 2036 – just 23 years away – when the Alberta government has been developing wind power, for instance, since 1998 and has achieved just 1.96% wind supply in 15 years.

And...is wind power a 'low impact renewable?' Is this in fact a valid goal for a modern industrialized city in a northern climate? *imagineCalgary* targets are now the drivers behind the Calgary Municipal Development Plan, Land Use Plan and Fiscal Plan – the implications are far-reaching.

Are these practical and attainable, or are they sheer ideology based on faulty science?

Diffuse Power with no Dispatchable Capability – No wind. No power.

Wind power is an extremely diffuse power source requiring a large number of wind turbines with very little power generation during peak demand periods. Wind farms destroy the scenic beauty of landscapes and require many access roads to each wind turbine. Wind farms are so intrusive, noisy, dangerous and ugly that most rural people all over the world are starting to oppose them vigorously.

In the UK, some landowners are paid so handsomely that they accept these gigantic towers but neighbors who are not getting paid see the value of their property fall quickly. Wind turbine towers can be so close that the throbbing noise, ground vibrations and flicker of the blades prove very annoying, often debilitating. **The recent CBC documentary “Wind Rush” shows that even in ‘green’ Denmark, over 100 anti-wind groups are demanding that wind power expansion stop.**

All ~5000 UK wind turbines produced less energy in August 2013 than just the imported French nuclear power, with the UK wind farms [contributing](#) 3.4% of the peak demand.

In Ontario, Pembina Institute wrote “Renewable is Doable” – the basis of Ontario’s disastrous Green Energy Act. Rural Ontario has been turned from pastoral farmland into a massive industrial wind operation over the objections of landowners. Health issues have skyrocketed; livestock and dairy owners have reported that stray voltage from wind turbines have negatively affected cattle and milk production in the dairy sector. At least one farmer reported being shocked into unconsciousness while using a loader when stray voltage, that had already been affecting his herd, knocked him out. This family was forced to move out of their house due to health impacts. Property values have collapsed. As widely reported in the National Post, the Ontario Green Act has essentially bankrupted Ontario.^{xviii}

More recently, it was reported that the Ontario government (i.e. taxpayers) will be paying wind producers exorbitant amounts NOT to produce wind.^{xix}

Key AESO Stakeholders Reject Wind & Warn of \$\$ Risks

From March 2013 Alberta Electrical System Operator Stakeholder (AESO) comments on-line:

ATCO:

- While ATCO Power is in principle open to the idea of Wind participating in the merit order, we currently see no reasonable way to achieve this. While the AESO deemed the Wind Dispatch Pilot a success, ATCO would consider the results sobering. Even with significantly reduced restatement times we would consider the compliance subpar by orders of magnitude. **The simple fact remains that the wind regime is uncontrollable** and the only decision wind farm operators can make is to generate less than the current wind conditions permit.
- http://www.aeso.ca/downloads/Phase_2_Wind_Integration_-_ATCO_Power.pdf

EnMax:

- The AESO notes that, since wind generation does not offer into the merit order, higher amounts of wind energy will result in growing amounts of generation that acts as a price taker. **ENMAX would add that growing amounts of wind generation will also tend to reduce prices when the wind is blowing, reduce the predictability of net load, reduce the number of hours in which dispatchable generators are able to recover their fixed costs, increase the number of supply surplus hours, potentially cause base-load generation to curtail, and polarize energy prices, all while providing little capacity benefit to the system.** In ENMAX’s view, something that should be included in the AESO’s wind integration plan is a discussion of whether the current market design is sustainable in the

face of much higher levels of non-dispatchable generation. ENMAX notes that high levels of wind power are becoming a significant concern in other markets; see, for example, the following article (dated February 27, 2013): **Surplus wind power could cost Ontario ratepayers up to \$200 million: IESO—Surplus wind power could cost Ontario ratepayers millions and compromise power system, says electricity system operator**, at http://www.thestar.com/business/2013/02/26/surplus_wind_power_could_cost_ontario_rate_payers_up_to_200_million_ieso.html

These reports from the actual ‘boots on the ground’ electrical providers should give all taxpayers cause for alarm.

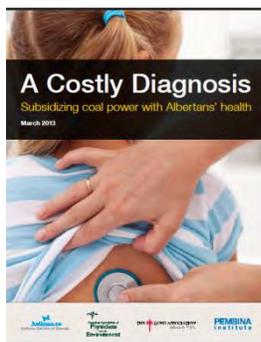
But are these being reported to city hall by GHG reduction consultants?

Has the City of Calgary ever done a full cost-benefit analysis on the GHG Reduction Plan or the risks of the low-carbon targets of “*imagineCalgary*”? Have the above qualified statements of seasoned electrical operations companies, who have done a long-term test of ‘renewables’ in the market, been reported to city hall and the business owners and taxpayers?

And how can a province that is based in fossil fuels be coerced to move to renewables?

Pembina Institute Demonizes Coal Claims it is Deadly and Costs \$300 Million in Health Care/yr

Pembina’s “A Costly Diagnosis” – a “Costly Misinformed Diagnosis”



Major mathematical and factual discrepancies about the volume of emissions from coal-fired plants and their alleged health impacts as stated in Pembina Institute’s “**Costly Diagnosis**” were uncovered and statistically assessed by Dr. Ross McKittrick and Friends of Science director Ken Gregory. Here is an excerpt from the Friends of Science press release on this matter:

Fine particulate matter (PM2.5) emissions from coal-fired plant are only 0.4% of all sources in Alberta. The Pembina report says the PM from coal-fired plants are 6% of man-made emissions, but they fail to mention amounts from agriculture, construction, road dust, and forest fires.

“Health effects can't be correlated if the contaminant concentrations aren't correlated. Sulphur dioxide (SO₂) levels have always been very low in prairie cities, at least back to the early 1970s when the NAPS records begin.” says McKittrick.

SO₂ levels have declined by 80% from 1974 to 2009 in Canada.

“Urban SO₂ concentrations are most relevant to epidemiology. In most Canadian cities the hourly readings range from 0 to 5 parts per billion, whereas the national air quality standard is 60 ppb. So I doubt their model, could seriously be generating health and mortality effects from airborne SO₂ in the populated centers,” says McKittrick.

He notes that nitrogen oxides (NO_x) sources are much more diverse, including motor transport. NO_x levels have declined by 60% in Canada since 1980.

McKittrick adds: “Mercury isn't usually included in these studies as a mortality risk or an asthma trigger because the exposure levels are so low. But if they are worried about mercury exposure they should be pushing for a ban on Compact Fluorescent Light bulbs (CFLs) in homes.”

Pembina Calls for Early Shut-down of Coal Plants in Alberta

Pembina Institute has also been calling for the early shut-down of coal fired generators in Alberta. The Pembina Institute **report “Costly Diagnosis”** claimed that Alberta coal-fired generators were causing deaths, asthma and millions of dollars in medical costs. Pembina claimed coal-fired plants contributed 6% of all man-made particulate matter (PM 2.5) in Alberta.

In fact, coal-fired plants only contribute 0.4% of man-made PM 2.5 in Alberta during 2011. This is a significant misrepresentation.

Friends of Science asked Dr. Ross McKittrick, world-renowned economist of the University of Guelph to review the Environment Canada information.

The data [here](#) shows that coal-fired plants in Alberta emitted 1,800 tonnes of PM 2.5. The total man-made emissions were 400,600 tonnes.

Pembina Institute omitted 369,500 tonnes of the man-made particulate emissions from their calculation.

The major omissions were:

Roads	223,100 tonnes
Construction	129,900 tonnes
Agriculture	15,300 tonnes

There is a disturbingly large discrepancy between what the Pembina Institute reported and what Environment Canada actually reported. Even residential fireplace PM 2.5 emissions of 3,400 tonnes are twice that of coal-fired power plants.

Dr. Ross McKittrick Disputes Pembina Institute Claims of Deaths and Health Care Costs

Regarding the statistical health risks of coal as reported by Pembina, Friends of Science asked expert economist [Dr. Ross McKittrick](#).

“These are modeling studies,” says Dr. McKittrick. “They don't track actual individuals. Before using such model predictions you need to ask if the numbers make sense, and here is where the problems start to arise.”

According to McKittrick, in Alberta, [coal-fired power plants generated](#) 1800 tonnes of fine particulate emissions in 2011.

“It appears the Pembina clean-energy activists are attributing 1 death for every 18 tonnes,” says McKittrick. “That same year in Alberta there were 3,400 tonnes of fine particulate emissions from residential fireplaces, 7,000 tonnes from forest fires and 209,000 tonnes from driving on unpaved roads.”

“So by their reasoning these sources caused about 12,200 deaths. Since there were only about 22,000 deaths from all causes in Alberta in 2011, the Pembina model attributes over half the annual deaths in the province to airborne fine particulates.”

At a recent forum on the matter June 10, 2013, **Redford government MLA** Donna Kennedy-Glans stated that when the **“Costly Diagnosis”** report came out, it **“caused quite a stir in our department.”**

Ross McKittrick is a Professor of Economics at the University of Guelph where he specializes in environmental economics. He has published many studies on the economic analysis of pollution policy, economic growth and air pollution trends, climate policy options, the measurement of global warming, and statistical methods in paleoclimatology. His book *Economic Analysis of Environmental Policy* was published by the University of Toronto Press in 2010. He has also published numerous invited book chapters, newspaper and magazine essays and think tank reports. In 2003 his (coauthored) book *Taken By Storm: The Troubled Science, Policy and Politics of Global Warming* won the \$10,000 Donner Prize for the best book on Canadian Public Policy. Professor McKittrick has made invited academic presentations around the world and has testified before the US Congress and the Canadian Parliamentary Finance and Environment Committees. In 2006 he was one of 12 experts from around the world asked to brief a panel of the US National Academy of Sciences on paleoclimate reconstruction methodology.

“I find this implausible, to say the least,” says McKittrick.



“Greening the Grid” Pushes for Renewables Province-wide

“Greening the Grid” was a 2009 report issued by the Pembina Institute.

Greening the Grid excerpt: “We used the most optimistic of the latest AESO projections of 7,400 MW¹⁷⁴ of new wind installations estimated between now and 2027 as our number for what is achievable in the Pale Green scenario. There are international precedents showing that this amount is achievable in far less than 20 years. Spain, with an area smaller than Alberta, installed 3,522 MW of new capacity in 2007 alone and over 8,750 MW in the last four years.¹⁷⁵ In order for this amount to be achievable Alberta would require the following:

- Additional transmission lines would have to be built between the southern wind resource and the Calgary region. AESO would have to identify need in a “Need Identification Document.”

Texan regulators recently approved \$4.9 billion to upgrade transmission lines specifically to accommodate wind.”¹⁷⁶

The premise of ‘greening’ the grid and ‘cleaning’ the grid in Alberta is reliant on the theory that carbon dioxide (CO₂) is causing catastrophic global warming – therefore the federal and provincial governments introduced various legislation to force reduction in GHG emissions, or to cause ‘polluters to pay.’

Pembina premised the closure of coal plants on the expense of carbon capture technology or the carbon emissions penalties.

However, it is apparent today in 2013 that in 2009 when the ‘Greening the Grid’ plan was written for the Alberta government, **global warming had stopped some 10 years prior.**

Throughout the document, Pembina Institute claims that instituting renewables like wind would be ‘laudable’ and realistic.

That’s what Spain, Denmark, Germany, the UK and many other countries thought too. Now they are bankrupt or on the brink – thanks largely to a ‘rush-to-renewables.’

In Germany, the carbon emissions market collapsed from a high of 34.90 euro in 2008....to 3 euro in the spring of 2013. Carbon emissions penalties became low enough that Germany simply returned to old King Coal – because it is reliable and inexpensive. And with new plant technologies, coal use is relatively low in pollution, considering the power output ratio.

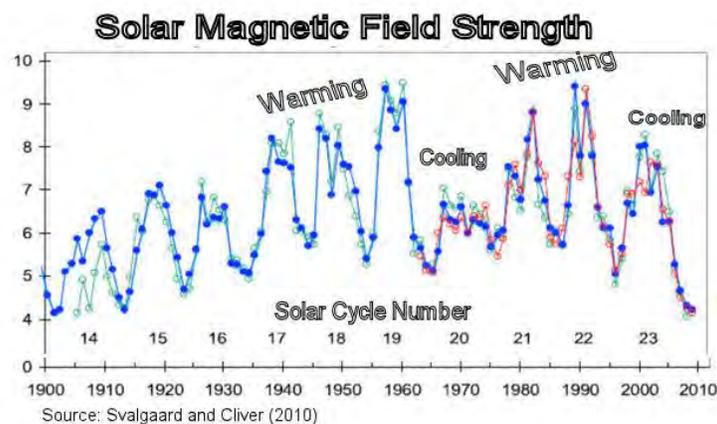
We find no acknowledgement of these international experiences in the online Pembina GHG Reduction Plan for Calgary or amendments posted online to reflect the collapse of these foreign ‘low-carbon’ economies.

“Greening the Grid” based on Rhetoric, not Science

Pembina Institute’s “Greening the Grid” is premised on the following statement: **“Alberta’s Current Electricity Mix Relies on Dirty, Wasteful Technology.”**

A brief review of the key points illustrates the factual and scientific errors in this statement.

Pembina Statements	Facts
<p>1. One-quarter of Alberta’s greenhouse gas emissions come from electricity generation.</p>	<p>Item 1 makes the a priori assumption that CO2 released from industrial activity will warm the atmosphere. CO2 in the atmosphere has now reached 400 ppmv but there has been no warming in the past 16 years, that is since 1997. A fact confirmed by the UK Met office. Claims by IPCC that there is a 95% probability that warming in the last 50 years is human caused is simply rhetoric, unsupported by any scientific evidence. The global temperature curves show that the climate cooled from 1950 until 1978 while CO2 increased. In the period from 1978 until 1997 there was a warming correlative with an increase in CO2 but since 1997 there has been no warming. Therefore, in the last 50 years, CO2 correlated warming has occurred for only 19 years. There is no smoking Gun to indicate that this is the result of human activities but on the contrary the climate variability is very well correlated with solar output. As shown in figure 1</p>



The above graph shows that the solar magnetic field increased through most of the 20th century, except for a dip during cycle 20 corresponding to the 1970's global cooling. The increasing solar magnetic field caused warming by affecting cloud cover and jet stream patterns. The solar magnetic field peak in 1991 caused a delay peak temperature response about 10 years later. The solar activity has declined recently causing a small temperature decline over the last 10 years despite increasing CO2 levels.

Pembina Institute’s “Greening the Grid” is premised on the following: **“Alberta’s Current Electricity Mix Relies on Dirty, Wasteful Technology.”...continued**

Pembina Statements	Facts
<p>2. Electricity generation produces 80% of Alberta’s airborne mercury pollution and 30% of its acid rain-causing sulphur oxide emissions.</p>	<p>Item 2 The claim that Electricity generation produces 80% of Alberta’s airborne mercury pollution and 30% of its acid rain-causing sulphur oxide emissions is totally misleading. According to the Economist Dr Ross McKittrick atmospheric mercury levels are so low they are not regarded as having any health issues. He states that SO2 levels have declined by 80% from 1974 to 2009. “Urban SO2 concentrations are most relevant to epidemiology. In most Canadian cities the hourly readings range from 0 to 5 parts per billion, whereas the national air quality standard is 60 parts per billion” says McKittrick.</p>
<p>3. Power plants draw the second highest volume of water in Alberta after irrigation. About 4% of the water allocated for cooling is never returned to its watershed.</p>	<p>Item 3 Cooling towers are necessary and assist in scrubbing discharge free of true pollutants such as SO2, Nitrous Oxides and heavy metals like Mercury.</p>
<p>4. Coal-based electricity generation is forcing Alberta taxpayers to bear the costs of pollution. For example, the Alberta government recently promised \$2 billion dollars to help industry cover the costs of capturing and storing carbon pollution.</p>	<p>Item 4. This is a complete non sequitur. Taxpayers are being unnecessarily burdened by misguided policies based on carbon dioxide as a pollutant which is unrelated to electrical power generation.</p>
<p>5. Coal plants are inefficient: almost two-thirds of the energy found in the coal they burn is lost out the smoke stack. Many advanced countries employ combined heat and power systems to ensure this valuable energy is not wasted.</p>	<p>Item 5. “Coal Plants are inefficient”, says Pembina. While this statement has validity, the objective then should be to capitalize on this lost energy – not close coal plants! As it is, this is one more statement designed to mislead. At 33% thermal efficiency coal is competitive with other power generation technology. Furthermore the High Efficiency, Low Emission Technology currently available efficiencies of 45% are achieved currently while greater efficiencies up to 60% are possible. The GE Baglan Bay generator in Wales achieves thermal efficiencies of 60% with a combined cycle gas turbine. Furthermore as the efficiencies increase CO2 output can be decreased by 30%.</p>

Coal is the largest source of power globally, and given its wide availability and relatively low cost, it is likely to remain so for the foreseeable future according to the International Energy Agency. Over the next 20 years, in Alberta annual electricity consumption is expected to almost double as a result of rapidly expanding oil sands development. Alberta will need large amounts of new capacity to meet demand. The AESO Long Term Forecast indicates an increase from 14,000 to 25,000 MW an increase of 11,000 MW in the next 20 years.

According to Pembina, coal generation can be phased out by 2028 but this requires a contribution of 24% from Wind Turbines. This is simply not practical since experience shows that if Wind contribution to the grid exceeds 5% it threatens the stability of the grid because of the highly variable and fluctuating nature of wind energy. Also when the jet stream goes south and Alberta is occupied by an Arctic High pressure system we have clear very cold weather with NO WIND, so that in winter peak high demand 24% of our energy requirements would require replacement by reliable fossil fuel.

There is misconception that wind is free, but wind is a low density energy source. The average coal fired plant of 680-1500 MW requires occupies typically only one sq. km of land area. On the other hand, a wind farm requires 1000 to 1400 sq. km of land to produce the equivalent delivered power as a 1000 MW coal plant. Alberta wind farms typically deliver 30% of their capacity, whereas a coal plant delivers at least 85% of capacity. The wind farm produces intermittent output which requires 100% back-up by conventional generation.

To construct a modern state of the art clean coal fired power plant the costs run to about \$1,400 per kilowatt so that a 1,000 MW station would have a capital cost of \$1.4 Billion with a life of up to 50 years.

To construct an equivalent wind farm would require up to \$2000/kilowatt so that the capital cost incurred would be \$2 billion, but this does not include grid connection costs construction and other costs necessary to integrate variable wind production to the grid. Also, although turbines are expected to have a 25 year life, experience shows significant degradation of output within 15 years. Wind turbines operate most efficiently in the wind velocity window of 50-60 kph but this is also dangerously close to the point where they can lose stability when hit by gusts exceeding normal operational

levels. This can result in burned out bearings as well failure of the structure and the turbine blades.

From an economic perspective paying 40% more for a totally unpredictable power source, which requires equivalent backup, makes no economic sense. Experienced engineers like Halkema (Wind Energy: Facts or Fiction) or Opalek (Wind Power Fraud) show that Wind Turbines output can not be calculated and the turbines very seldom output their nameplate power rating. Indeed Opalek claims that on average they output only 20% of their rated output

It is then clear that, wind turbines have an embarrassingly low Energy Returned on Energy Invested value of 0.29. The manufacture, installation and operation of wind power facilities will consume more than 3 times the energy they will ever produce.

But for 'global warming/climate change' carbon hysteria no one would contemplate using wind power as a substitute for conventional production. Even so, wind is a very flawed 'solution.'

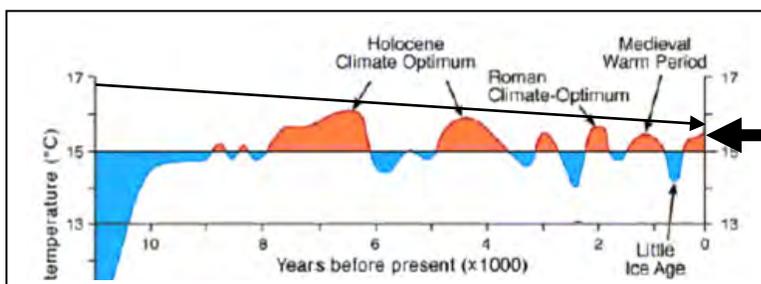
Wind power is not "clean" or carbon neutral as touted, it requires significant conventional energy to acquire materials, manufacture, ship and install the turbines with no economic return. There is also no reduction in CO2 output, as indicated by Opalek, because backup fossil power plants have to cycle wildly and inefficiently attempting to keep up with the vagaries of wind power output.

Worse still is the fact that wind power producers are being paid to take their turbines off the grid- paid not to generate electricity. This occurs in the UK and Ontario. The Independent Electricity System Operator in Ontario will start paying industrial wind developers for not producing any electricity, starting on September 11, 2013. They could possibly receive as much as \$200,000 per megawatt of installed power for **not** producing that electricity.

Wind turbines are not environmentally friendly, they are noisy, unsightly and highly destructive to wild life. In the last five years 2008- 2012, 67 rare and endangered golden eagles and bald eagles have been killed on US wind farms but the toll for smaller birds and bats is extraordinary. A recent study in the Wildlife Society Bulletin^{xx} estimates that 600,000 birds annually are killed by wind turbines, and although destruction

	<p>of wildlife on this scale is subject to prosecution. Under the Migratory Bird Treaty Act, killing one bird carries fines ranging from \$15,000 to \$500,000 and prison terms of six months to two years. Yet, a recent Associated Press investigation found the federal government has never fined or prosecuted a wind farm owner for violating federal law by killing birds.</p>
<p>6. If Alberta continues to rely on coal for most of its electricity, total greenhouse gas emissions will continue to increase, even if new coal plants are able to capture and store their carbon pollution. Investing in renewables, on the other hand, could allow absolute greenhouse gas reductions of 66% from 2007 levels by 2028.</p>	<p>Item 6 We would argue that the best thing to do about carbon dioxide is nothing.</p> <p>There is no credible evidence to indicate that CO2 has a significant effect on climate. Attempts to control climate are foolhardy and will fail. Europe and the United Kingdom have vigorously pursued the renewable energy option with demonstrably disastrous results driving up energy costs by as much as 30% with contractual liabilities still to come and no reduction in CO2 output..</p> <p>The only reason Wind Power continues is because of subsidies. Reason magazine columnist and Mercatus Center Economist Veronique de Rugy found in the US “Between fiscal years 2007 and 2010, annual wind subsidies grew from \$476 million to nearly \$5 billion.”</p>

It is the expert opinion of the Friends of Science that the Pembina proposal for “Greening the Grid” is naïve and fundamentally uneconomic. This experiment has been tried in other jurisdictions with disastrous results and burgeoning energy costs placing an undue burden on consumers, taxpayers and industry. The deregulation of the electrical industry has not resulted in savings for the consumer. The declining size of plants and multi-cogeneration is losing the advantages of the economies of scale and efficiencies provided by fewer larger state of the art facilities which provide simple control of the grid demand. Wind is like a bad employee who is always late or sick and can not be relied upon when needed. Few employers will put up with such an individual. It is time to give wind notice.



We are here – cooler than previous epochs. Is global warming caused by humans alone? This record of 11,500 years indicates a cooling trend and numerous natural warming and cooling cycles.

Wind is Attractive due to Subsidies and Carbon Credits^{xxi}

Wind and renewables receive subsidies and investors get tax credits at the federal level.^{xxixxxiii}

Average citizens pay the price of the hidden costs of accommodating variable wind.

Thanks to the volume of fluctuating wind power, EnMax had to build a \$2 billion gas plant to manage the variability.

That is an outcome of reliance on ‘free’ wind, and the ‘low-carbon’ initiatives like PlanIt, “Greening the Grid,” *imagineCalgary*, and the “GHG Reduction Plan.”

Wind farms are quick to fail

Wind farms are popular with investors these days. Why? Wind farms have a stated lifespan of some 25 years, but begin to fail within the first 10, reducing their power output by about 1/3. However, the tax advantages are attractive to investors. As well, for every 1 MW of ‘green’ power, you get an REC – Renewable Energy Certificate. You can sell it or trade it, kind of like printing money. Investing in ‘green’ energy also makes a corporation look more socially responsible to investors (many of whom are being pushed to divest from fossil fuels) and shareholders (some of whom are green activists who have purposely taken stock to affect corporate decisions).

Accelerated Capital Cost Allowance for Efficient and Renewable Energy Generation Equipment (Class 43.1)

Objectives and Description:

Class 43.1 provides an accelerated rate of write-off (30 per cent per year, on a declining balance basis) for investments that produce heat for use in an industrial process or electricity by using fossil fuel efficiently or by using renewable energy sources.

Budget 2005 proposed that a new capital cost allowance class ... The rate of write-off for this class will be 50 per cent on a declining balance basis. The new class will apply to eligible investments that occur on or after February 23, 2005 up to 2020.

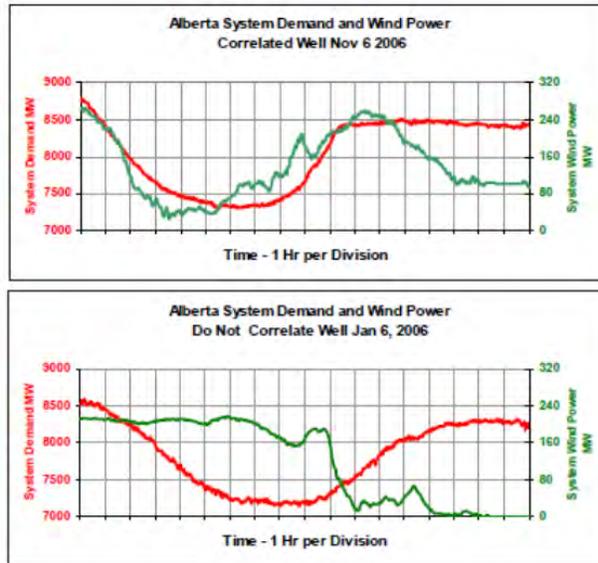
Program administered by Canada Revenue Agency in partnership with Finance Canada

Wind energy has another financial downside for users...and taxpayers. The variable nature of wind may result in financial compensation or cost penalties that someone pays to large users of power when the AESO asks them to reduce their consumption in peak demand times:

Wind generation, given its variable output, must be backed up by resources that the AESO can dispatch or control in order to keep the supply and demand of electricity in continuous balance on the AIES. These backup resources may include generation capacity, exchanges of electricity with neighboring jurisdictions through transmission interconnections, or curtailment of industrial or large commercial customer consumption as required by the AESO. When wind-generated electricity is available, its output is accepted into the AIES and the AESO directs other generation sources (coal-fired, hydro and natural gas-fired generators) to decrease their output. When the amount of wind-generated electricity is decreasing, the AESO directs other generators to increase their output. The AESO may also call upon customers who have contracted with the AESO to reduce consumption in order to offset the reduction in wind generation.

Renewable is not so Doable - AESO

Implementation of the Market and Operational Framework for Wind Integration



At the extreme, wind power may be at full capacity during light load periods just as other generating units approach their minimum stable operating levels. These studies also illustrated how ramping (20 minute to hours) of wind generation rather than intra-hour variability presented the greatest operational challenges.

Reliable power system operation requires ongoing precise balancing of supply and demand in accordance with minimum operating criteria. The AESO system operator manages supply-demand balance on a minute-to-minute basis considering load forecasts, operating uncertainties (i.e. unit de-rates and outages) and using current

On an annual basis, the wind generation capacity factor in Alberta is 30 to 35 per cent. There are, however, times of the year (typically spring and fall) when the capacity factors of wind generation can approach 60 to 70 per cent and periods when there is no wind generation output on the system due to prevailing weather conditions (no wind, too much wind, or extremely low temperatures). Footnote 35^{xxiv}

What was once an electrical grid built on reliability with ‘renewable wind’ becomes a grid designed to financially compensate customers for lack of provision of service.

Who pays for that?

These programs can be very responsive (available in seconds or minutes) and helpful in balancing the variability of renewable generation such as wind. The Commission heard in the Inquiry that the introduction of new demand response programs could support the integration of wind and maintain the reliability of the AES. These programs would be attractive to large industrial and commercial customers if they can be structured as an ancillary service provided to the AESO in which the customers are financially compensated for curtailing their consumption.^{42 xxv}

For example, the system operator in Texas curtailed 1100 MW of industrial load in February 2008 to avoid a major system disturbance. The unexpected loss of wind generation coincident with an unanticipated load increase and the unavailability of conventional generation prompted the system operator to call upon the industrial load to curtail their load and assist in balancing the system.

Footnote 42

First taxpayers, now industry has to ‘help’ the grid because of wind. Yet what does Pembina Institute recommend in their GHG Reduction Plan?

Best ways to reduce emissions

Based on the triple-bottom-line analysis, a number of emission reduction opportunities were identified to have the greatest potential to reduce GHG emissions in Calgary. These were then grouped into four key areas. While these areas are the focus for the current Community GHG Reduction Plan, the Plan will need to be reviewed and revised periodically to ensure it is kept up to date as new technologies emerge, government policies are developed and market conditions change. The previously mentioned research report summarizes all of the emission reduction opportunities previously investigated.

These four focus areas are ranked in order of reduction potential. Deciding which opportunities to pursue first are dependent on many factors including the ease of implementation and the level of potential impact.

- 1. Provincial electricity grid**
 - Includes large-scale wind farms, natural gas cogeneration or combined heat and power generation (CHP), coal with carbon capture and storage (CCS), and nuclear power
- 2. Energy efficiency and conservation**
 - Include energy used in buildings, vehicles, and electrical and industrial equipment
- 3. Distributed energy**
 - Includes passive solar space heating, active solar water and air heating, photovoltaics, district energy and CHP
- 4. Transportation choices and compact development**
 - Include walking, cycling and transit and are influenced by land use and transportation planning and pricing policies

The following graph shows that actions need to be pursued in all areas. No single action will be enough. For

First item...large scale wind farms

All this effort, allegedly to save the planet from global warming and climate change. But public policy should not be based on ideology – rather a **rigorous cost-benefit analysis**, which appears to be totally lacking in the Pembina Institute’s GHG Reduction plan and the City of Calgary’s decision making process on this topic.

An April 2013 Fraser Institute report, co-authored by economist Ross McKittrick, concluded that Ontario's Green Energy Act is “causing energy prices to soar; the plan is now 10 times costlier than [conventional fuel] alternatives that would have yielded the same environmental benefits.”

Wind Has Cost Alberta Grid Stability and Imposed Hidden Costs

<http://www.financialpost.com/story.html?id=f7ef4e6d-29f0-4a5e-95c3-084ff5eac8c0&k=3367>

"We now have so much windpower generation that we need to fall back on reliable sources of power," said Peter Hunt, an Enmax spokesman.

"The problem with wind power is that the wind doesn't blow all the time, so the greater percentage of the system depends on wind, the more vulnerable to disruption the system becomes when the wind stops blowing."

Europe's Renewable Climate Change Policies are Dying

Dr. Benny Peiser was guest speaker at the Friends of Science 10th Annual Luncheon March 2013 in Calgary, Alberta and brought news of the collapse and failure of EU Climate Policies upon which are predicated **Pembina Institute's recommendations to Alberta**. The Mayors of Calgary and Edmonton were offered a complimentary ticket (or to send a designate) but neither responded. The Calgary Chamber of Commerce representative also did not attend though a ticket was issued and intended attendance confirmed.

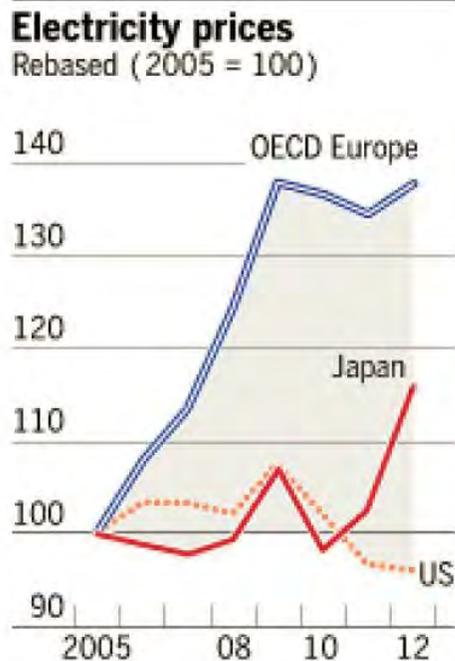
The image shows a screenshot of a Financial Post article. At the top, it says 'FP COMMENT'. Below that is a 'TRENDING' section with links to 'Verizon', 'Microsoft-Nokia deal', 'Interest Rates', 'Detroit', 'Mining', 'Keystone', and 'Housing'. The main title of the article is 'The EU green hell'. Below the title, it says 'FP BENNY PEISER, SPECIAL TO FINANCIAL POST | 13/05/13 | Last Updated: 13/05/13 3:55 PM ET'. There is also a 'Republish Reprint' icon.

<http://opinion.financialpost.com/2013/05/13/the-eu-green-hell/>

Dr. Peiser's full pdf as well as a video of his presentation on the 'green hell' and economic catastrophe in Europe is available on Friends of Science website.

<http://www.friendsofscience.org/index.php?id=653>

Heat-or-eat Fuel Poverty has Killed Thousands in the UK & EU



Source: European Commission

Since adopting the European Roadmap 2050 in the form of the Climate Change Act 2008, electricity prices in the UK and EU have skyrocketed, leaving thousands of people in fuel poverty.

A report by Prof. John Hills of the UK entitled “**Fuel Poverty: The Problem and its measurement**” delineates fuel poverty’s serious adverse human health implications, mental health trauma, stress, stunting of adolescent physical and emotional growth, isolation and death in the elderly, very young or infirm. **A million deaths in the UK have been blamed on fuel poverty; thanks to the ‘rush to renewables’ that spiked energy prices. A main target in that rush was shutting cost-efficient, reliable coal plants.**

xxvi

Jeremy Nicholson, director of the Energy Intensive Users Group (EIUG), gave warning that this could turn into a crisis when the UK is reliant on 6,400 turbines accounting for a quarter of all UK electricity demand over the next 10 years.

He said the shortfall in power generated by wind during cold snaps seriously undermined the Government's pledge on Friday to build nine major new wind "super farms" by 2020.

"If we had this 30 gigawatts of wind power, it wouldn't have contributed anything of any significance this winter," he said. "The current cold snap is a warning that our power generation and gas supplies are under strain and it is getting worse."

Coal stations are currently used as back-up generation when there is a surge in demand for gas and the wind does not blow – which both tend to happen during cold weather.

PROFESSOR HILLS' RESEARCH

“Fuel Poverty: the problem and its measurement”

Key findings:

Key elements in the evidence include:

- There are specific health consequences of exposure to low temperatures and the drivers of fuel poverty are significant factors in determining the temperatures at which individuals live (Sections 2.5 and 3.2).
- **Health impacts caused by exposure to cold tend to relate to cardiovascular and respiratory problems**
- **diminished resistance to infections and the incidence of damp and mould in the home**
- Most dramatically, the UK has a higher rate of ‘**excess winter deaths**’ .. **around 27,000 per year in the last decade, this is comparable to more than ten times the number of transport-related deaths in 2009.**
- **increased risk of cardiovascular-related death.... half of excess winter deaths may be attributable to indoor temperatures**

Beyond each premature death, there will be **many more health-related incidents** and associated costs ...

- **low temperatures and poor mental health,**
- **stressed and subject to common mental disorders**
- **social isolation amongst adults**
- **truancy, negative impacts on educational attainment and risk of anti-social behaviour amongst adolescents**
- **facing a choice of ‘heat or eat’**

All of these problems are very good reasons for trying to ensure that people can and do keep warm.

(Excerpt of Executive Summary of “Fuel Poverty: The Problem and its Measurement”)

GERMANY IS BUILDING 26 COAL PLANTS - WHY?

Often touted as the green leader of European Climate Change, Dr. Peiser's presentation revealed that **Germany is going back to coal.**

Why?

The EU carbon market collapsed in the spring of 2013.

The carbon 'risk' factor of coal went from 34.90 euro per carbon unit in 2008 to just 3 euro in the spring of 2013.

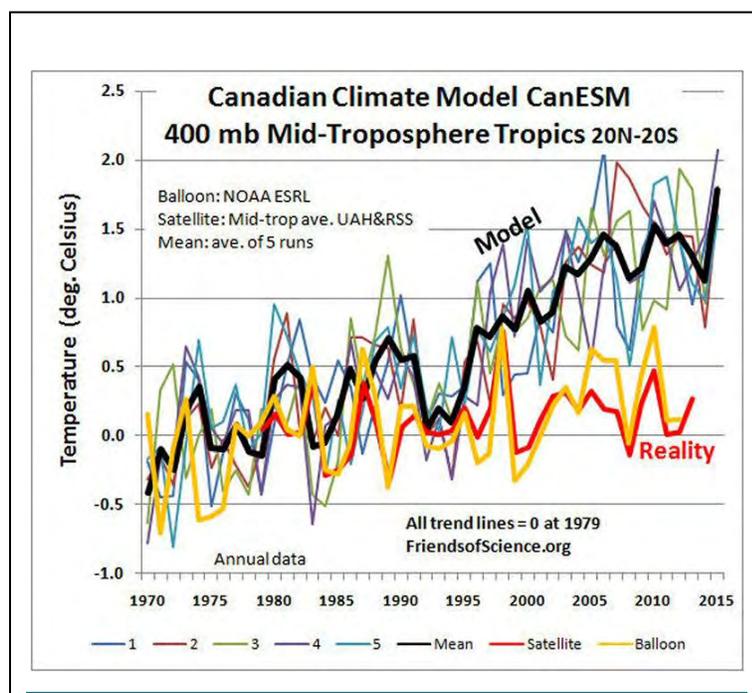
Germany is burning 'brown coal' – said to be the more 'polluting' kind.

In a health conscious country like Germany, if coal use were a significant risk to human health, do you think they would be going back to coal? Is it health....or carbon risk that is the main factor in shutting down coal plants.

Carbon risk and the penalties and subsidies imposed because of it are the reason UK and EU citizens have been pushed into fuel poverty, not health concerns.

Therefore, Alberta – a northern climate filled with modern industry – must maintain a reliable power grid. Coal and natural gas are the answers for Alberta. Coal is the cheapest alternative – Alberta has lots of it, and we also have excellent, continuous improvement in coal operations and emissions reduction.

Canadian Climate Models Scare the Public and Government into Climate Action - In reality they are 590% off the mark^{xxvii}



Canadian Climate Model CanESM2: Canadian climate model simulations of mid-troposphere 400 mbar tropical temperatures and two datasets of observations

Friends of Science have released a new in-depth study of the predictive climate models of the [Canadian Centre for Climate Modeling and Analysis](#) (CCCma) located at the University of Victoria in British Columbia. The CCCma is a division of [Environment Canada's Climate Research Branch](#).

"Taxpayers in Canada should be appalled at how their money has ended up funding faulty science that has driven climate change terror around the world," says Ken Gregory, director of Friends of Science.

The Intergovernmental Panel on Climate Change (IPCC) used the Canadian model to claim dangerous climate change and global warming were imminent. Friends of Science study reveals that the faulty Canadian computer models have led to climate change policies that have wasted trillions of taxpayers' dollars on a non-existent problem.

The study titled "The Canadian Climate Model's Epic Failure" is on the Friends of Website [here](#) and was also published on the award-winning website "Watts Up With That?" [here](#).

Gregory compared the Canadian models against observed temperatures and found the Canadian model produces one of the most extreme warming and most faulty projections of all the [30 models](#) evaluated by the IPCC.

Canadian Climate model simulations were compared to the actual temperature records of near-surface air measurements, weather balloon measurements, satellite measurements and the average trends.

Six graphs in the study show the Canadian CanESM2 climate model simulations dramatically diverge from the real temperatures.

"The modeled prediction of global near-surface temperature warming rate is 226% of the measurements - far too high," says Gregory. See [here](#).

"In the tropics, the Canadian predictions are extremely far off," says Gregory, pointing to a predicted temperature model trend over the tropics at 7 km altitude that is 690% of the actual trend based on satellite measurements, from 1979 to today. See [here](#).

The Canadian model near-surface tropical temperature trend is 300% of the average of the three observational trends. See [here](#).

In much of the southern hemisphere, the near-surface modeled temperature trend is in the opposite direction from the measurements, which show cooling.

"These huge errors render the projections useless," says Gregory. "They are terrifying, but completely inaccurate. Global warming stopped 16 years ago. Models that are this far off are useless for setting public policy."

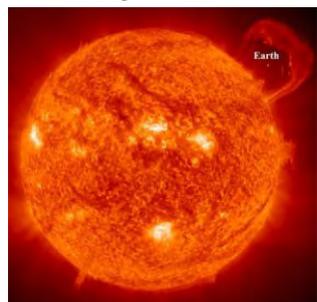
Climate alarmism has already cost global taxpayers \$1.6 trillion and pushed taxpayers into 'heat-or-eat' poverty in the UK.

Friends of Science Society wants governments to abandon using faulty climate computer models for setting public policy on climate change until they are changed to match the observations as is required by the Scientific Method.

Gregory points out, "Politicians design energy policies, carbon taxes and GHG reduction strategies based on faulty science; taxpayers suffer when the Scientific Method is ignored."

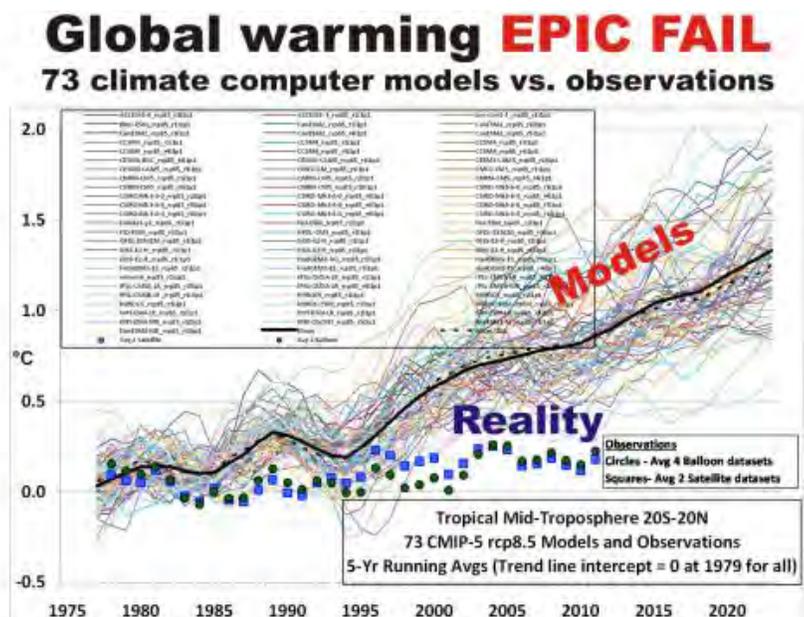
The Science on Global Warming and Climate Change...Leaves out the Sun's Magnetic Flux

The Intergovernmental Panel on Climate Change (IPCC) is typically cited as the scientific consensus source for the claim that carbon dioxide is warming earth. The IPCC was established to study the *human-made* factors of climate change. Their review does not include any comprehensive study of solar or cosmic factors affecting climate because this is **not their mandate**.

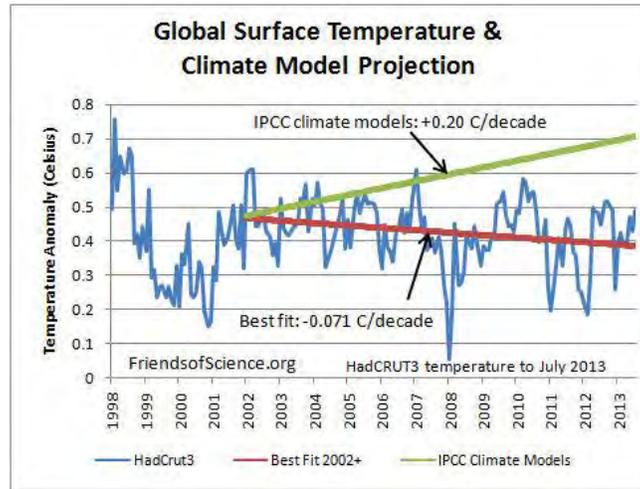


But solar scientists have established patterns of influence between the changing solar cycles of magnetic flux (i.e. every 11 years the sun's magnetic poles 'flip') and related infiltrations of cosmic rays, which in turn affect cloud cover and ocean oscillations. These patterns have been observed over

hundreds of years through natural phenomenon (i.e. Galileo tracked sun spots – an indicator of solar magnetic flux change); paleoclimatology has identified proxy measurements from ice cores, sediments, carbon 14 dating, tree rings etc from around the globe to establish climate patterns over eons. This is hard evidence – as opposed to the work of the IPCC, most of which is predicated on computer models.



This graph shows that the average temperature trend of 73 climate model runs since 1979 is 5 times the temperature trend of weather balloon and satellite observations in the tropical mid-troposphere. Dr. Roy Spencer, author of the graph, writes *"Now, in what universe do the above results not represent an epic failure for the models? I frankly don't see how the IPCC can keep claiming that the models are 'not inconsistent with' the observations. Any sane person can see otherwise."*



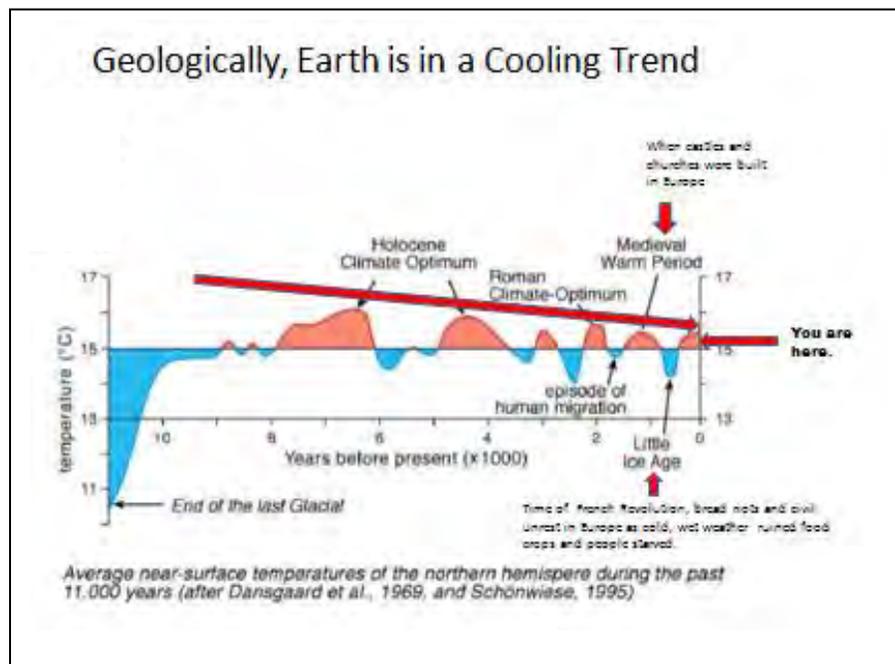
The January 2002 to July 2013 data indicates a **decline** of 0.07 C/decade, but the models projected that temperatures would increase by 0.20 C/decade during this period.

Yet governments have set climate policies on these unreliable predictive **virtual** models instead of properly evaluating hard scientific evidence.

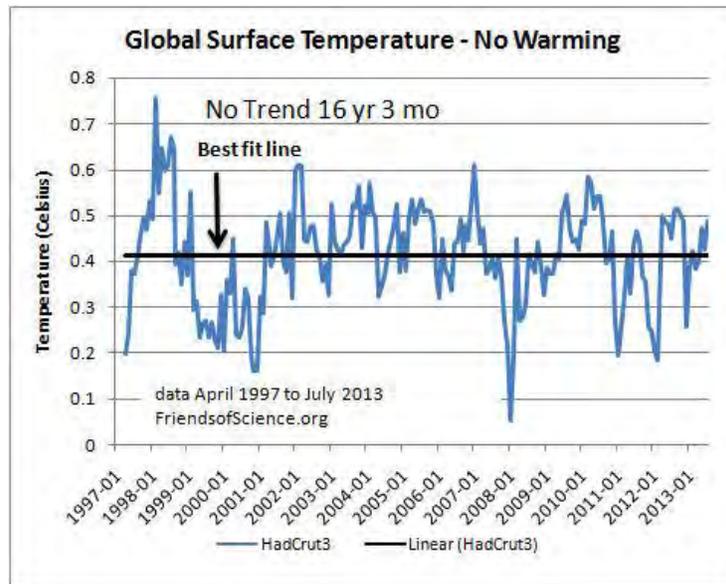
Low-carbon GHG reduction plans were based on IPCC computer model predictions. Friends of Science relies upon scientific evidence.

The Sun Drives Climate Change, Not CO2

xxviii



Supporting scientific references can be found on Friends of Science Solar page.^{xxix}



No global warming in 16 years.

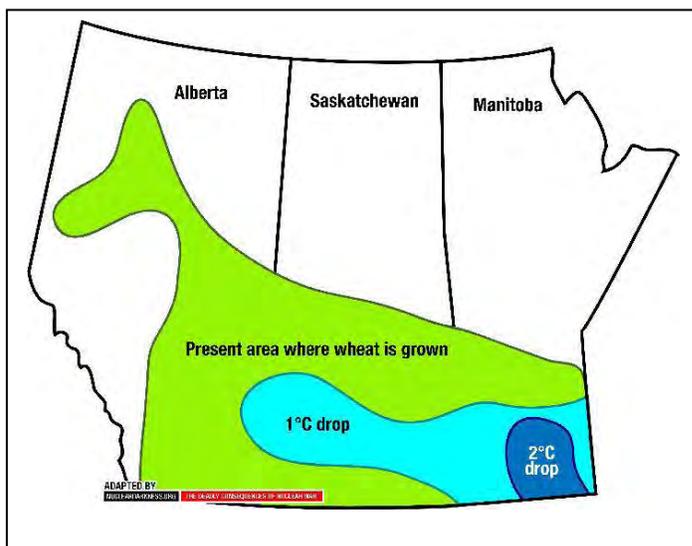
In light of this scientific evidence, why are we following the ‘low-carbon’ recommendations of Pembina Institute at any level of government?

What of the Impact of Global Cooling?

Alberta needs coal and gas-fired plants to face a more likely threat of solar hibernation and drop in temperature.

As noted by NASA and many solar scientists, the sun is now in cycle 24 and shows very little solar spot activity compared to previous cycles. This low activity parallels the “Dalton Minimum” of low solar activity that corresponded to the latter part of the “Little Ice Age” wherein temperatures were unusually low for five hundred years. In the event of a 1 or 2 degree drop in annual temperatures, Alberta and Canada would lose much of its productive crop land. Albertans must be prepared for anything – including global cooling.

xxx



The map indicates crop areas affected by temperature drop.

The green area of the map is the current cultivated area. The light blue indicates the arable land remaining (vis a vis temp and growing season) if there was a 1 degree C drop in temperature; the dark blue area indicates the only arable land if a 2 degree C drop in temperature. Climate fluctuations such as these (cooling and warming) have happened many times in human and geologic history.

But isn't wind clean and green? And Free?



Not Green or Clean



Neodymium Miners

Victims of the West's Obsession with 'Green'

Villagers Su Bairen, 69, and Yan Man Jia Hong, 74, stand on the edge of the six-mile-wide toxic lake in Baotou, China that has devastated their farmland and ruined the health of the people in their community

Read more: <http://www.dailymail.co.uk/home/moslive/article-1350811/In-China-true-cost-Britains-clean-green-wind-power-experiment-Pollution-disastrous-scale.html#:::ZREA6HFNb>
Follow us: @MailOnline on Twitter | DailyMail on Facebook

Not Green - Dead Bats - Sliced Endangered Birds



What killed this bat?



Massive amounts of CO₂ for footings & fossil fuel consumption

If the objective is to 'reduce GHGs' then wind farms are the worst recommendation.

TransAlta's Taylor Wind Farm operated for only 7 years (2004-2011). When decommissioned some 60,000 tonnes of cement was 'recycled' by scattering it along a dam as 'erosion control.'

Current cement production*

1. Carbonate feedstock: limestone is dug up and processed. Typically **400kg of CO₂** released from limestone per tonne of cement.
2. High temp process (1,450°C) requires fossil fuel. Typically **400kg of CO₂** created from fuel per tonne of cement.
3. **No absorption of CO₂ in cement production.**

Total typical emissions of
+800kg CO₂/tn cement

* Global weighted average figures from International Energy Agency 2007

Renewable is NOT so Doable - Rescind the GHG Reduction Plan, *imagineCalgary* and PlanIt

The City of Calgary has engaged the Pembina Institute to provide the city with expert advice regarding a GHG Reduction plan, allegedly to protect the environment from global warming by reducing emissions related to the Greenhouse Gas Effect. This plan was written in 2011, 13 years after global warming stopped. The Pembina Institute advocated for the closure of coal-fired electricity generation plants in **Alberta in its 2009 “Greening the Grid” report.**

In the spring of 2013, the Pembina Institute issued “Costly Diagnosis” – a condemnatory attack on **Alberta’s coal-fired energy plants** which included serious statistical manipulations and misinformation, making coal appear to be responsible for substantial health costs and numbers of deaths.

Dr. Ross McKittrick, an expert, **disputes the Pembina Institute’s** figures as do Friends of Science.

With regard to the GHG Reduction Plan, it does not appear that the City of Calgary ever requested an independent audit of these recommendations. **Pembina’s “Renewable is Doable” plan for Ontario has** virtually bankrupted that economy.

Serious economic and health impacts have been the result of similar GHG reduction recommendations in the UK and Europe; many ‘low-carbon’ plans were based on faulty Canadian global warming computer model simulations that are some 590% higher than the actual recorded temperature trends.

Australia has abandoned its carbon tax; this was a crucial election issue. In the EU and UK, similar abandonment of climate change/GHG reductions is underway. Their hard experience should be a helpful lesson for us. Renewable is NOT so doable.

Friends of Science recommend that:

- 1) The City of Calgary should order an immediate independent audit and cost-benefit analysis of all GHG reduction recommendations by an expert authority such as Dr. Ross McKittrick.
- 2) The City of Calgary should formally withdraw from the 2009 Climate Accord – and should publicly state that Calgary is an energy capital founded on the development of fossil fuels and leading edge environmental management of these resources.
- 3) All GHG reduction targets of *imagineCalgary*, PlanIt and Sustainability 2020 should be scrapped; coal power should be reinstated as a reliable, cost-effective power generation for Albertans. We cannot afford a scenario where the unreliability of wind power forces individual consumers and large electricity customers to cut their productive use of power while wind farm investors profit on the backs of taxpayers and power consumers.

We would be happy to make a personal presentation on any of these matters.

Respectfully,
Friends of Science Society



About Friends of Science

Friends of Science have spent a decade reviewing a broad spectrum of literature on climate change and have concluded the sun is the main driver of climate change, not carbon dioxide (CO₂). The core group of the Friends of Science is made up of retired and active earth and atmospheric scientists. Membership is open to the public and available on-line.

Our web-site offers a wide selection of climate change science. Feel free to ask for specific information or to comment on our facebook page.

Friends of Science Society is funded by individual member donations; it is a registered non-profit society in Alberta. Friends of Science Society has an unpaid, volunteer board of retired scientists and business professionals.

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- ⁱ <http://www.friendsofscience.org/> (Retrieved Sept. 10, 2013)
- ⁱⁱ <http://www.pembina.org/re/greening-the-grid-in-alberta> (September 09, 2013)
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xxviii **Over longer time periods, there is significant correlation between solar proxies (C14) and climate**

<http://www.friendsofscience.org/assets/documents/FOS%20Essay/ScafettaWestSunvsTemp%20Adj.jpg>

<http://www.friendsofscience.org/assets/documents/FOS%20Essay/Solar%20activity%20CR%20vs%20Temp.jpg>

http://www.friendsofscience.org/assets/documents/FOS%20Essay/Koch_SCL.jpg

Over the long time period, the noise caused by the ocean cycles cancel, the time delay between forcing changes and temperatures become less important.

Nir Shaviv shows in a paper summarized that heat flux going into the oceans correlates with the solar cycle. The heat flux has no time lag with respect to the solar cycle. Shaviv finds that the heat flux going into and out of the oceans over the solar cycles is about seven times that expected from the TSI forcing alone.

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

Changes in forcing have a delayed effect on temperatures due to the large heat capacities of the oceans. A study "Solar activity and Svalbard temperature" shows strong correlations between northern temperature and solar cycle length. The strongest correlations are with lags of 10 to 12 years. The abstract says, "These models show that 60 per cent of the annual and winter temperature variations are explained by solar activity." See last item on this page.

<http://www.friendsofscience.org/index.php?id=227>

Those who advocate carbon dioxide as the primary driver of climate change should explain why there is no correlation between CO₂ and temperatures over the last 10,000 years.

^{xxix} Our Solar page is [here](#).

This [article](#) by Alec Rawls lists several studies that show high correlation of solar activity to temperature. "The evidence overwhelmingly supports the solar-magnetic warming theory."

Some specific articles:

[Bond et al. 2001](#) "Persistent Solar Influence on North Atlantic Climate"

"Over the last 12,000 years virtually every centennial time scale increase in drift ice documented in our North Atlantic records was tied to a distinct interval of variable and, overall, reduced solar output."

Neff et al. [2001](#), "Strong coherence between solar variability and the monsoon in Oman between 9 and 6 kyr ago," Nature.

Finding from Neff: Correlation coefficients of .55 and .60.

Usoskin et. al. [2005](#), "Solar Activity Over the Last 1150 years: does it Correlate with Climate?" Proc. 13th Cool Stars Workshop.

The long term trends in solar data and in northern hemisphere temperatures have a correlation coefficient of about 0.7 — .8 at a 94% — 98% confidence level.

Shaviv and Veizer, [2003](#), "Celestial driver of Phanerozoic climate?" GSA Today.

Mangini et. al. [2005](#), "Reconstruction of temperature in the Central Alps during the past 2000 yr from a $\delta^{18}O$ stalagmite record."

Ogurtsov et al, [2010](#), "Variations in tree ring stable isotope records from northern Finland and their possible connection to solar activity,"

Statistical analysis of the carbon and oxygen stable isotope records reveals variations in the periods around 100, 11 and 3 years. A century scale connection between the ¹³C/¹²C record and solar activity is most evident.

Di Rita, [2011](#), "A possible solar pacemaker for Holocene fluctuations of a salt-marsh in southern Italy,"

The chronological correspondence between the ages of saltmarsh vegetation reductions and the minimum concentration values of ¹⁰Be in the GISP2 ice core supports the hypothesis that important fluctuations in the extent of the salt-marsh in the coastal Tavoliere plain are related to variations of solar activity.

Raspopov et al, [2011](#), "Variations in climate parameters at time intervals from hundreds to tens of millions of years in the past and its relation to solar activity,"

Our analysis of 200-year climatic oscillations in modern times and also data of other researchers referred to above suggest that these climatic oscillations can be attributed to solar forcing. The results obtained in our study for climatic variations millions of years ago indicate, in our opinion, that the 200- year solar cycle exerted a strong influence on climate parameters at those time intervals as well.

Tan et al, 2011, "Climate patterns in north central China during the last 1800 yr and their possible driving force" Solar activity may be the dominant force that drove the same-phase variations of the temperature and precipitation in north central China.

Solheim et al. [2011](#), "The long sunspot cycle 23 predicts a significant temperature decrease in cycle 24,"

We find that for the Norwegian local stations investigated that 30-90% of the temperature increase in this period may be attributed to the Sun. For the average of 60 European stations we find $\approx 60\%$ and globally (HadCRUT3) $\approx 50\%$. The same relations predict a temperature decrease of $\approx 0.9^\circ\text{C}$ globally and $1.1\text{--}1.7^\circ\text{C}$ for the Norwegian stations investigated from solar cycle 23 to 24.

The world is dominated by powerful negative feedbacks that reduce the "basic science" climate sensitivity. Declining upper atmosphere water vapor, increasing clouds and changes in air and ocean circulation patterns changes the no-feedback climate sensitivity to roughly 0.5 C . This temperature change would be almost all beneficial, as warming reduces storminess, reduces tornadoes, increases crop and forest growth, reduces heating costs, reduces construction costs, reduces road maintenance costs, improves health, and makes a more pleasant climate. - Ken Gregory, director and lead researcher Friends of Science.

Anthony Watts reminds us that the sun's magnetic field: " The sun's magnetic field is said to deflect cosmic rays when its solar magnetic dynamo is more active, and right around the last solar max, we were at an [8000 year high](#), suggesting more deflected cosmic rays, and warmer temperatures. Now the sun has [gone into a record slump](#), and there are predictions of cooler temperatures ahead ".

^{xxx} <http://www.forbes.com/sites/peterferrara/2013/05/26/to-the-horror-of-global-warming-alarmists-global-cooling-is-here/> (Retrieved Sept 12, 2013)