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Nov 13, 2015

CBC Edmonton

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Executive Producer, All Platforms Email: Neill Fitzpatrick TEL: (780) 468-7527

News Director Email: Gary Cunliffe TEL: (780) 468-7505

Audience Relations, CBC
P.O. Box 500 Station A
Toronto, ON
Canada, M5W 1E6

Dear Mr. Fitzpatrick and Mr. Cunliffe,

RE: "Computer-generated video shows pollution spread across the Prairies" Oct 8, 2015

http://www.cbc.ca/news/canada/edmonton/computer-generated-video-shows-pollution-spread-across-the-prairies-1.3261783

We believe this new item to be false and misleading and that the source material has been significantly distorted, as shown by the evidence herein.

Our interest in energy-air pollution and the persistent 'phase-out coal campaign' is simply that, as scientists who examine evidence and facts, we are disturbed at the level of distorted reporting about a valuable resource/industry that provides Albertans with affordable power. We do not want to see Alberta become like Ontario, saddled with debt and an inefficient, costly grid. At present, Alberta has no public debt for utilities. Ontario's debt is $44 billion and their overall provincial debt is $239 billion.

A significant portion of Ontario's problems are related to poor decisions on power generation, which stemmed from recommendations that were put forward there over a decade ago, in a similar way to what is being done now, by Pembina Institute and CAPE.

The Pembina Institute report "A Costly Diagnosis…" which Dr. Vipond, for CAPE, frequently cites, is not supported by the evidence.

In your report, you say:

"Dr. Joe Vipond of Canadian Association of Physicians for the Environment says the visual representation of air pollution brings awareness of the issue to a whole new level….. He's leading a campaign to shut down coal-fired power plants, one source of the emissions seen in the video model."

Dr. Vipond is quoted as saying:

"In the populated areas, it's the coal-fired power plants that are really causing the disturbances," he said, noting there are 12 plants west of Edmonton and several more to the south.

Our evidence, in our report "BURNING QUESTIONS" indicates that most asthma-respiratory issues are related to ground level air quality – this study relates **to aerial dispersion of oil sands emissions**.

Consequently, it appears that you are reporting false and unsubstantiated information to the public.

We would be happy to comment or provide more information. We look forward to a prompt and public correction.

Sincerely,

Michelle Stirling
Communications Manager
Friends of Science Society

Errors and Misrepresentations in:

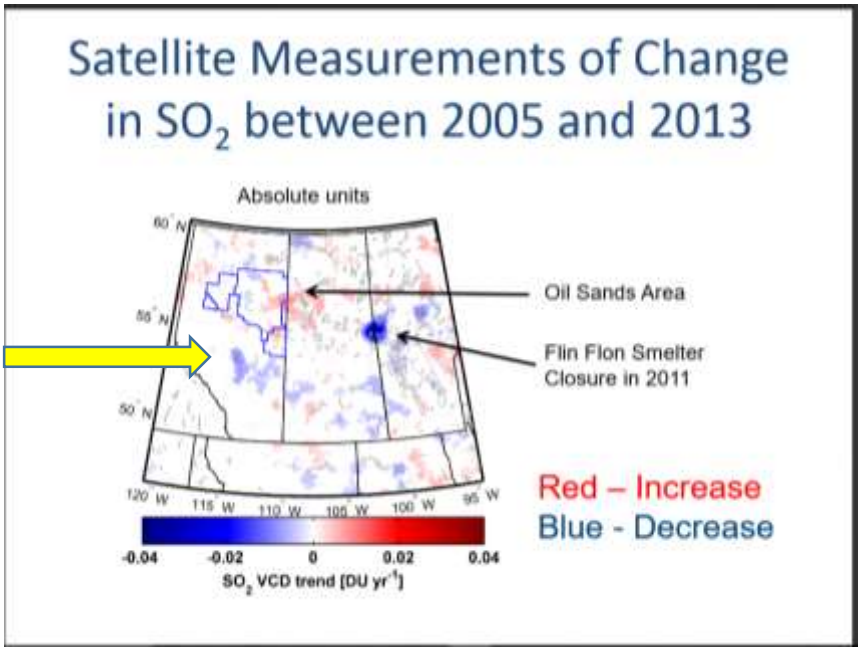
RE: "Computer-generated video shows pollution spread across the Prairies" Oct 8, 2015

http://www.cbc.ca/news/canada/edmonton/computer-generated-video-shows-pollution-spread-across-the-prairies-1.3261783

1) There are significant misrepresentations of the information presented in the original Joint Oil Sands Monitoring conference, from which this information is taken.

2) Within the Joint Oil Sands Monitoring explanatory video by Heather Morrison of Environment Canada, she presents the following image. http://aemera.org/oil-sands-symposium-program/8-3-high-resolution-air-quality-modelling-in-the-oil-sands/

Coal-fired power plants are in a fairly dark blue. They have REDUCED SO2 emissions over 8 years from 2005.



3) Ms. Morrison of Environment Canada states at 4:09 in the video that there has been a *decrease* in sulfur dioxide concentrations from the coal-fired power plants *"which aligns very nicely with the mitigation that has happened over that time period…"* and that this image shows in blue where there has been a decrease to 2013.

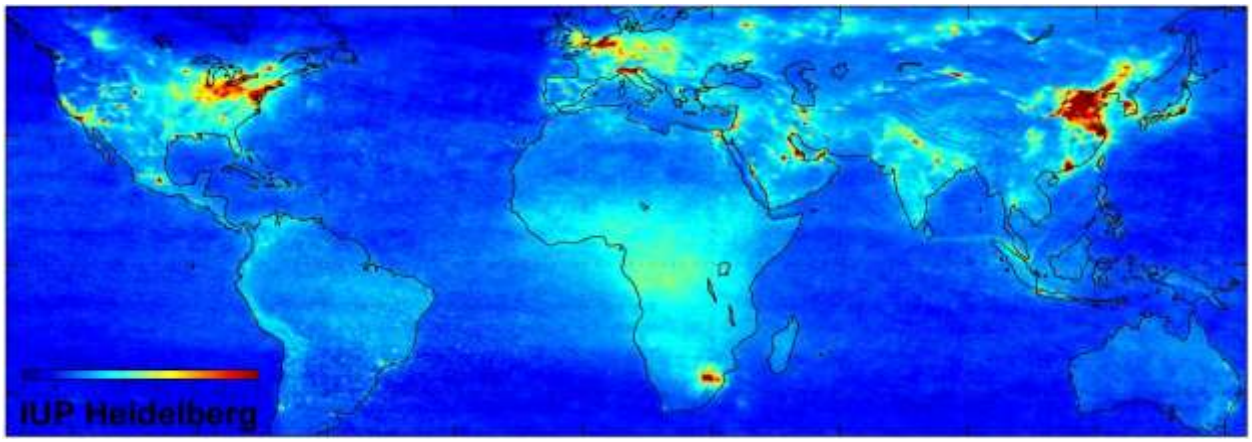
4) Furthermore, the study is evaluating a model, a computer simulation, vis a vis forecasting abilities related to landscape, emissions and weather conditions, with the model specifically applied in the oil sands operations area. This is NOT a report or study on output of emissions in all areas of the province.

5)

6) 

7) At 8:59 in the video clip, Heather Morrison of Environment Canada says “what you can see is the measurements are sparse across the landscape and look **disproportionately large** because **they had to make the dots big enough that you can see them.”**

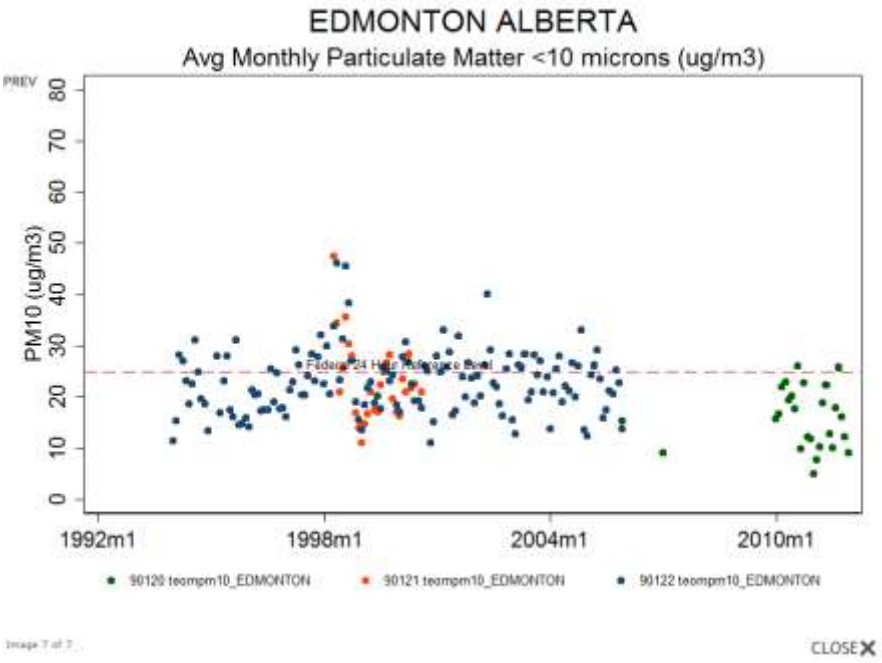
8) Here is a map of NO2 emissions worldwide from the ESA satellite from 2004. Alberta does not have anywhere near the concentrations of pollutants that eastern Canada has – the model being used in the Joint Oil Sands Monitoring study is a very high resolution on a 2.5 km grid, which is, as we understand it from Ms. Morrison’s discussion, a new, model on a new finer matrix. Thus, comparatively low levels of **simulated emissions** appear larger than life as they rise and disperse.



Global air pollution map produced by Envisat's SCIAMACHY

http://www.esa.int/Our_Activities/Observing_the_Earth/Envisat/Global_air_pollution_map_produced_by_Envisat_s_SCIAMACHY

9) Here are the federal and provincial graphs of average monthly emissions for the city of Edmonton for the past 10 to 30 years (depending on records) from federal and provincial data sources. Air quality has consistently **improved** – emissions have significantly dropped for most industries and in most areas of the nation. Please look at Edmonton's data.



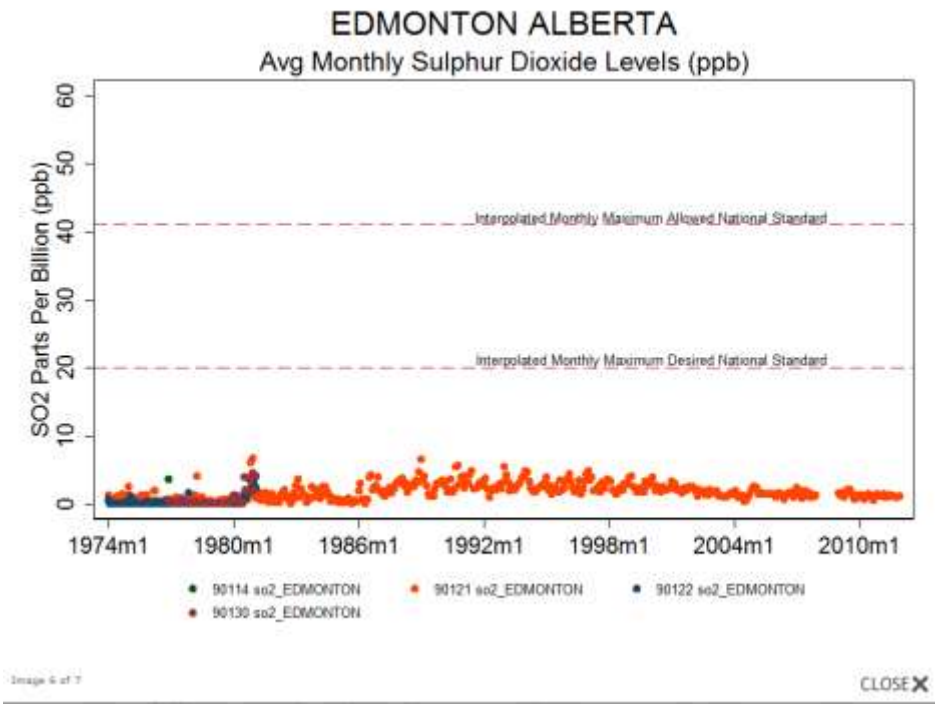


Image 6 of 7

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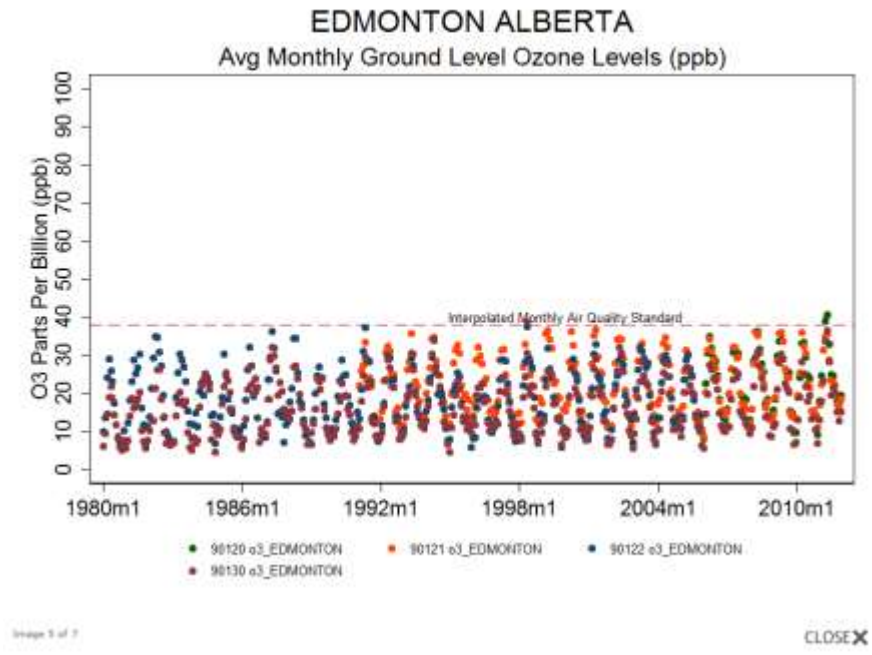

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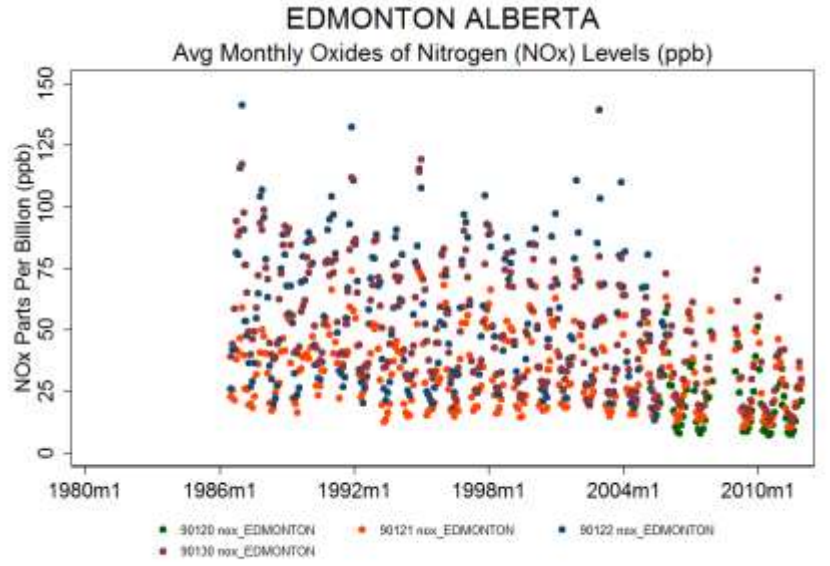

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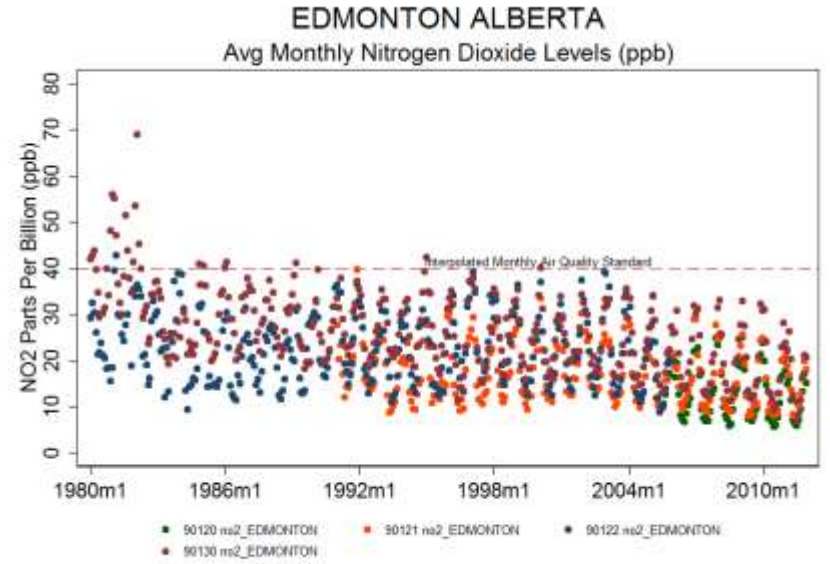

Image 3 of 7

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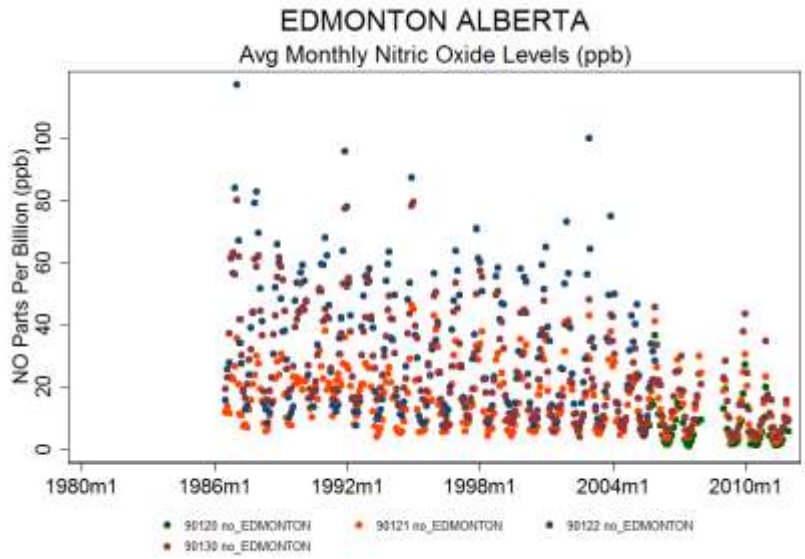

Image 2 of 7

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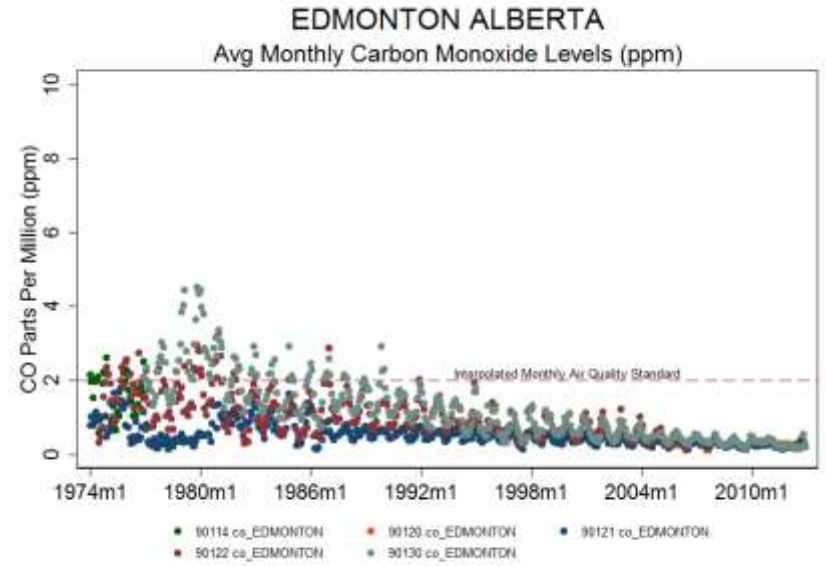

Image 1 of 7

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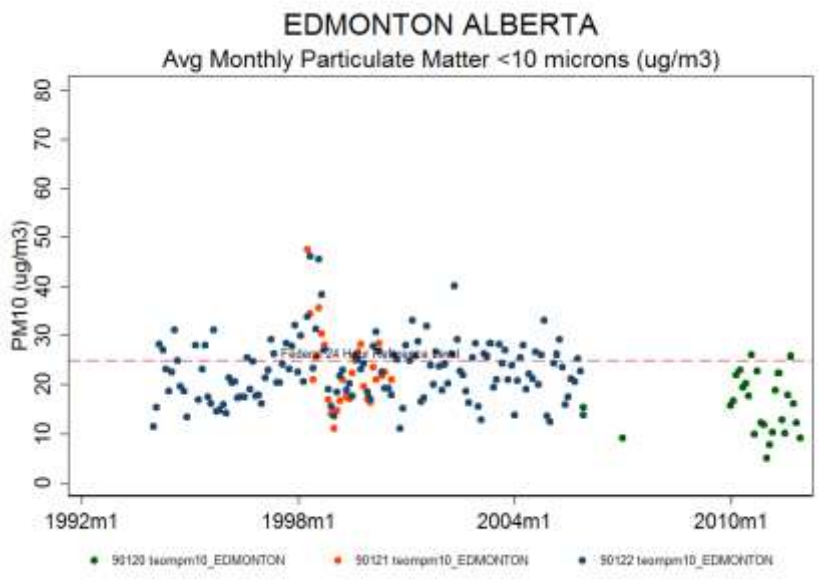


10) Likewise the statements by Andrew Read of Pembina Institute misrepresent the purpose of the video. The video images are first of all a model, a simulation.

"I think it really outlines the cumulative effects that are present from a large number of emission sources," said Andrew Read, an analyst with the Pembina Institute, an environmental watchdog agency.

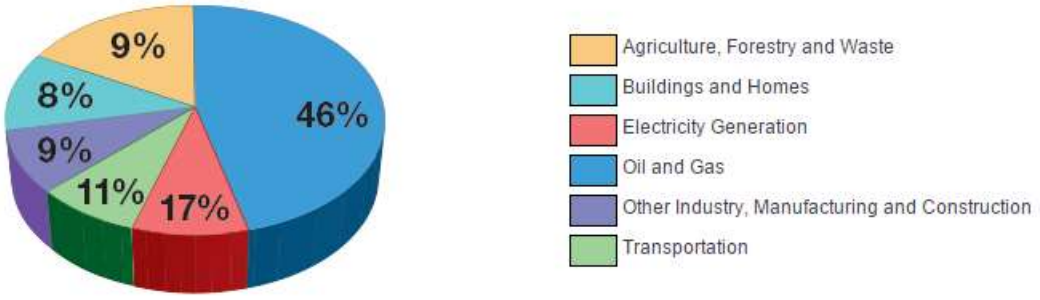
"The video is really a good tool to demonstrate how emissions are distributed and dispersed in the province," he said.

As noted in your article, the simulation excludes all other source of emissions. So this video only shows how high stack emissions from oil sands monitoring were possibly distributed during a specific test period, based on specific parameters. As you note, it does not include all forms of emissions or all sources, therefore it does not outline the cumulative effects, because it deals with only one element.

Let us look at the sectors that emit GHGs in Alberta. Shutting coal fired power plants would move to natural gas, which also has similar emissions.

Sources of Emissions

Over half the emissions in Alberta are the result of industrial, manufacturing and construction activity, as well as from producing the electricity we consume in our homes, communities and businesses. The remainder comes from heating our homes and businesses, transportation and from agriculture, forestry and municipal waste.



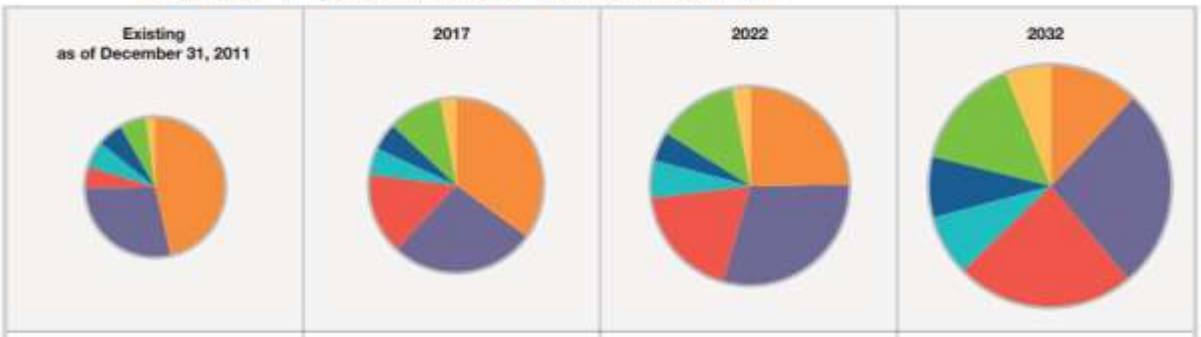
Emissions Growth

Alberta's emissions have increased 15 per cent from 2005. Alberta's greenhouse gas emissions are projected to continue to rise from most emissions sources from now to 2030.

One might conclude that Albertans will have to stop living in buildings, thus reducing 46% of GHGs.

If we look at the 2017 forecast chart for power generation in Alberta, we find that coal generation will make up only about 1/3 of power generation in the province – therefore, if 17% of GHGs come from power generation and coal fired power plants are closed, as Dr. Vipond subsequently advocates for in your story, only 5% of GHGs would be reduced from the above emissions chart – with 11% still being GROUND LEVEL asthma inducing Diesel Emissions Particulates.

Figure 5.3.5–1: Generation Outlook – Installed Capacity (MW)



Existing as of December 31, 2011		2017		2022		2032	
46% Coal	6,242	35% Coal	5,900	25% Coal	4,832	12% Coal	2,876
28% Cogeneration	3,782	27% Cogeneration	4,619	30% Cogeneration	5,770	27% Cogeneration	6,365
5% Combined Cycle	750	15% Combined Cycle	2,518	19% Combined Cycle	3,668	24% Combined Cycle	5,568
6% Simple Cycle	827	5% Simple Cycle	901	6% Simple Cycle	1,176	8% Simple Cycle	1,826
6% Hydro	879	5% Hydro	879	5% Hydro	979	8% Hydro	1,979
6% Wind	865	10% Wind	1,694	13% Wind	2,544	15% Wind	3,578
2% Other	314	3% Other	445	3% Other	585	6% Other	1,385
Total	13,659	Total	16,956	Total	19,554	Total	23,577

Source: AESO

Looking at the AESO forecasts above, it is clear the the Alberta Electric System Operator sees coal-fired power as an essential part of our power generation mix.

However, in your report, you say:

“Dr. Joe Vipond of Canadian Association of Physicians for the Environment says the visual representation of air pollution brings awareness of the issue to a whole new level….. He's leading a campaign to shut down coal-fired power plants, one source of the emissions seen in the video model.”

Dr. Vipond is quoted as saying:

"In the populated areas, it's the coal-fired power plants that are really causing the disturbances," he said, noting there are 12 plants west of Edmonton and several more to the south.

Our evidence, in our report “BURNING QUESTIONS” indicates that most asthma-respiratory issues are related to ground level air quality – this study relates **to aerial dispersion of oil sands emissions**.

As shown in the pie graph above, buildings emit the most GHGs, while transportation is on a part with non-coal fired power generation.

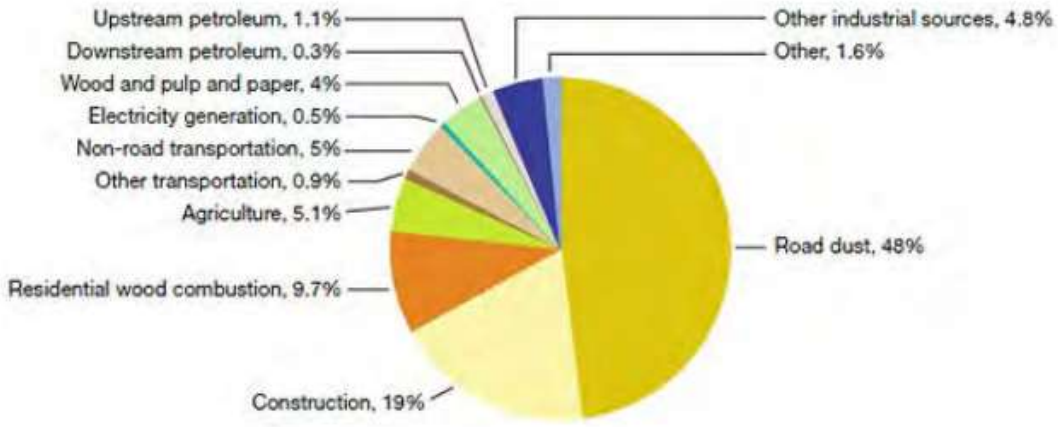
The graph below, addressing only PM2.5 in Canada, shows that coal-fired power generation is only 0.5% of PM2.5 emissions. In Alberta in 2011, coal-fired power plants produced only 0.4% of PM2.5.

Consequently, it appears that you are reporting false and unsubstantiated information to the public.

APPENDIX B – Environment Canada does not see coal plants as a major source of PM2.5

Primary Particulate Matter (PM)

The largest sources of primary (directly emitted) fine particulate matter (PM2.5) are road dust and construction/demolition activity, both characterized as open sources, amounting to approximately 67% of the national total. Other important anthropogenic sources are residential wood combustion, transportation and some industrial activities such as wood processing and pulp and paper plants (Figure 10). One area of high PM2.5 emissions density is the Windsor–Quebec City corridor resulting mainly from industrial activities and from the transportation, and residential wood combustion sectors (Figure 11). Major urban centres in western Canada and along the Edmonton–Calgary corridor are also shown as areas of high PM2.5 emissions density, again likely the result of emissions from the transportation sector. Figure 11 includes the emissions from open anthropogenic sources, illustrating the impact of these sectors such as in the interior of British Columbia. In this area, primary PM2.5 is a major issue of concern associated with residential woodstoves, agricultural and controlled burning, and road dust.



We would like to see the substantiating evidence Dr. Vipond provided to you, to support his claim that it is coal-fired power plants that are allegedly causing ‘disturbances’ in urban areas.

Dr. Vipond goes on with this quote:

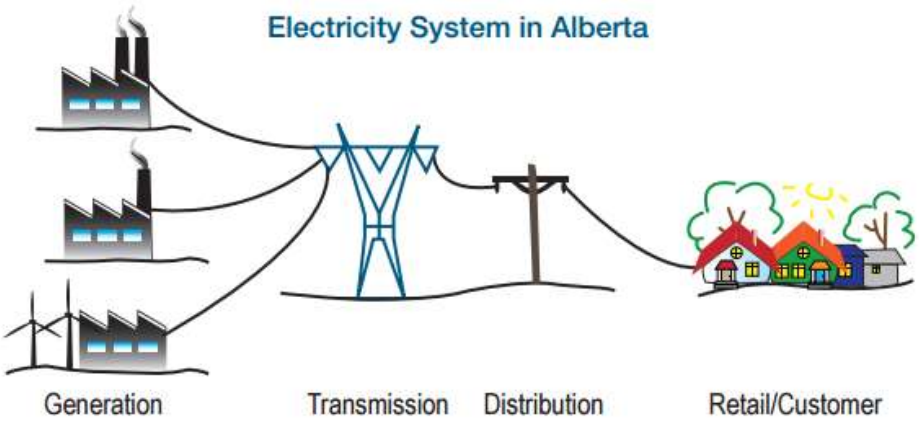
"These coal plants have viable alternatives, they're not bringing any money into the government pockets and they're having incredible health impacts on Albertans."

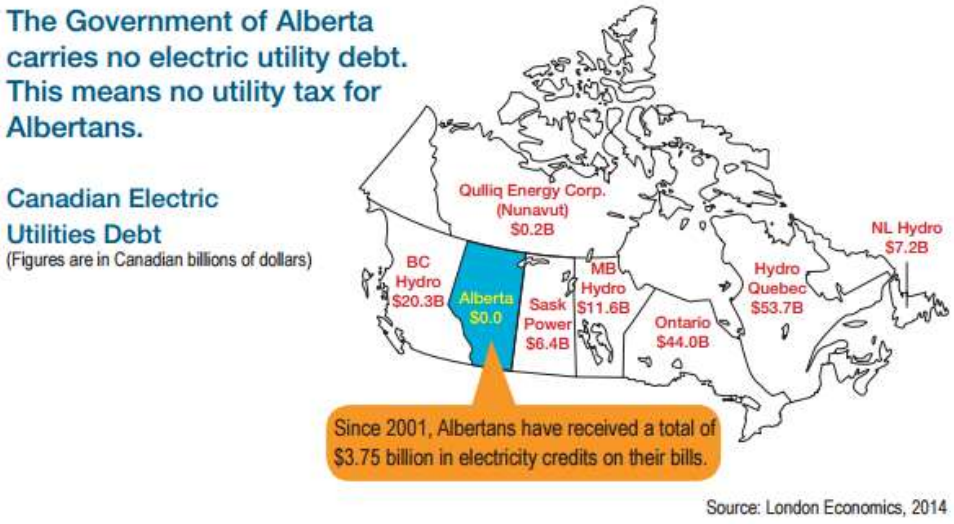
These are very bold statements.

What evidence to do you have to back them up?

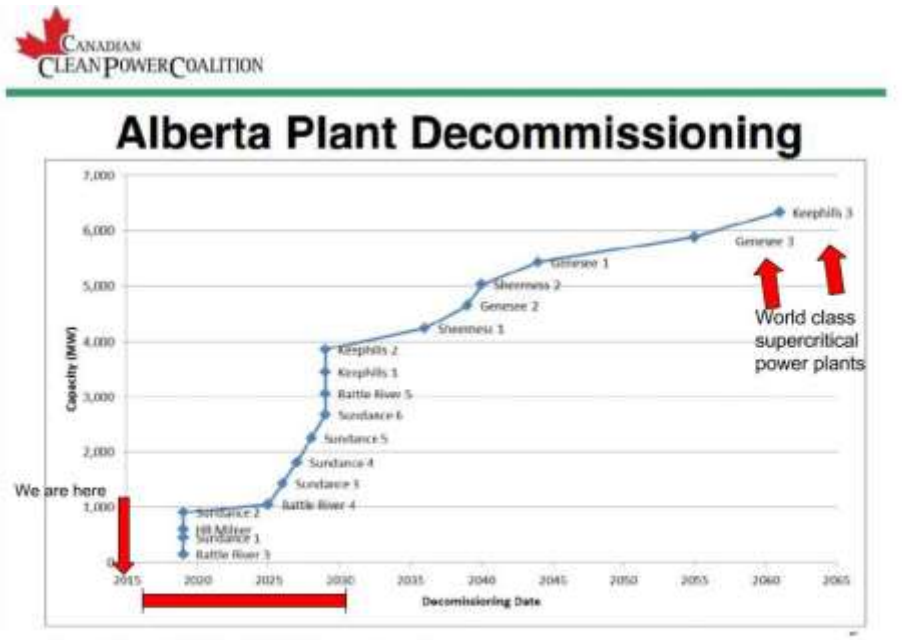
a) What are the alleged ‘viable alternatives’?
b) What substantiating evidence do you have that coal-fired power plants do not bring any money into the (Alberta) government’s pockets?
c) What evidence do you have to support the claim that coal-fired power plants are having ‘incredible health impacts on Albertans?”

11) There is an existing coal phase-out schedule, set by federal legislation. Most of the older plants will soon be phased-out on their own. Evan Bahry of the Independent Power Producers' Society of Alberta has said that to replace current coal supply, it would require eight natural gas plants, similar to that of the new Shepard Energy Centre in Calgary, at a costs of $1.4 each or about $11 Billion in total. From a previous interview, he reported that he doubts it would be possible to gather such capital or build that many plants in such a short space of time. Please feel free to confirm with Mr. Bahry independently.
12) Presently, Alberta has no public utility power debt – this would be eroded if some of the renewables policies are incorporated according to the recent statements by the Premier and Minister.



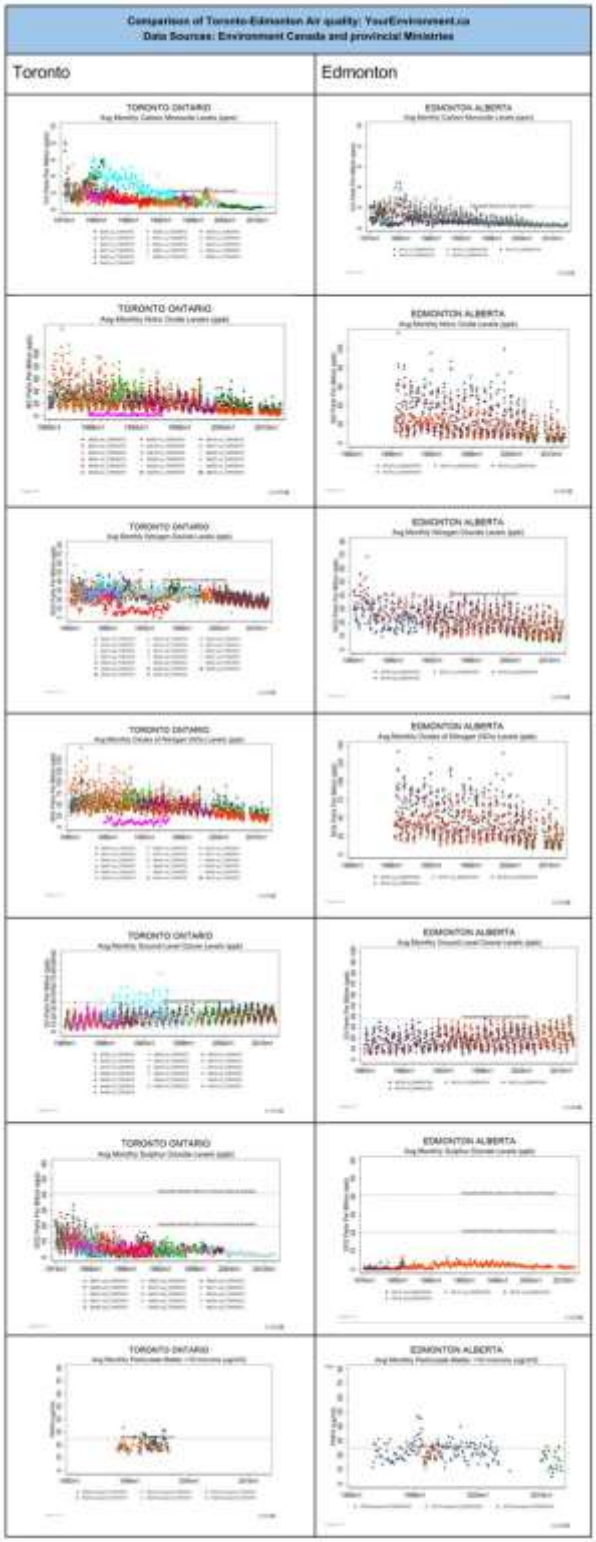


13) Is it good value for Albertans' money to pay $11 billion (plus compensation estimated at another $11.1 billion) to close coal fired power plants 10 to 15 years early, when it would cost us nothing to wait? Based on our review of the evidence, there would be little or **no proportionate benefit to environment or health.**



Early phase-out of coal-fired power plants would cost Alberta >$11 BN (to transition to nat. gas) + hundreds of millions or billions to compensate coal owners, shareholders, employees, who have agreed to the the federal retirement schedule above.
What is the message to investors when Alberta tries changing Ottawa's word?

14) Regarding previous media reports of the claim that Alberta's air quality is like that of Toronto's, here below is what a side-by-side comparison to Toronto air looks like. It does not seem like the reporter did a fact check on this matter.



15) During the dates and timeframe referred to in the video clip of Heather Morrison from Environment Canada, our people went to the CASA Data warehouse to see if the video was portraying anything out of the ordinary. For the day of Feb. 17, 2015 which was

randomly selected by Heather Morrison (as she states in the video) there were no exceedances of SO2 from any station.

Number Of Times Alberta Ambient Air Quality Objectives were exceeded from February 17, 2015 to February 17, 2015

Parameter	Sulphur Dioxide		
Averaging Period	1-	24-	Annual
Objective	0.172	0.048	0.008
Station			
Anzac	0	0	0
Battle River North Ambient Trailer	0	0	0
Battle River South Ambient Trailer	0	0	0
Beaverlodge	0	0	0
Bertha Ganter - Fort McKay	0	0	0
Breton	0	0	0
Bruderheim	0	0	0
Buffalo Viewpoint	0	0	0
Calgary Northwest	0	0	0
Calgary Southeast	0	0	0
Caroline	0	0	0
Carrot Creek	0	0	0
Clairmont-Portable	0	0	0
CNRL Horizon	0	0	0
Cold Lake South	0	0	0

Crescent Heights	0	0	0
Didsbury West	0	0	0
Edmonton Central	0	0	0
Edmonton East	0	0	0
Edmonton South	0	0	0
Edson	0	0	0
Elk Island	0	0	0
Elk Point Airport (Portable)	0	0	0
Everdell	0	0	0
Evergreen Park	0	0	0
Falher	0	0	0
Ferrier Acres	0	0	0
Firebag	0	0	0
Fort Chipewyan (WBEA)	0	0	0
Fort McKay South (Syncrude UE1)	0	0	0
Fort McMurray-Athabasca Valley	0	0	0
Fort McMurray-Patricia McInnes	0	0	0
Fort Saskatchewan-92 St and 96 Ave	0	0	0
Genesee	0	0	0
Grande Prairie (Henry Pirker)	0	0	0
Hinton	0	0	0

James River	0	0	0
James River East	0	0	0
Lamont County	0	0	0
Lancaster	0	0	0
Lethbridge	0	0	0
Lower Camp	0	0	0
Mannix	0	0	0
Maskwa	0	0	0
Meadows	0	0	0
Mildred Lake	0	0	0
Millennium Mine	0	0	0
Olds South	0	0	0
Ponoka	0	0	0
Portable Taber	0	0	0
Power	0	0	0
Range Road 220	0	0	0
Red Deer - Riverside	0	0	0
Redwater Industrial	0	0	0
Rimbey Townsite	0	0	0
Rocky Mountain House North	0	0	0
Ross Creek	0	0	0
Scotford (Temporary)	0	0	0
Scotford 2	0	0	0
Shell Muskeg River	0	0	0

Smoky Heights	0	0	0
ST. LINA	0	0	0
Steeper	0	0	0
Sylvan Lake East	0	0	0
Tomahawk	0	0	0
Valleyview	0	0	0
Violet Grove	0	0	0
Wagner2	0	0	0
Wapasu	0	0	0
Woodcroft	0	0	0

n/a - Data was not collected.

*There is no 1-hour objective for PM2.5.

A 1-hour guideline of 80 ug/m3 is based on the statistical equivalent of the Canada Wide Standard (CWS).

This guideline is not used for compliance purposes.

Calculation of hourly, multiple hour averages, or
The collection period starts at 12:01 AM MST.
Calculation requires data availability of 75%.

Today() is: 19/10/2015

We then checked to see about SO2 exceedances this year.

Number Of Times Alberta Ambient Air Quality Objectives were exceeded from January 1, 2015 to September 30, 2015

Parameter	Sulphur Dioxide		
Averaging Period	1-	24-	Annual
Objective	0.172	0.048	0.008
Station			
Anzac	0	0	0
Battle River North Ambient Trailer	0	0	0
Battle River South Ambient Trailer	0	0	0
Beaverlodge	0	0	0
Bertha Ganter - Fort McKay	0	0	0
Breton	0	0	0
Bruderheim	0	0	0
Buffalo Viewpoint	0	0	0
Calgary Northwest	0	0	0
Calgary Southeast	0	0	0
Caroline	0	0	0
Carrot Creek	0	0	0
Clairmont-Portable	0	0	0
CNRL Horizon	0	0	0
Cold Lake South	0	0	0
Crescent Heights	0	0	0
Didsbury West	0	0	0
Edmonton Central	0	0	0

Edmonton East	0	0	0
Edmonton South	0	0	0
Edson	0	0	0
Elk Island	0	0	0
Elk Point Airport (Portable)	0	0	0
Everdell	0	0	0
Evergreen Park	0	0	0
Falher	0	0	0
Ferrier Acres	0	0	0
Firebag	0	0	0
Fort Chipewyan (WBEA)	0	0	0
Fort McKay South (Syncrude UE1)	0	0	0
Fort McMurray-Athabasca Valley	0	0	0
Fort McMurray-Patricia McInnes	0	0	0
Fort Saskatchewan-92 St and 96 Ave	0	0	0
Genesee	0	0	0
Grande Prairie (Henry Pirker)	0	0	0
Hinton	0	0	0
James River	0	0	0
James River East	0	0	0
Lamont County	0	0	0

Lancaster	0	0	0
Lethbridge	0	0	0
Lower Camp	0	0	0
Mannix	0	0	0
Maskwa	0	0	0
Meadows	0	0	0
Mildred Lake	0	0	0
Millennium Mine	0	0	0
Olds South	0	0	0
Ponoka	0	0	0
Portable Taber	0	0	0
Power	0	0	0
Range Road 220	0	0	0
Red Deer - Riverside	0	0	0
Redwater Industrial	15	3	0
Rimbey Townsite	0	0	0
Rocky Mountain House North	0	0	0
Ross Creek	0	0	0
Scotford (Temporary)	0	0	0
Scotford 2	0	0	0
Shell Muskeg River	0	0	0
Smoky Heights	0	0	0
ST. LINA	0	0	0
Steeper	0	0	0

Sylvan Lake East	0	0	0
Tomahawk	0	0	0
Valleyview	0	0	0
Violet Grove	0	0	0
Wagner2	0	0	0
Wapasu	0	0	0
Woodcroft	0	0	0

n/a - Data was not collected.

*There is no 1-hour objective for PM2.5.

A 1-hour guideline of 80 ug/m3 is based on the statistical equivalent of the Canada Wide Standard (CWS).

This guideline is not used for compliance purposes.

Calculation of hourly, multiple hour averages, or
The collection period starts at 12:01 AM MST.
Calculation requires data availability of 75%.

Today() is: 19/10/2015

To date, there are no exceedances of SO2. So, despite the computer simulated video clip showing patterns of simulated dispersal of oil sands emissions, in this time period there were no exceedances.

We also cross-checked the time frame of the SO2 computer simulation video clip and found no exceedances between August 10 and September 0, 2013, except for the Redwater location.

Number Of Times Alberta Ambient Air Quality Objectives were exceeded from August 10, 2013 to September 10, 2015

Parameter	Sulphur Dioxide		
Averaging Period	1-	24-	Annual
	0.172	0.048	0.008

Objective Station			
Anzac	0	0	0
Battle River North Ambient Trailer	0	0	0
Battle River South Ambient Trailer	0	0	0
Beaverlodge	0	0	0
Bertha Ganter - Fort McKay	0	0	0
Breton	0	0	0
Bruderheim	0	0	0
Buffalo Viewpoint	0	0	0
Calgary Northwest	0	0	0
Calgary Southeast	0	0	0
Caroline	0	0	0
Carrot Creek	0	0	0
Clairmont-Portable	0	0	0
CNRL Horizon	0	0	0
Cold Lake South	0	0	0
Crescent Heights	0	0	0
Didsbury West	0	0	0
Edmonton Central	0	0	0
Edmonton East	0	0	0
Edmonton South	0	0	0
Edson	0	0	0

Elk Island	0	0	0
Elk Point Airport (Portable)	0	0	0
Everdell	0	0	0
Evergreen Park	0	0	0
Falher	0	0	0
Ferrier Acres	0	0	0
Firebag	0	0	0
Fort Chipewyan (WBEA)	0	0	0
Fort McKay South (Syncrude UE1)	0	0	0
Fort McMurray-Athabasca Valley	0	0	0
Fort McMurray-Patricia McInnes	0	0	0
Fort Saskatchewan-92 St and 96 Ave	0	0	0
Genesee	0	0	0
Grande Prairie (Henry Pirker)	0	0	0
Hinton	0	0	0
James River	0	0	0
James River East	0	0	0
Lamont County	0	0	0
Lancaster	0	0	0
Lethbridge	0	0	0
Lower Camp	0	0	0

Mannix	0	0	0
Maskwa	0	0	0
Meadows	0	0	0
Mildred Lake	0	0	0
Millennium Mine	0	0	0
Olds South	0	0	0
Ponoka	0	0	0
Portable Taber	0	0	0
Power	0	0	0
Range Road 220	0	0	0
Red Deer - Riverside	0	0	0
Redwater Industrial	46	8	0
Rimbey Townsite	0	0	0
Rocky Mountain House North	0	0	0
Ross Creek	0	0	0
Scotford (Temporary)	0	0	0
Scotford 2	0	0	0
Shell Muskeg River	0	0	0
Smoky Heights	0	0	0
ST. LINA	0	0	0
Steeper	0	0	0
Sylvan Lake East	0	0	0
Tomahawk	0	0	0
Valleyview	0	0	0

Violet Grove	0	0	0
Wagner2	0	0	0
Wapasu	0	0	0
Woodcroft	0	0	0

n/a - Data was not collected.

*There is no 1-hour objective for PM2.5.

A 1-hour guideline of 80 ug/m3 is based on the statistical equivalent of the Canada Wide Standard (CWS).

This guideline is not used for compliance purposes.

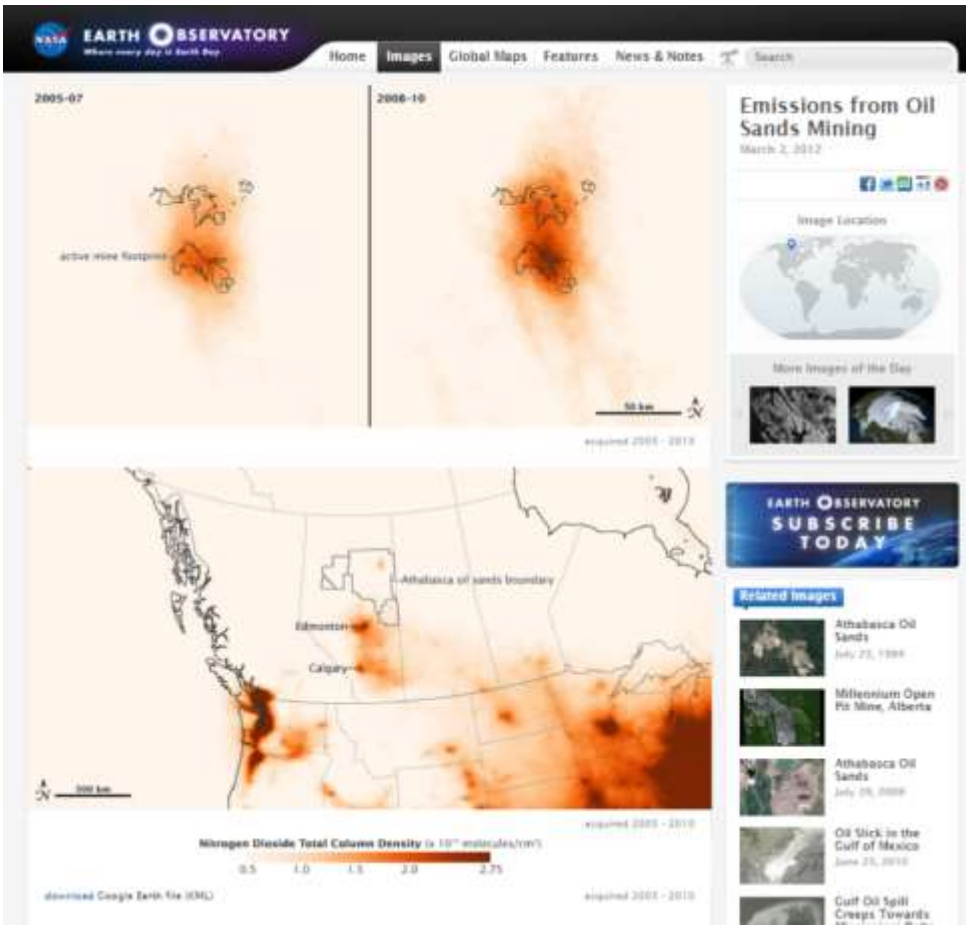
Calculation of hourly, multiple hour averages, or
The collection period starts at 12:01 AM MST.
Calculation requires data availability of 75%.

Today() is: 19/10/2015

16) So, despite the images giving an uninformed viewer a sense that Alberta is being inundated with terrible pollution, the exact opposite is true. Likewise, the source of exceedances in the test time frame was Redwater – north and east of Edmonton and far from coal-fired power plants.

17) Based on this evidence, one must consider that some reporters at the CBC accept everything that the Pembina Institute tells them or that CAPE – the Cdn Association of Physicians for the Environment – are telling them, without checking the facts.

18) As recently reported in the US, about the Sierra Club fronting renewables investors in a campaign to demonize coal, one could consider the possibility that Pembina Institute or CAPE might have a secondary agenda – such as pushing renewable energy, carbon taxes or cap and trade .http://www.washingtontimes.com/news/2015/jul/20/drew-johnson-sierra-club-has-become-front-group-do/?page=all



http://earthobservatory.nasa.gov/IOTD/view.php?id=77283&src=ve

19) Finally, above, these 2010 NASA images above on Alberta and the oil sands – compared between a 2005 and 2008 image at the top – that do show increased emissions, set in context of North America below (images acquired from 2005-2010) show that oil sands emissions are about the same as a medium sized city or power plant – and you can see how other areas of North America are polluted.
If Edmonton's coal-fired power plants were such a pollution risk, why would they not show up as a massive blob of dark brick red colors of Vancouver and the mid-west/industrialized east of the US and Canada?

20) The conclusion of the above evidence shows that Alberta does have excellent air quality, despite significant industrial activity**,** and based on the visible pattern above, it seems clear that **transportation** is a major contributing factor to air pollution.

21) The SO2 dispersal video should also not surprise anyone. Here is a satellite video of wildfire smoke from Siberia coming to North America. https://youtu.be/JzHXmrYd2tI

22) Below is a comparison chart showing the relative quantities of output of toxic pollutants from wildfires in Alberta. Please note the equivalencies; the anti-coal-fired power plant

claims are disproportionate and exaggerated. While the human race should continue to better manage pollution, when it comes to Mother Nature, nothing beats her for generating GHGs, PM2.5 and PM10, heat, toxic VOCs, polycyclic Aromatic Hydrocarbons and explosive turbulence, which is something you will never get from a coal-fired power plant.

About Modelling Studies and Simulations

We also consulted with a data management / analysis professional (who is also an ecologist) who wrote:

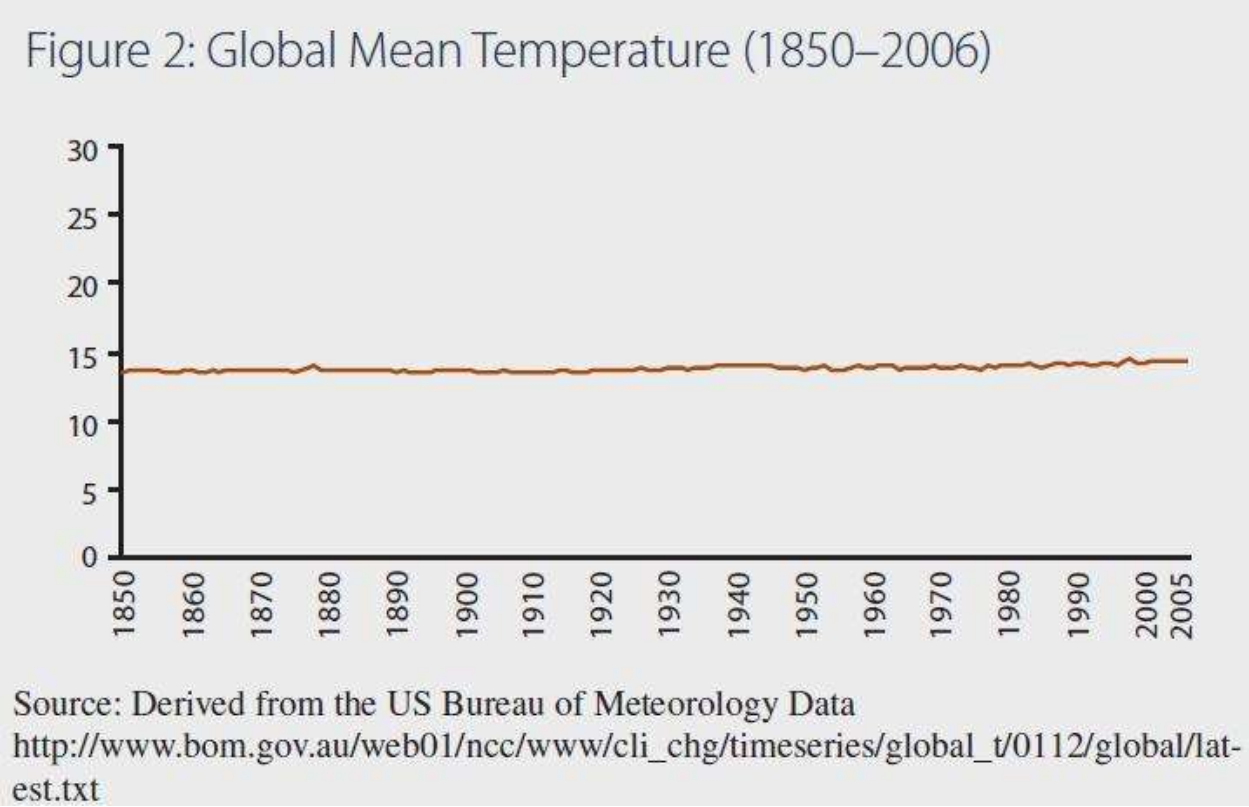
> The reporter should have asked the question: So what? Is this bad? Does it reflect reality? What good does it do? How does it compare to other jurisdictions (Notethat chunks of California and the entire Eastern NA region were far worse).
>
> It is a model, therefore a logical construct. Outputs from models are not data, though they are often treated as such by media. The *real life empirical data* that we reviewed – also from EC - shows a decrease over time regardless of increased population / activity. It might be useful for predicting behavior of emissions plumes, but if they are within safe limits, who cares?
>
> 2006 Alberta population = 3.256 million
> 2014 Alberta population = 4.120 million
> http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo26j-eng.htm
> http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm
>
> So, if SOx and NOx emissions are at about the same levels in 2014 as they were in 2006 that means in real terms a reduction of just over 26% per capita. That is a lot like what industry has been saying (assuming there is a direct correlation between GHG and SOx/NOx:
>
> http://www.oilsandstoday.ca/topics/ghgemissions/Pages/default.aspx
>
> The *model* appears to be parameterized on actual observations, but with no level of confidence / error margins disclosed.
>
> The *model* shows a pattern of dispersion that is interesting, but meaningless without proper context (i.e. air quality in Alberta is consistently above minimum AQHI levels)
>
> The *observed* numbers from Environment Canada validate that oil sands / electric generation industry in Alberta has been steadily decreasing emissions. (See graphs in Appendix)
>
> The *observed* data show air quality improving from 2006 to 2014.
>
> The *observed* data show a few AQHI spikes and as implied, seem to be correlated with winter atmospheric inversions.

He also comments that ozone is the only factor in Environment Canada information that shows a slight uptick – and adds this:

> All show reductions in *polluting* emissions (leaving CO2 out) over time even as the population and industry has increased over the same period. The exception is ozone which is related to population and difficult to influence.
>
> As per the EPA:
>
> *"Ground-level ozone (the primary constituent of smog) is the most complex, difficult to control, and pervasive of the six principal air pollutants. Unlike other pollutants, ozone is not emitted directly into the air by specific sources. Ozone is created by sunlight acting on NOx and VOC in the air. There are thousands of types of sources of these gases. Some of the common sources include gasoline vapors, chemical solvents, combustion products of fuels, and consumer products."*
>
> http://www3.epa.gov/airtrends/aqtrnd95/o3.html

He also added:

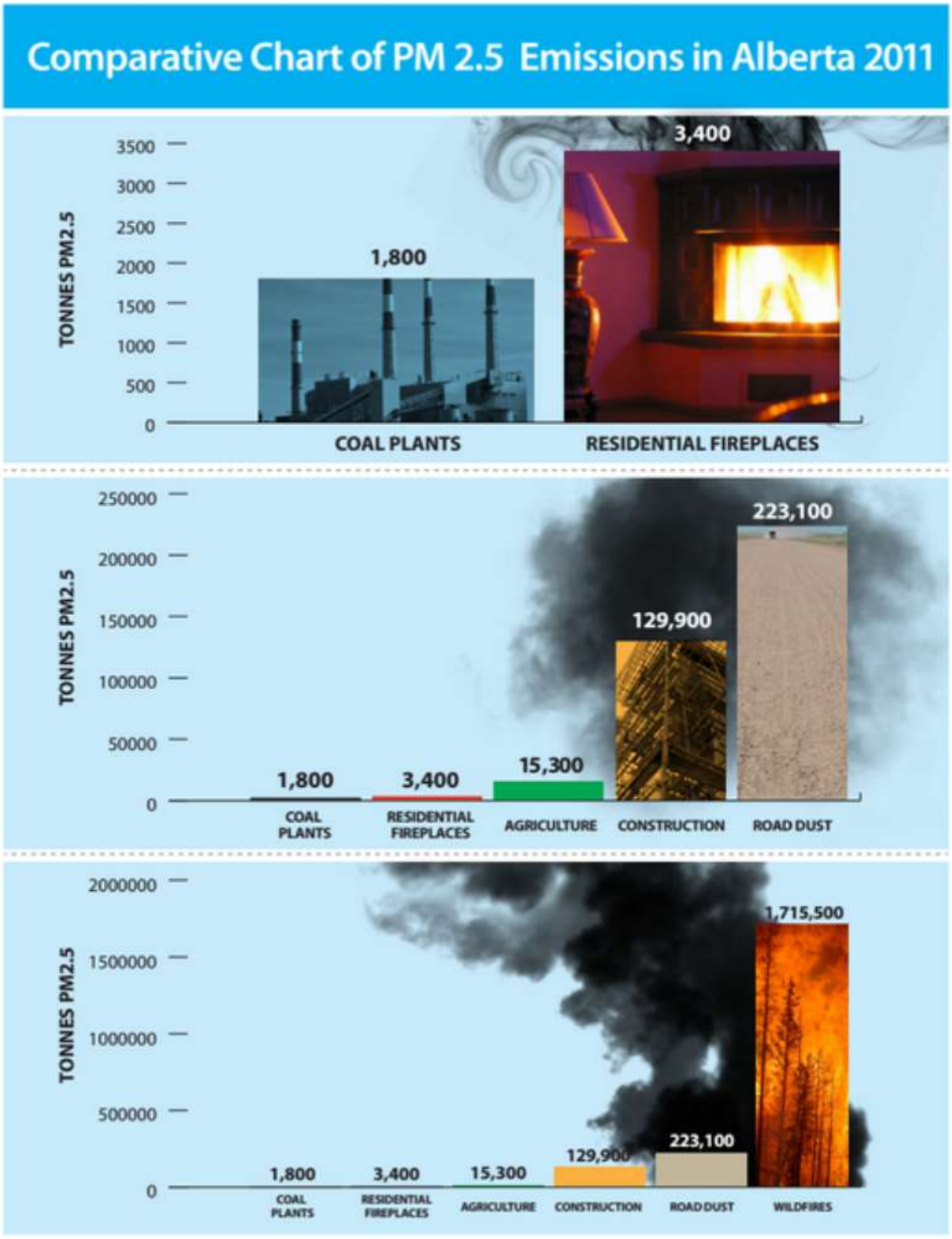
> Lastly, I would note that **sulfur and nitrogen deposition are natural and necessary for a healthy ecosystem.** The question is whether the anthropogenic additions are harmful. Just because there are some increases (modelled in red) does not necessarily indicate a problem. Similar to the global temperature since 1900 – if you round up the data on a graph to 1.0 C instead of the usually reported .01 C, the trend is flat.



As you see below, Mother Nature puts out a huge amount of sulfur and nitrogen, compared to that of human industry.

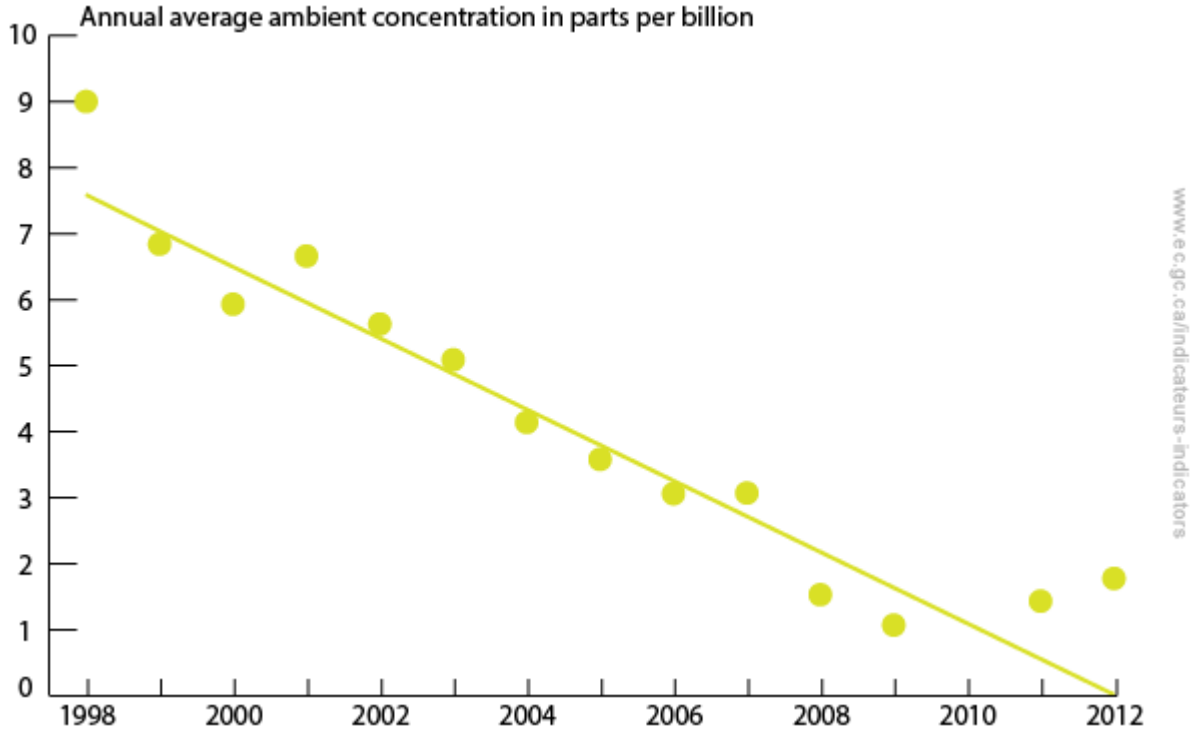
Alberta

	Slave Lake - 2011		2011	Notes
Total 2011				
Fires *	1		1150	
Cost *				
Ha *	4,700		946,698	
$/ ha				
Silviculture Requirement				
ha	2,350		473,344	THFLB
Seedlings	2,820,000		568,012,800	
Cost	$ 3,384,000	$	681,615,360	
Timber Values Lost				
Volume destroyed	1,410,000		284,006,400	m³
Stumpage loss	$ 705,000	$	142,003,200	
Biomass Consumption				
Gross	967,824		194,941,993	BDT
Net	193,565		38,988,399	BDT
Energy Release				
Heat - Gross	2,903,472		584,825,979	GJ
Heat - Net	2,467,951		497,102,082	GJ
Heat - value	$ 27,147,463	$	5,468,122,903	
Homes heated	22,436		4,519,110	Home heating needs per year
Electric - Gross	807,165,216		162,581,622,129	kWhr
Electric - Net	201,791,304		40,645,405,532	kWhr
Electric - value	$ 14,125,391	$	2,845,178,387	
Homes electrical	11,057		2,227,146	Home electrical needs per year
Explosion equivalence	0.59		118.81	Mt TNT
Emissions - Greenhouse Gas				
CO2	518,754		104,488,908	tonnes CO2e
CO	180,209		36,298,199	tonnes CO2e
CH4	1,112,998		224,183,292	tonnes CO2e
NOx	84,007		16,920,965	tonnes CO2e
Total GHG	1,895,967		381,891,364	tonnes CO2e
BC Carbon Tax	$ 28,439,508	$	5,728,370,463	
Personal GHG	611,602		123,190,763	People
Car Equivalent	379,193		76,378,273	Passenger Car - gas
Truck Equivalent	43,090		8,679,349	Truck - diesel
Emmisions - Human Health				
PM 2.5	8,517		1,715,490	tonnes
SO4	387		77,977	tonnes
PM 10	77,977		272,919	tonnes
Diesel Truck Emmision Comparison				
PM 2.5	2,224,187		448,002,318	Diesel trucks
SO4	151,128		30,440,645	Diesel trucks
PM 10	326,542		65,773,104	Diesel trucks

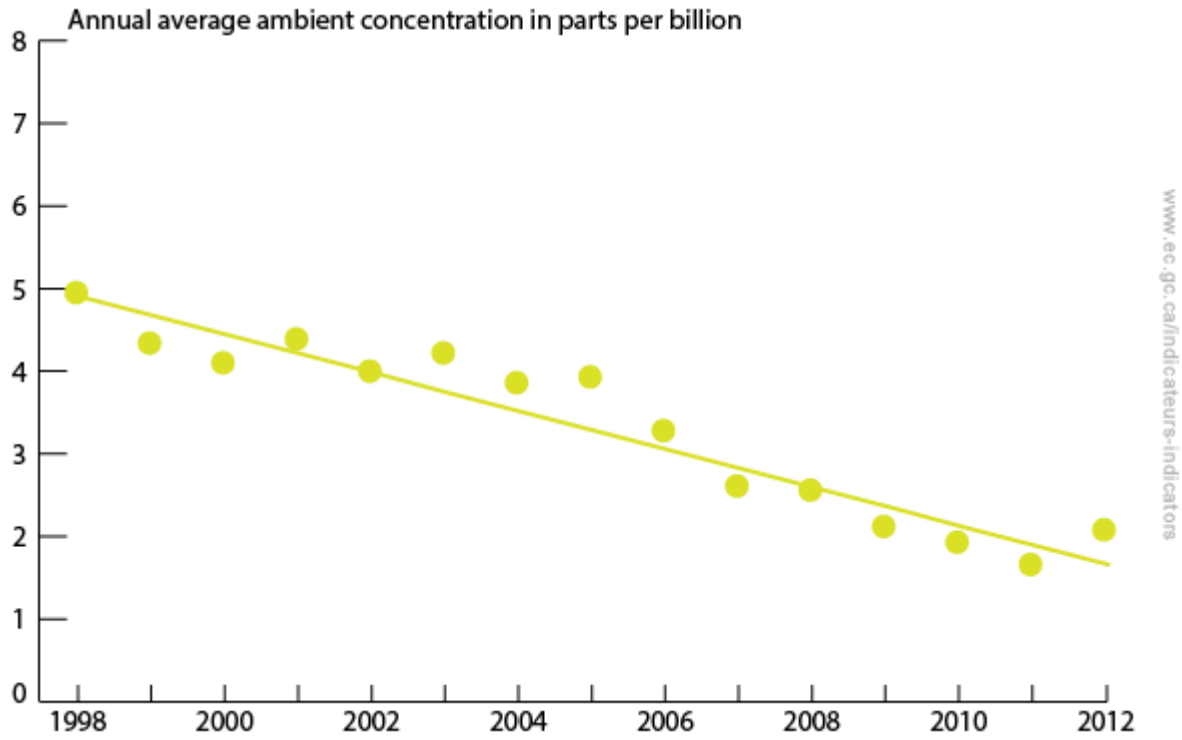

Comparative Chart of PM 2.5 Emissions in Alberta 2011
TONNES PM2.5
3500
3000
2500
2000
1500
1000
500
0
1,800
3,400
COAL PLANTS
RESIDENTIAL FIREPLACES
TONNES PM2.5
250000
200000
150000
100000
50000
0
1,800
3,400
15,300
129,900
223,100
COAL PLANTS
RESIDENTIAL FIREPLACES
AGRICULTURE
CONSTRUCTION
ROAD DUST
TONNES PM2.5
2000000
1500000
1000000
500000
0
1,800
3,400
15,300
129,900
223,100
1,715,500
COAL PLANTS
RESIDENTIAL FIREPLACES
AGRICULTURE
CONSTRUCTION
ROAD DUST
WILDFIRES

ENVIRONMENT CANADA DATA:

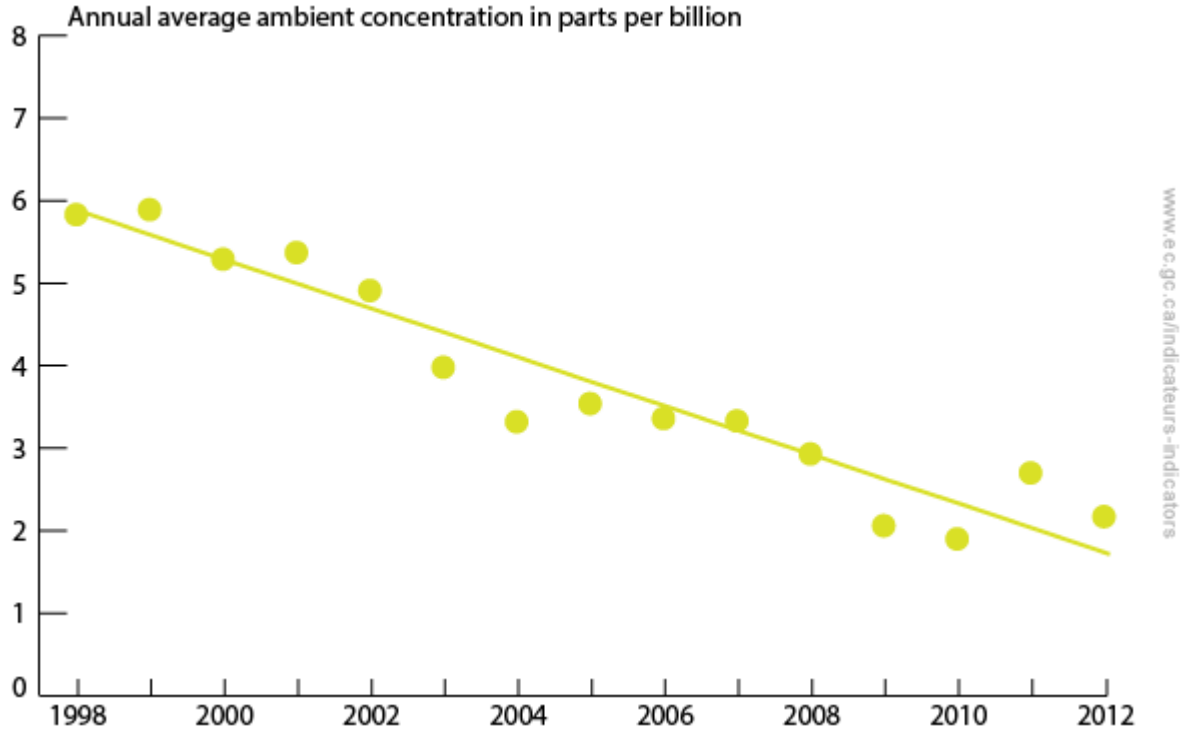
https://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=307CCE5B-1



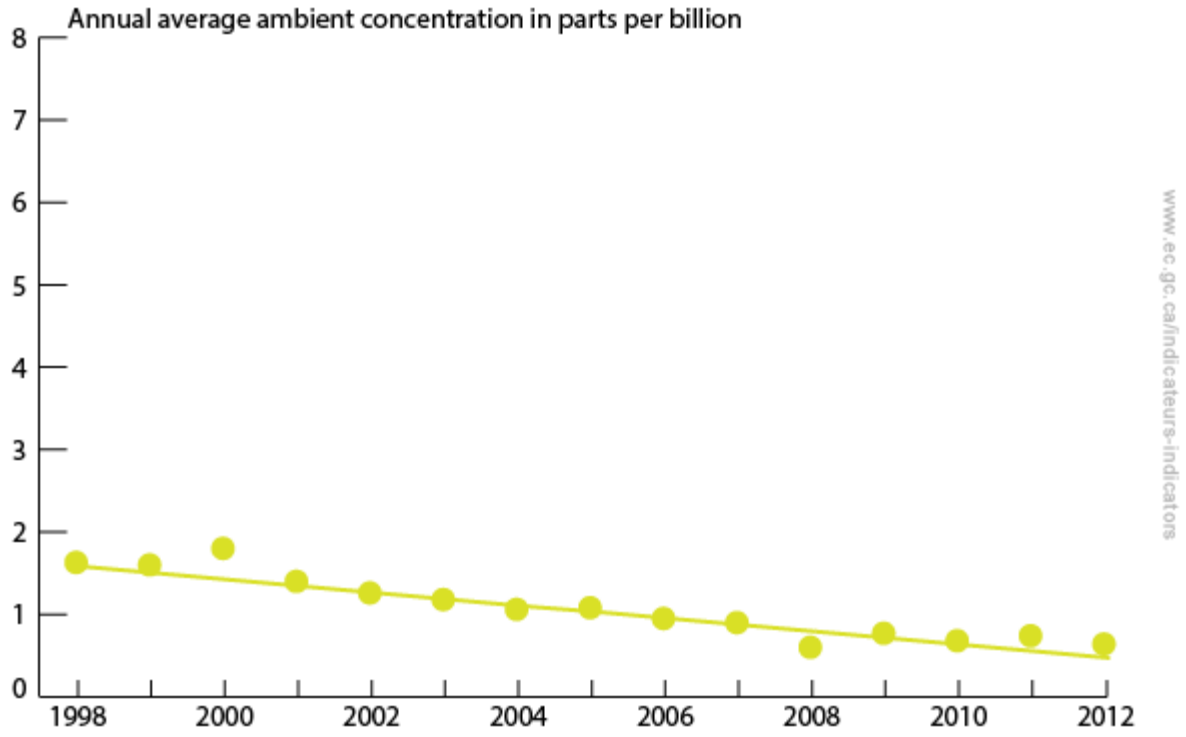
Atlantic



Southern Quebec



Southern Ontario



Prairies and Northern Ontario

The line chart shows the average concentration of sulphur dioxide in the air in the Prairies and northern Ontario from 1998 to 2012. In 2012, the annual average concentration of sulphur dioxide in outdoor air was 0.6 parts per billion, or 14 percent lower than in 2011. A declining trend was detected from 1998 to 2012, representing a decrease of 68 percent (or an average decrease of 4.8 percent per year) over that period.