



Climate, Health, and Alberta's Coal-Fired Power Plants



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Prepared for the Broadbent Institute by John Wellner | October 2015

John Wellner has spent 20 years analyzing environmental and health policies and the places where health and the environment intersect. After work with the Toronto Environmental Alliance and Pollution Probe, he oversaw the Illness Costs of Air Pollution projects at the Ontario Medical Association and advised the Canadian Medical Association on the development of their national analysis of the health impacts of air pollution. John has proven success advancing a number of public health policies and encouraging the uptake of illness preventive programs.

EXECUTIVE SUMMARY

This report is a submission to the Alberta Climate Change Advisory Panel. It provides important evidence supporting the accelerated phase-out of the province's coal-fired electricity generation.

The report investigates the state of Alberta's air quality. It highlights what the cumulative health impacts of air pollution will be from 2015 to 2030, and Alberta's coal-fired electricity sector's contribution to this air pollution.

Between now and 2030, air pollution will be responsible for more than 4,500 premature deaths and nearly 16,000 hospital admissions in Alberta. The health-care costs of treating those illnesses, along with lost productivity due to illness-related absences from work, are projected to be more than \$760 million.

Alberta's fleet of coal-fired power plants is not the only source of this air pollution, but reducing emissions generated by burning coal provides a number of climate and air-quality benefits. Many of these polluting plants are located near large communities because their placement was based on proximity to the coal supply, and the vulnerability of population centres to their emissions was not taken into account. The fact that there are three large plants very close to Edmonton is cause for significant concern.

The report also points out that as jurisdictions around the continent and globe move away from coal-powered electricity, Alberta is increasingly an outlier in its disproportionate dependence on this greenhouse-gas-emitting fossil fuel.

Although there are a number of policies in place geared toward shortening the life of coal-fired power plants in the province, the perspective of the Independent Power Producers Society of Alberta is that a mere seven per cent of the coal-fired power plant capacity has to close by 2030.¹ Much more must be done more quickly.

This paper makes it clear that an accelerated coal phase-out would make a significant contribution to Alberta's reduction of greenhouse gas emissions and action on climate change, but it also shows that it would have significant health benefits. These would in turn deliver significant economic savings, both to Albertans and to the government-funded health-care sector.

¹ Independent Power Producers Society of Alberta. June 2015. "Alberta Power Market Current Supply and Coal Retirement Schedule," Media Backgrounder, page 2. [http://www.ippsa.com/IP_pdfs/Backgrounder on Power Market - June 2015.pdf](http://www.ippsa.com/IP_pdfs/Backgrounder%20on%20Power%20Market%20-%20June%202015.pdf)

1.0 CONTEXT: ALBERTA'S HISTORIC OPPORTUNITY

Alberta recently updated its carbon emissions regulations, increasing the carbon levy. It also commissioned an advisory panel, chaired by Andrew Leach. The panel is tasked with reviewing current climate-related policies and engaging with Albertans, experts in the field, and the government to gather advice on measures to further reduce greenhouse gas emissions.

In its discussion document, the Alberta government suggests that it is not only looking for a pathway to lower emissions, but also wants to usher in a new era of responsible energy development that protects the health and quality of life for all Albertans, with “clean air and water, thriving wildlife and biodiversity and a global reputation as good stewards of our environment.”²

It is well documented that climate change has a negative impact on human health, due to increased temperatures, floods, extreme storms, forest fires, droughts, and the increased spread of insect-borne diseases.³ These effects are global in scale, but are being felt in Alberta, too. Reducing the impact of climate change will certainly have local rewards, but there are many co-benefits of actions to reduce climate-changing greenhouse gas emissions.

Accelerating the phase-out of Alberta's coal-fired electricity sector offers many such co-benefits. As the government's consultation paper states, “emissions from electricity generation, especially from burning coal, from industry and from the tail pipes of cars and trucks can pose real dangers to human health.”⁴ Burning coal is a very dirty way to produce electricity, and it releases a number of other pollutants besides greenhouse gases that have impacts on the air that Albertans breathe.

² Phillips, Shannon, Minister of Environment and Parks Alberta. August 2015. “Minister's Message.” Climate Leadership Discussion Document. <http://www.alberta.ca/albertacode/images/Climate-Leadership-Discussion-Document.pdf>

³ Health Canada. 2007. From Impacts to Adaptation: Canada in a Changing Climate 2007. <http://www.hc-sc.gc.ca/ewh-semt/climat/eval/index-eng.php>

⁴ Government of Alberta. 2015. Climate Leadership Discussion Document, page 6. <http://www.alberta.ca/albertacode/images/Climate-Leadership-Discussion-Document.pdf>

The government has stated clearly that public health is an important benefit of reducing coal-fired electricity emissions. Various health organizations, environment and health ministries, and international bodies agree about the health burden of air pollution. As Dr. John Howard, chair of the Canadian Association of Physicians for the Environment, said, “The combustion of coal pollutes the air, causing illness and death in more people than any other method of energy generation.”⁵

It is important that the panel consider not just the current health impacts of burning coal, but also the cumulative impact and costs over time. Delaying the inevitable phase-out of coal has a human cost that increases as the years pass. There is also a very real economic cost associated with delay, which must be contrasted with any economic impact statements put forth by the coal industry to argue for delayed action.

⁵ Pembina Institute, Asthma Society, Lung Association, and Canadian Association of Physicians for the Environment. March 2013. “A Costly Diagnosis: Subsidizing Coal Power with Albertans’ Health.” <http://www.pembina.org/reports/pi-costly-diagnosis-26032013.pdf>

2.0 HEALTH IMPACTS

In 2008, the Canadian Medical Association (CMA) modelled the health impacts of air pollution across Canada, and calculated their economic burden. It released a report, entitled *No Breathing Room: National Illness Costs of Air Pollution*, on the health burden of the two key components of airborne smog: ground-level ozone (O₃) and fine airborne particulate matter (PM_{2.5}).⁶ Its analysis was province-specific and had detailed findings about air quality health impacts in Alberta.

Although the CMA report was released eight years ago, the air pollution health effects were projected through the year 2030, providing a long-term estimate of air pollution impacts. This gives a clear picture of the human and economic cost of air pollution in Alberta, which is valuable when considering the timeline for emissions reductions and an accelerated phase-out of Alberta's coal-fired power plants.

2.1 ILLNESSES RELATED TO AIR POLLUTION

Just as there is an economic cost of reducing emissions from coal-fired power plants and other industrial sources of pollution, there is a corresponding cost of inaction – to the environment and to human health. The CMA's analysis of the cumulative health impacts of ground-level ozone and particulate pollution in the years to come is instructive here.

The CMA projected air pollution health impacts and their related economic costs out to the year 2030. As its modelling was based on 2008 air pollution concentrations, it presents an informative picture of the cost of inaction on Alberta's air pollution problem, as there has been no improvement to air quality since.

⁶ Canadian Medical Association. August 2008. *No Breathing Room: National Illness Costs of Air Pollution*. http://www.healthyenvironmentforkids.ca/sites/healthyenvironmentforkids.ca/files/No_Breathing_Room.pdf

In fact, since 2008, a new coal-fired plant, the large Keephills 3, has been added west of Edmonton, and there is some evidence of worsening concentrations of the very pollutants that the CMA report examined. If the air quality has been degraded, there will be an even greater health impact than the CMA findings suggest.⁷

There will be a significant cumulative health impact and a large economic cost if air quality is not improved before 2030. As Table 1 shows, the average number of acute premature deaths attributable to air pollution in Alberta is 284 per year, for a total of 4,551 deaths between 2015 and 2030.

The total number of hospital admissions between 2015 and 2030 is estimated to be 15,932, and there will be 73,551 emergency department visits by Albertans, for air pollution related illness, over the same period. The number of days when Albertans will have minor illnesses, like asthma symptoms, is estimated to total more than 660,000 per year, or more than 10.5 million between 2015 and 2030.

Table 1: Air Pollution Related Illnesses in Alberta 2015–2030⁸

Health Impact	2015	2030	Average/year	16 Year Total
ACUTE PREMATURE MORTALITY	216	356	284	4,551
HOSPITAL ADMISSIONS	807	1,906	996	15,932
EMERGENCY DEPT. VISITS	3,713	5,510	4,597	73,551
MINOR ILLNESSES	617,066	700,403	660,497	10,567,948

The CMA’s findings are comparable to findings by Health Canada’s Air Quality Benefits Assessment Tool (AQBAT)⁹ and studies undertaken in smaller geographical areas, like the City of Toronto’s Air Pollution Burden of Illness studies.¹⁰

⁷ Alberta Environment and Parks. June 2015. “State of the Environment: Air.” <http://esrd.alberta.ca/focus/state-of-the-environment/air/condition-indicators/default.aspx>

⁸ Canadian Medical Association. August 2008. No Breathing Room: National Illness Costs of Air Pollution, Provincial Summary Tables. Provided to author by Canadian Medical Association.

⁹ Health Canada. Nd. “AQBAT – Estimating Health Impacts for Changes in Canada’s Air Quality.” http://www.bc.lung.ca/mediaroom/news_releases/documents/AQBATEstimatingHealthImpactsforChangesinCanadasAirQuality.pdf

¹⁰ Toronto Public Health. April 2014. “Path to Healthier Air: Toronto Air Pollution Burden of Illness Update.” <http://www1.toronto.ca/City Of Toronto/Toronto Public Health/Healthy Public Policy/Report Library/PDF Reports Repository/2014 Air Pollution Burden of Illness Tech RPT final.pdf>

All of these studies have found that the older part of the population is most at risk. Although age alone does not make individuals more vulnerable to the effects of air pollution, there is a much greater health impact on seniors. Seniors are more likely to have pre-existing health conditions that make them vulnerable to air pollution's effects on both their respiratory and cardiovascular systems. If they have an existing chronic illness, they are at far greater risk than if they are in perfect health. It is important to note that a greater proportion of the illnesses associated with air pollution and premature deaths are cardiovascular in nature, rather than respiratory. It is not just seniors with lung disease, but also those with known (or unknown) heart conditions that can be seriously impacted by the air pollution from Alberta's coal plants and other sources.¹¹

The young are also at an increased risk of health effects of air pollution due to a number of factors. Children and newborns inhale a higher volume of air compared to adults, and consequently take in higher levels of pollutants. They are still growing and developing, and therefore their defence mechanisms are less equipped than those of adults. It is also the case that children spend more time outdoors and are more active than adults, increasing their exposure to air pollutants.¹²

2.2 THE ECONOMIC COST OF INACTION ON AIR POLLUTION

Although illnesses and hospital visits will have a toll on Albertan families, the economic cost of these illnesses will also be significant.

The CMA calculations in Table 2 include the following: lost productivity costs for those who are sick or have family members that are sick; direct health-care costs; the costs of pain and suffering associated with illness; and the same for the economic costs of premature death.

The CMA found that the direct costs of lost productivity through missed work and health-care expenditures in Alberta would average \$47,736,200 per year between 2015 and 2030, and the total for those 16 years would be over \$760 million – almost \$400 million of which represents provincial health-care costs.

¹¹ Ontario Medical Association. 2006. "Smog's excess burden on baby boomers." <https://www.oma.org/Resources/Documents/SmogBoomersReport.pdf>

¹² Canadian Medical Association. August 2008. No Breathing Room: National Illness Costs of Air Pollution. http://www.healthyenvironmentforkids.ca/sites/healthyenvironmentforkids.ca/files/No_Breathing_Room.pdf

When all of the costs are factored in, including the estimated cost of premature mortality, the total human health burden of air pollution in Alberta between 2015 and 2030 is estimated to be more than \$12 billion.

Table 2: Economic Costs of Air Pollution Related Illness in Alberta 2015–2030¹³

Cost (\$)	2015	2030	Average/year	16 Year Total
LOST PRODUCTIVITY COSTS	22,596,600	24,242,100	23,494,400	375,910,900
HEALTH-CARE COSTS	20,033,900	28,583,100	24,241,800	387,868,500
COSTS OF PAIN & SUFFERING	12,368,700	15,477,200	13,929,200	222,867,500
COST OF PREMATURE MORTALITY	531,913,400	867,908,100	698,368,200	11,173,891,200
TOTAL COST	586,912,500	936,210,600	760,033,600	12,160,538,200

3.0 COAL AND ALBERTA'S AIR QUALITY

Alberta's coal plants are a significant contributor to the economic costs of air pollution, and their phase-out represents a real opportunity for air quality improvement.

3.1 ALBERTA AIR ZONES REPORT

In September 2015, Alberta's *Air Zones Report 2011–2013* was released. It is a status report on whether Alberta is meeting Canada's new air quality standards. From the findings, it is clear that Alberta has much work to do to improve air quality in the province.

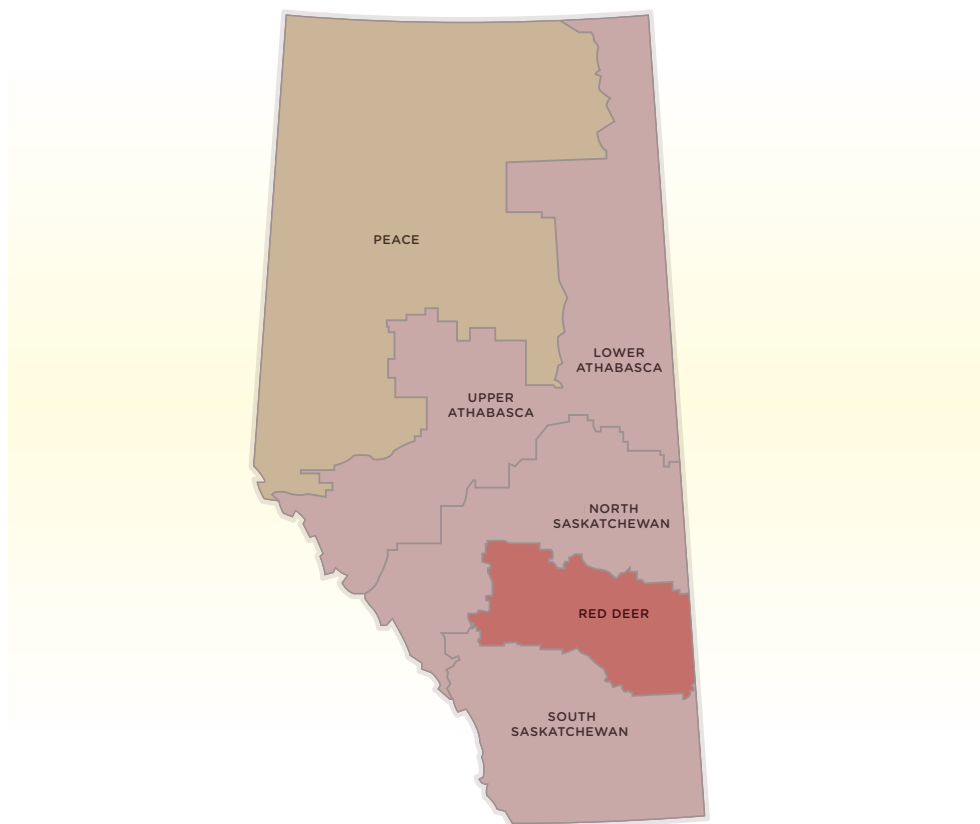
The report was part of a federal, provincial, and territorial process finalized in 2012 by the Canadian Council of Ministers of the Environment.¹⁴ The outdated Canada-Wide Standards for air pollution were replaced with the more health-protective Canadian Ambient Air Quality Standards. The *Air Zones Report* looks at whether there is attainment of these new health standards.

¹³ Ibid., Provincial Summary Tables.

¹⁴ Canadian Council of Ministers of the Environment. Canadian Ambient Air Quality Standards for Particulate Matter and Ozone. http://www.ccme.ca/en/current_priorities/air/caaqs.html

Unfortunately, the report shows parts of Alberta already exceeding the fine particulate matter standard for the period 2011–2013 (shaded red in Map 1). This is a pure measure of air pollution, as the influence of forest fire smoke and dust has been factored out of the calculation. Just as disconcerting is the fact that a significant swath of the province (shaded violet) is designated as dangerously close to exceeding the new air standards as well, and, as a result, is mandated to implement significant emissions reductions to improve air quality.¹⁵ This vast region contains a significant proportion of the population of Alberta.

Map 1: Alberta Air Zone Map for PM2.5



¹⁵ Alberta Government. September 2015. Alberta: Air Zones Report 2011–2013, page 5. <http://esrd.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards-for-particulate-matter-and-ozone/documents/AlbertaAirZonesReport-2011-13-Sep2015.pdf>

For ground-level ozone, Map 2 shows that the North Saskatchewan Air Zone is of most concern, and requires action to prevent exceeding the air standards in the future.

Map 2: Alberta Air Zone Map for Ozone



These provincial air quality challenges are for fine particulate matter and ozone – the very pollutants analyzed in the Canadian Medical Association’s health projections. These pollutants are significantly influenced by coal-fired power generation.

The *Air Zones Report* begs the question of whether air quality is generally getting worse in Alberta, and going against the North American trend for air quality improvement. Trend reporting is difficult, especially given new methods of monitoring that are hard to compare to older data, but *Alberta’s State of the Environment: Air report* does suggest increased annual ground-level ozone concentrations in Edmonton and Calgary locations.¹⁶

¹⁶ The particulate monitors also show that the air is dirtier, but the new instruments might just be more sensitive than the previous monitoring devices, so it’s worse than thought, but hard to determine if the particle concentrations are increasing. See: Alberta Environment and Parks. June 2015. “State of the Environment: Air.” <http://esrd.alberta.ca/focus/state-of-the-environment/air/condition-indicators/ozone-levels.aspx>

3.2 COAL PLANT CONTRIBUTION

The *Air Zones Report* makes it clear that Alberta has been too slow to take action on existing pollution sources. In fact, it has added new coal-fired plants. The Genesee 3 (2005) and the Keephills 3 (2011) are, to put it mildly, not actions that improve air quality.¹⁷

To better understand the air pollution concentrations described in this report, it is important to realize that both ground-level ozone and fine particulate matter are secondary pollutants – they form in the atmosphere as the result of what are called precursor emissions. Nitrogen dioxide (NO₂) is a primary precursor for both ground-level ozone and fine particulate matter, and sulphur dioxide (SO₂) is a precursor for particulate. In Alberta, electricity generation accounts for 25 per cent of the SO₂ emissions and 13 per cent of NO₂ emissions. While many jurisdictions have decreased these pollutants to address smog and acid rain concerns, emissions in Alberta have increased over the past 15 years.¹⁸

Another concern for population health is that power plants in Alberta are located close to the coal mines that feed them.¹⁹ This secures a long-term fuel supply and cuts down on transportation costs for producers. The plant placement does not, however, take into account the proximity to large populations, or the direction in which their emissions blow. Not enough consideration has been given to the populations that are downwind and have to breathe the air that these plants pollute. The Keephills, Genesee, and Sundance plants are all close to Edmonton and part of its airshed, and have a significant impact on air quality and health in that city.

It is also a concern that the majority of the coal in Alberta is on Crown land, owned by the province, and is mined through the provision of Crown leases. An average of 50–60 per cent of yearly coal extraction is from Crown land. So not only are coal-fired power plants often located close to large populations due to the location of the coal, but the coal that is causing the problematic emissions is also often publicly owned.²⁰

¹⁷ Pembina Institute. September 2015. Press Release. “New Alberta air quality report shows need for province-wide pollution reduction.” <http://www.pembina.org/media-release/new-alberta-air-quality-report-shows-need-for-province-wide-pollution-reduction>

¹⁸ Alberta Environment. June 2008. “Alberta Air Emissions Trends and Projections.” <http://esrd.alberta.ca/air/reports-data/documents/7964.pdf>

¹⁹ National Energy Board. September 2008. “Energy Brief – Coal-Fired Power Generation.” <https://www.neb-one.gc.ca/nrg/sttstc/lctrct/rprt/archive/clfrdpwrgnrtn2008/clfrdpwrgnrtnnrgybrf-eng.html>

²⁰ Alberta Energy. February 2010. Coal fact sheet. http://www.energy.alberta.ca/coal/pdfs/FactSheet_CoalFacts.pdf

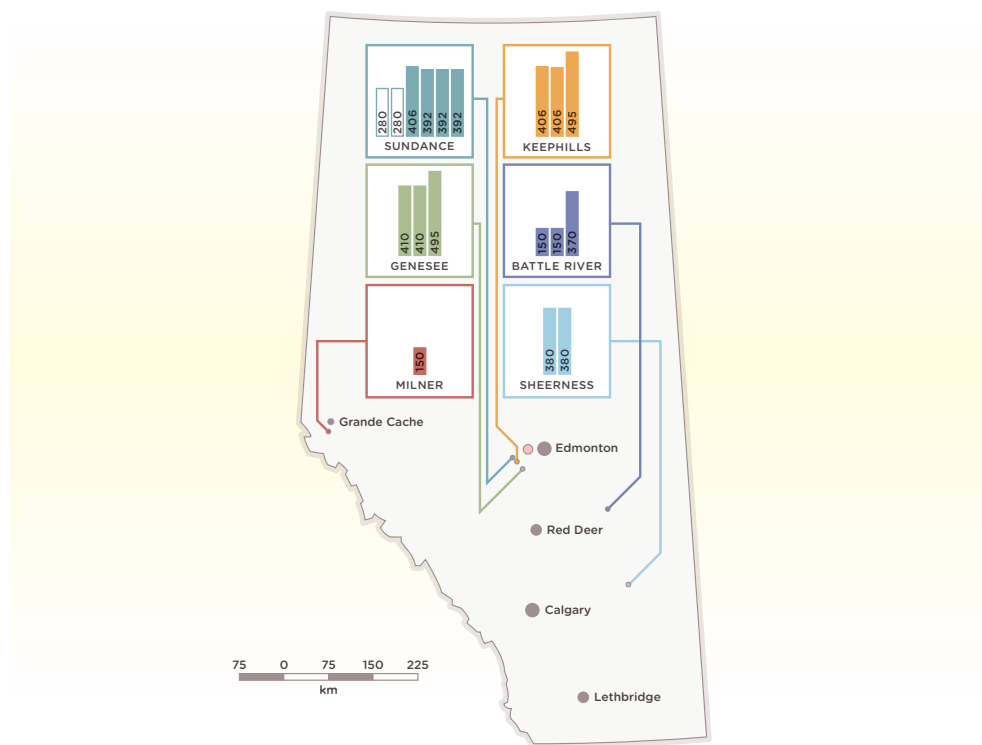
3.3 EMISSIONS FROM ALBERTA'S COAL-FIRED GENERATORS

Table 3 shows the total emissions of nitrogen dioxide and sulphur dioxide pollution from Alberta's coal-fired power plants.

Table 3: NO₂ & SO₂ Emissions from Alberta Coal-Fired Generators (NPRI 2013, in Tonnes)²¹

Facility	NO ₂	SO ₂
GENESEEE	14,530	16,973
SHEERNESS	9,579	31,120
SUNDANCE	20,915	21,742
KEEPPHILLS	9,965	11,871
BATTLE RIVER	11,014	24,022
HR MILNER	928	1,250
TOTAL EMISSIONS	66,931	106,978

Map 3: Coal-Fired Power Plants in Alberta²²



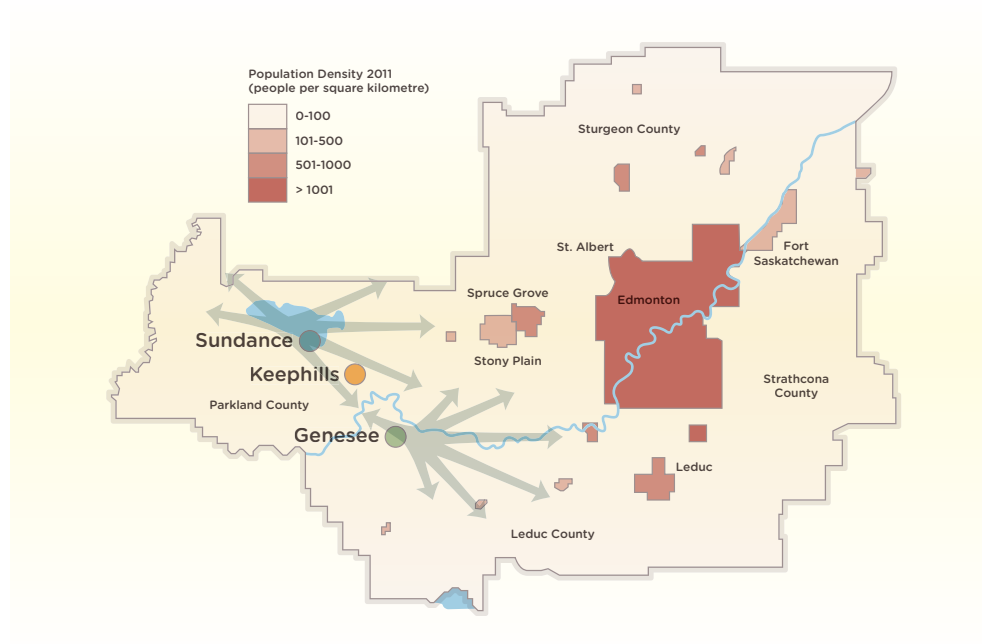
Map 3 shows the distribution of the coal-fired generators in Alberta and their generating capacity in megawatts (MW) in 2013. The volume of emissions from

²¹ Environment Canada. National Pollutant Release Inventory. <http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=98A4F382-1>. (Using Google Earth, this site maps Alberta's electricity generators and other emissions sources and reports on their most recent emissions data. In this case, 2013 emissions data was retrieved for Alberta's coal-fired power stations.)

²² Pembina Institute, et al. March 2013. "A Costly Diagnosis: Subsidizing coal power with Albertans' health," page 4. <http://www.pembina.org/reports/pi-costly-diagnosis-26032013.pdf>

these plants is of concern, as is their proximity to major population centres.²³ The prevailing winds are represented by the arrows in Map 4. The length of the arrow represents the frequency that the wind blows in that direction, showing clearly that Edmonton is downwind.

Map 4: Prevailing Winds from Coal-Fired Power Plants



4.0 COAL PHASE-OUT AND ALBERTA GREENHOUSE GAS EMISSIONS

The government’s ambition to address climate change by further reducing greenhouse gas emissions could focus on a variety of sectors, but the case for going after coal is obvious. Burning coal emits significantly more greenhouse gases (GHGs) than any other fuel in a sector that is the second-largest source of these emissions in the province.

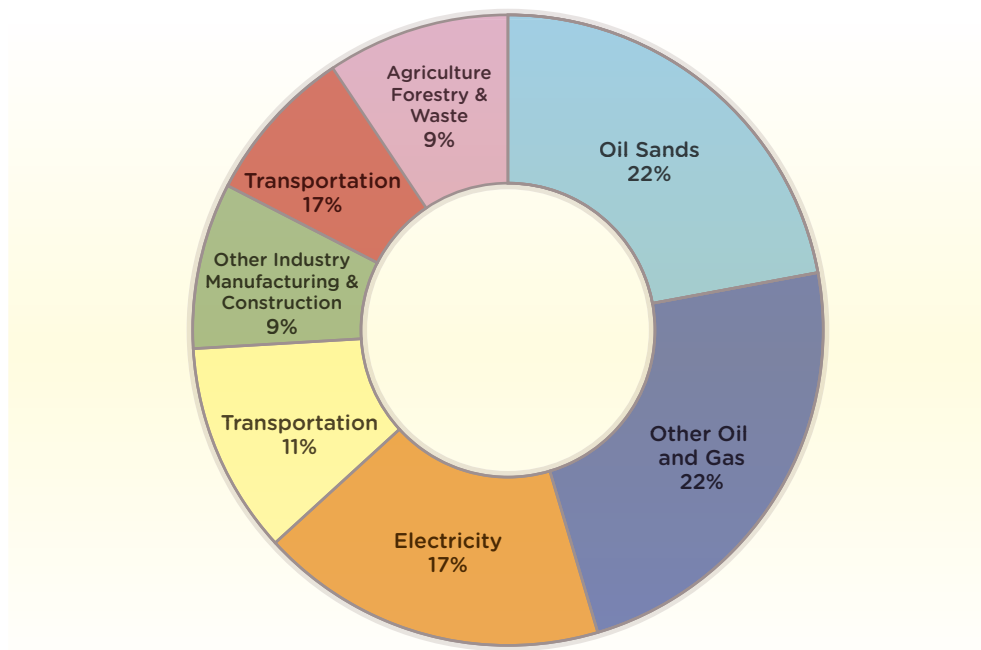
Alberta’s total GHG emissions in 2013 were 267 megatonnes (Mt), which is 14 per cent (33 Mt) higher than Alberta’s emissions total in 2005. 2005 is an important year, as it is the baseline of many emissions reduction scenarios being discussed in a national and global context.²⁴

²³ Ibid., page 41.

²⁴ Government of Alberta. August 2015. Climate Leadership Discussion Document. Page 14. <http://www.alberta.ca/albertacode/images/Climate-Leadership-Discussion-Document.pdf>

As Chart 1 shows, the electricity sector is the second-largest source of greenhouse gas emissions in the province, after the petroleum and gas sector. Electricity accounted for 17 per cent of GHG emissions in 2013, totalling 45 Mt. Eighty-five per cent of those GHG emissions are from Alberta's coal-burning power plants. About 43 per cent of Alberta's installed electricity generation capacity is from coal, and almost 40 per cent is from natural gas.²⁵

Chart 1: Sectoral Share of GHG Emissions in Alberta²⁶



There are a number of federal and provincial regulations currently in place that have been presented as the solution to Alberta's emissions problem, but it is clear that even the electricity producers don't see these as delivering significant improvements before 2030.²⁷

Table 4 is from the Independent Power Producers Society of Alberta and tracks retirement dates and residual coal generation capacity. It is clear that there is no binding commitment to retire more than a paltry 869 MW of capacity before 2030, when the next regulations take effect. Given current trends, it is

²⁵ Ibid., page 27.

²⁶ Ibid., page 14.

²⁷ Emissions intensity limit is not an overall emissions cap, but rather a limit on emissions per unit of production (in this case, no more than 420 kilograms of CO₂ per megawatt hour of electricity production).

likely that generating companies will produce as much electricity as possible by burning the cheaper, dirtier coal right up until the target dates in Table 4. The 869 MW decrease represents just over seven per cent of the coal-fired generating units' capacity in the province. In other words, by 2029, 93 per cent of the stations will likely still be burning coal and polluting Alberta's air.

Table 4: Alberta's Coal Fleet Retirement Schedule²⁸

Date	Retiring Coal Capacity (MW)	Remaining Coal Capacity (MW)
BY 2020	869	5,402
BY 2030	2,893	2,509
BY 2040	1,180	1,329
BY 2050	400	929
AFTER 2050	929	

Keep in mind that the Alberta energy sector could generate more electricity from gas than coal, but chooses not to. Although 44 per cent of the system's capacity in 2014 was natural gas and 39 per cent was coal, much more electricity was generated by burning coal. The market chose the cheaper and dirtier fuel. Even though there was greater natural-gas capacity, coal produced 67 per cent of the energy share in 2014, while gas produced only 20 per cent.²⁹

Of course, this is not just a question of coal versus gas. As the Pembina Institute found in its *Power to Change* report, within 20 years, Alberta has the potential to drastically reduce its over-reliance on fossil fuels for power generation and replace it with renewable energy sources such as wind, sun, biomass, hydro, and geothermal energy.³⁰

²⁸ Independent Power Producers Society of Alberta. June 2015. Media Backgrounder. "Alberta Power Market Current Supply and Coal Retirement Schedule." <http://www.newswire.ca/news-releases/media-backgrounder--alberta-power-market-current-supply-and-coal-retirement-schedule-517918041.html>

²⁹ Ibid.

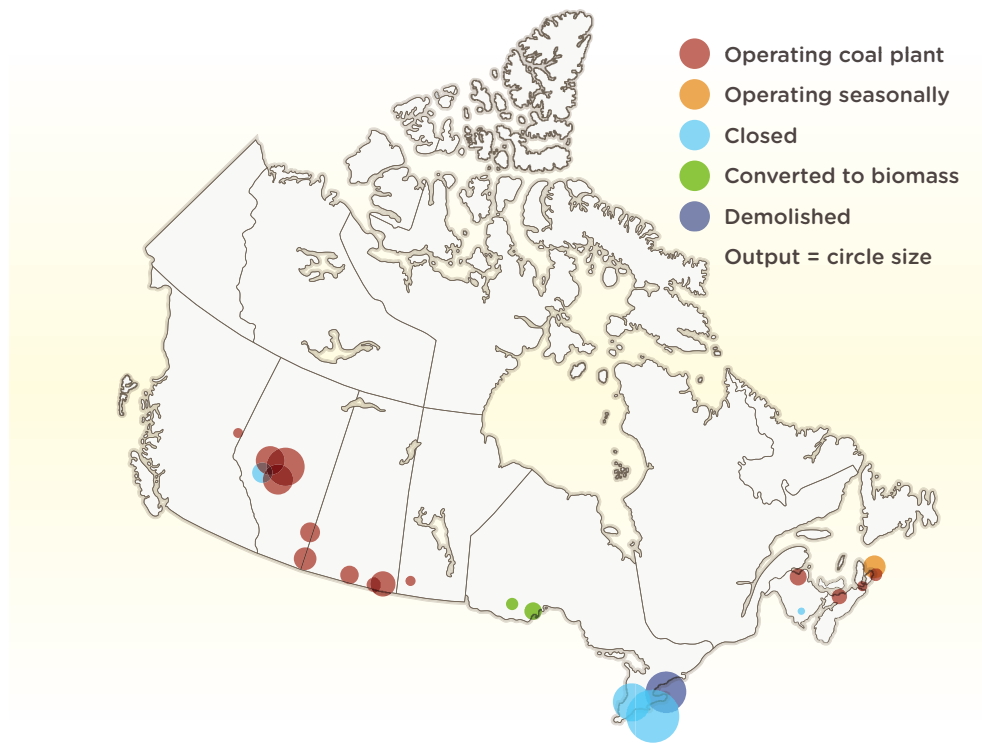
³⁰ Pembina Institute. May 2014. "Power to Change." <http://www.pembina.org/pub/power-to-change>

5.0 PUTTING ALBERTA'S COAL RELIANCE IN CONTEXT

Alberta currently produces 65 per cent of all Canadian coal-fired electricity.³¹

Map 5 provides a picture of where the remaining coal plants in Canada are.

Map 5: Coal-fired Electricity Generating Stations in Canada



By moving away from coal, Alberta would be joining the mainstream of a trend that's now picking up speed around the world. Bloomberg New Energy Finance recently reported that “about 17 percent of U.S. coal-fired power generation will vanish in the next few years – some 7.5 percent this year alone.”³²

Other business news provides some insight into what is happening in international coal markets. With China's commitment to a peak in its GHG emissions by 2030, the concept of “peak coal” is being discussed elsewhere. Peak coal, or the date after which coal use will continually decline, is not about supply so much as the world's willingness to continue to allow its heavy emissions burden.

³¹ Estimates based on coal emissions from Specified Gas Emitters Regulation and Specified Gas Reporting Regulation reporting & EC 1990–2013 National Inventory Report. As found in the Government of Alberta's Climate Leadership Discussion Document (August 2015).

³² Roston, Eric and Blacki Migliozi. April 13, 2015. “Obama's EPA Rule is Redrawing the U.S. Coal Map.” <http://www.bloomberg.com/graphics/2015-coal-plants/>

The ANZ Bank had estimated peak coal would occur in 2020, but is now declaring that it in fact happened last year. It is not alone. Goldman Sachs' commodity analysts recently downgraded their long-term projections for coal "to reflect what we see as the remote likelihood that the market will [improve] ever again."³³

As we approach the December 2015 United Nations Climate Change Conference in Paris, there have been a series of initiatives announced and targets set with respect to GHG emissions reductions, and specific commitments related to burning coal.

5.1 EUROPE AND THE UNITED KINGDOM

In the United Kingdom, the Conservative, Liberal Democrat, and Labour leaders have made a commitment "to accelerate the transition to a competitive, energy-efficient low-carbon economy and to end the use of unabated coal for power generation."³⁴

U.K. Minister of Energy and Climate Change Andrea Leadsom clarified that by 2025, their policy initiatives will get them to a point where unabated coal burning (i.e., without carbon capture and storage) will account for only one per cent of total U.K. electricity generation. Coal currently supplies approximately 22 per cent of the electricity mix.³⁵

To that end, the U.K. announced the closure of two plants by March 2016: the Eggborough power station in Yorkshire; and the Longannet power station in Fife, which is one of the biggest coal plants in Europe and the last in Scotland.³⁶ The European Union's Industrial Emissions Directive requires plants to reduce the amount of toxic particles they emit or be forced to close by 2023. Although this directive has nothing to do with greenhouse gases, it will have a significant impact on GHG emissions because it is likely to force many plants to shut down altogether.³⁷

³³ Edis, Tristan. September 2015. "One Goldman Sachs chart shows that India won't save the coal industry." *Business Spectator*. <http://www.businessspectator.com.au/article/2015/9/24/resources/one-goldman-sachs-chart-shows-india-wont-save-coal-industry>

³⁴ Mathieson, Karl. September 2015. "Will the UK phase out coal in a decade?" *The Guardian*. <http://www.theguardian.com/environment/2015/sep/18/will-uk-phase-out-coal-in-decade>

³⁵ Leadsom, Andrea, Minister of State for Energy and Climate Change. September 2015. Statement. <http://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2015-09-04/8560/>

³⁶ Macalister, Terry. September 2, 2015. "Eggborough power station to close." *The Guardian*. <http://www.theguardian.com/business/2015/sep/02/eggborough-power-station-to-close>

³⁷ OECD/International Energy Agency. 2014. Coal fact sheet. <http://www.iea.org/aboutus/faqs/coal/>

5.2 THE UNITED STATES AND CHINA

In the United States, the Clean Power Plan, which President Barack Obama announced in August 2015, is expected to significantly speed up the reduction of an already declining coal market. As its contribution to the Climate Treaty, the United States has pledged to cut overall emissions by 26–28 per cent by 2025, compared to 2005.³⁸ When fully implemented in 2030, the Clean Power Plan will cut carbon pollution from the power sector by 32 per cent (or 870 million tonnes) below 2005 levels. Much of the coal-fired electricity sector will not be able to achieve these reductions, resulting in many coal-plant closures and significant co-benefits in the reduction of other pollutants. By 2030, this will result in a 90 per cent reduction of SO₂ and a 75 per cent reduction of NO₂ (compared to 2005 levels). SO₂ and NO₂ are both significant contributors to smog and air pollution health impacts, and these reductions will avoid thousands of premature deaths and hospital admissions.

Seemingly in response to the U.S. plan, on September 25, 2015, China's President Xi Jinping announced that his country, a massive world emissions source and the largest consumer of coal-fired electricity, will implement the world's largest cap-and-trade program, facilitating a halt to the country's GHG emissions growth, by 2030.

China may be the last to the coal negotiating table, with the exception of Alberta, but its recent commitment in the lead-up to the UN conference is a game changer. China is the largest domestic consumer of coal and the largest importer of coal. Its massive economic engine has been fuelled by coal, which makes up 64 per cent of its generating capacity, but it is now turning its economic interests toward renewables.

China will peak its total GHG emissions by 2030 or earlier, will lower carbon dioxide emissions per unit of GDP by 60–65 per cent from the 2005 level by 2030, and has committed to generating 20 per cent of its energy from zero-emission sources in the same timeframe.³⁹

³⁸ U.S. Environmental Protection Agency. August 2015. "Fact Sheet: Clean Power Plan By the Numbers." <http://www2.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-numbers>

³⁹ White House. November 2014. "FACT SHEET: U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation." <https://www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-joint-announcement-climate-change-and-clean-energy-c>; and White House. September 2015. Press Release. "FACT SHEET: The United States and China Issue Joint Presidential Statement on Climate Change with New Domestic Policy Commitments and a Common Vision for an Ambitious Global Climate Agreement in Paris." <https://www.whitehouse.gov/the-press-office/2015/09/25/fact-sheet-united-states-and-china-issue-joint-presidential-statement>

In population centres most impacted by pollution, China is closing coal plants quickly. Beijing plans to cut annual coal consumption by 13 million tonnes by 2017 from the 2012 level to reduce pollution in that city, and in a trend reversal, the nation's emissions of carbon dioxide fell two per cent from 2013 to 2014.⁴⁰

Some Canadian energy stakeholders have said that there is no reason to commit to meaningful emissions reductions before China does. China is now at the table.

⁴⁰ Bloomberg Business. March 2015. "Beijing to Shut All Major Coal Power Plants to Cut Pollution." <http://www.bloomberg.com/news/articles/2015-03-24/beijing-to-close-all-major-coal-power-plants-to-curb-pollution>

CONCLUSION

As the world moves away from coal, and toward ever-more-significant reductions in GHG emissions, Alberta has an opportunity to significantly change its electricity sector.

It is clear that the electricity sector and the coal that it burns have a significant impact on the health of Albertans and represent a major climate change liability for the province. The coal plants represent the low-hanging fruit for policy makers grappling with a complex, energy-based economy.

Coal represents less than 40 per cent of Alberta's electricity capacity, but is used more than cleaner fuels, actually producing more than 65 per cent of the province's electricity and a disproportionate share of emissions. Coal plants are located close to the population, and often burn coal mined from public land.

Existing emissions regulations on coal will make very little difference in coal plants' capacity between now and 2030, and may not have any impact on their utilization. Meanwhile, thousands of Albertans will suffer the health impacts of the pollution that they produce, and the province will face hundreds of millions of dollars in health-care costs alone. This amount is compounded by adding lost productivity costs and putting a dollar value on pain and suffering as a result of coal-fired emissions.

Alberta cannot wait until beyond 2030 for emissions reductions that will benefit all Albertans. A coal phase-out must be achieved on an accelerated policy timeline that guarantees the elimination of coal-fired electricity generation within the next 15 years.

The Broadbent Institute urges Alberta's Climate Change Advisory Panel to recommend that coal be phased out before 2030, and that the Alberta government act quickly on this advice.