Get Off Coal:

A Doctor's Prescription

By Dr. Joe Vipond

My most powerful memory of exposure to Alberta's coal fired power generation is from a couple of decades ago on my first road trip from Edmonton to Jasper. Having just moved to Edmonton, the iconic Yellowhead Highway was new to me… beautiful farmland, rolling aspen parkland… and then suddenly the landscape north of the highway dropped away into a massive open pit mine. Huh?! My travelling companion, very familiar with this route, calmly explained that this was a strip mine feeding the nearby electricity plants of Wabamun Lake, whose smokestacks we could see nearby. It rattled me… wasn't Canada's electricity generation primarily hydroelectric?

So began a long learning process into the sources of electricity that charges my cell phone and drives Alberta's industrial processes. Coal is king of the electricity landscape in Alberta. In 2012 52 percent of the electricity used in Alberta came from coal . This translated into burning 20 kilograms of coal per day for each Albertan, or 6.6 tonnes per Albertan annually. Or, in total, more than the rest of Canada combined. Some incredible statistics.

Should we be concerned? Once coal is scooped out of the ground it must be burned to be truly useful. It's worth remembering that coal is essentially compressed trees and other organic matter, which means that although the majority of its material is carbon chains, there are also substantial other elements, such as sulfur, nitrogen, and heavy metals. When these elements burn, they generate a vast conglomeration of pollutants – over 60 at latest count.

So let's run down the prime suspects in our pollutant lineup PM 2.5: or particulate matter 2.5 microns, and known to most of us as soot. NOx: this refers to a number of nitrogen/oxygen compounds implicated in ozone and acid rain formation. SOx, primarily sulfur dioxide, is a key generator of the acidity of acid rain. Ozone, formed from the previous pollutants, visible as smog, and a powerful pulmonary toxin (bad for our lungs). There's also a mishmash of organic compounds such as furans, dioxins, hydroxychlorobenzene, and polyaromatic hydrocarbons. And we shouldn't forget the heavy metals such as mercury, cadmium, and arsenic. Our lineup needs a big room in the station.

The modern science behind coal's effects on health goes back to two major health disasters of the mid-20th century. In 1948 a major inversion in the steel-producing town of Donora, Pennsylvania killed 20 people and sickened 7,000 (50 percent of the town) over five days. Then in 1952 the ironically named "Great Smog" hit London. That five-day smog, primarily generated from houses using coal for heating, was calculated to have killed 4,000 people prematurely and sickened approximately 100,000.

Due to significant pollution control legislation, we find ourselves in a better situation today. But we should strive to do better. In March 2013 the Canadian Association of Physicians for the Environment (of which I am a member), along with the Lung Association of Alberta and NWT, the Asthma Society of Canada, and the Pembina Institute, produced a report called *A Costly Diagnosis: Subsidizing coal power with Albertans' health*. Using two well-validated models, one from the Canadian Medical Association and one from Environment Canada, the report calculated the impact of these emissions on Albertans' health. The numbers were staggering.

Looking at only two of the pollutants, ozone and PM 2.5, and at only the respiratory effects, the calculations showed that coal is associated with approximately 100 deaths, 80 hospital admissions, and 4,800 asthma days (an asthma day is defined as a day missed from work or school due to an exacerbation of asthma). The report calculated that this translates into an extra 1.7-2.1 cents/kWh in electricity costs to Albertans (off the baseline of approximately 6 cents/kWh pool price). This costs Alberta taxpayers an extra $300 million dollars per year. This is undoubtedly a gross underestimation – it doesn't consider the cardiovascular and stroke illnesses, intellectual disabilities caused by mercury, developmental disease, and cancers caused by the various other pollutants.

So, where do these illnesses occur? Alberta has 18 generating stations, scattered throughout the middle of the province. The highest concentration is directly west of Edmonton, in the Wabamun region, where 10 of the stations and 75 percent of the entire province's coal generation are located. With the prevailing westerly winds in the province, the emissions tend to settle over Edmonton and surrounding areas.

It should go without saying that, if hu-

mans are affected, so too are the surrounding vegetation (including croplands), agricultural animals, and wildlife.

The emissions elephant in the room is carbon dioxide. Burning coal is an extremely inefficient way to generate electricity and our coal plants, as a group, are responsible for approximately one-third of Alberta's industrial greenhouse gas (GHG) emissions. That's equivalent to all of the oil sands projects combined. There are viable technological alternatives to coal; coal mining provides minimal jobs for Albertans; coal producers provide very little royalty revenue to the provincial coffers – it's no wonder Premier Prentice seems likely to set his targets on the industry for his new GHG policy.

Currently two streams of regulations govern air pollution from coal-fired power plants. Provincially, the sector effectively is regulated by the Clean Air Strategic Alliance, or CASA, which is a group consisting of industry, government, and ENGOs. CASA's decisions are based on consensus. Their advice is reflected in regulations stipulating that, when a generating station hits 40 years of age, it must institute BATEA (Best Available Technology Economically Achievable) air pollution controls. So far, even with our aging plants, these controls have yet to be implemented, through trading of "credits" gained from other environmental pollution measures. No plant closures are forthcoming from these regulations.

Environment Canada, on the other hand, in 2012 instituted regulations that call for the closure of all coal-fired power plants when they hit 50 years of age. (It is worth noting that the-then Environment Minister Jim Prentice proposed a 45-year phase out. The Harper government extended this for an additional five years after his departure). The first closures are to take place in 2019, with four plants in Alberta closing, and the last will take place in 2061, with the closure of the 495 MW Keephills 3 plant.

Our coalition doesn't think that's good enough. It is unacceptable to imagine these impacts on Albertans' health (and the global climate) will continue for another 47 years. Coal won't be phased out entirely until I turn 92 and my 6-year old daughter turns 53.

Instead, we propose a 10-year coal phase out. It's been done before: Ontario, which in 2004 had about the same absolute amount of generation from coal as Alberta has today, closed its last plant in April of this year. Prime Minister Cameron of the UK in late September proposed a 10 to 15-year coal phase out (a staggering 25,000 MW!). And we now have Premier Prentice publicly stating he too sees a 10-year phase out in this province's future.

Can it be done? Certainly, replacing 6,250 MW of electricity will be challenging. But, with a strong plan, it can be done and deliver many benefits for the province. The first target of this plan, the easy target, should be energy efficiency. Amazingly, we are the only Canadian province, and one of very few jurisdictions in North America, without any energy efficiency program. And, as we are currently profligate users of electricity, long accustomed to abundant energy without consequence, the gains can be enormous. The Alberta Energy Efficiency Alliance has calculated that by 2020 we could improve our efficiencies by up to 20 percent or 2,900 MW. Realizing that goal would be equivalent to the electricity generated by 10 of the 18 coal fired power plants.

The next "wedge" is renewable energy. Once again, we are the only province, and one of the few jurisdictions in North America, without a renewable energy strategy (although one has been promised for years). This is despite the fact we have the best solar and wind resources in the country. As the technology has improved, wind has become on par for cost with fossil fuel generation; solar is not far behind… and the costs for both keep dropping. In 2013, renewables in Alberta accounted for 17 percent of generation capacity but only 9.6 percent of actual generation. Contrast this with the generation percentages for jurisdictions with strong renewable energy policies. In Germany renewables generated 31 percent of production in the first 6 months of 2014 and are projected to generate 45 percent by 2025. Renewables' share of California's production is expected to rise to 33 percent in 2020, up from 20 percent in 2013. In 2020 Nova Scotia projects that 40 percent of the province's generation will come from renewables, more than double today's 18 percent.

> "The legislature finds that generating electricity from the combustion of coal produces pollutants that are harmful to human health and safety and the environment."
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> *-Washington State Legislature, An Act Relating to coal-fired electric generation facilities, 2011*

What is Alberta's current renewable generation target for 2020? Who knows. We don't have one. We need to develop and implement strong policy to catch up to the leaders in the field.

Natural gas seems like an easy replacement to coal and will probably be a component of the solution in the short term as we transition to a fully green grid. It burns cleaner than coal, generates 55 percent of coal's CO^2 emissions, and and produces much fewer of the other pollutants (with the exception of NOx).

But there are distinct risks to simply replacing coal with natural gas. The first is that, unlike renewables, there are fuel input costs. As the commodity fluctuates with the North American market, so too will our electricity bills… I suspect this is more likely to be to the upside. Secondly, although cleaner, methane is still a fossil fuel and is a potent climate-changing gas. Since methane is thirty times more potent than carbon dioxide it has been calculated that, if fugitive emissions

from the production process (from drilling to pipelines to transfer stations) are more than three percent the climate benefits from using natural gas will be completely negated. Current estimates suggest leakage rates of between four and nine percent. With a projected lifespan of 30 years for each plant, we are locking ourselves in to infrastructure that will continue to pollute for another full generation and will not do enough to reduce GHG emissions.

If we are going to use natural gas, we need to do it wisely. We shouldn't build massive generating plants far from the end-users (ie. such as the three new gas plants proposed for the Wabamun region). A more elegant, more efficient solution is Combined Heat and Power (CHP, also known as co-generation). If we are going to burn natural gas to heat our homes and power industry anyway, let's use the excess energy produced to spin turbines, to produce electricity right where it is being used, and save on expensive transmission costs. Co-generation is currently used in Fort McMurray and District Energy Centres are located at many large institutions, such as our universities. These centres should be mandated for all new residential communities as well as created in existing industrial and commercial centres.

Will this ever happen? The ground is shifting rapidly. Over the last year, we have been meeting with politicians from the entire political spectrum – MLAs from all four provincial parties, federal MPs and senators. We have seen initial skepticism transform into support, and even downright enthusiasm. Multiple op/eds we've written over the last year have influenced the mainstream media writing on the subject. The *Edmonton Journal* editorial board publicly has supported a phase out. At the political and public levels it is becoming a believable and realistic solution.

We are hearing the right things from our new provincial leader. Mr. Prentice has stated that a coal phase out is a direction we will be moving in in the near future. But there is a lot of money, and institutional inertia, that will obstruct and obfuscate. The Premier will need the support of the public. If you would like to get involved, and learn more, visit our webpage at albertacoalphaseout.ca, and follow our regular posts on our Facebook page.

Those open pit mines are still there, physical scars reminding us of the impact of coal-fired power. But twenty years on, I see subtler, even more disturbing impacts. I hear those in the wheeze of my asthma patients and in the news reports of drought in California – and every time I look at a climate forecast. Dethroning King Coal isn't the entire solution to the world's problems, but it is a very local, very impactful one. I can't help but think that my children and yours deserve an Alberta coal phase out.

Keephills Generating Station PHOTO: © I. URQUHART