Methane regulation in Alberta and a brief comparison with other fossil fuel economy states and provinces: a fugitive in question

The oil and gas industry has been under close scrutiny over recent years as concern about our warming climate grows and energy sourced from fossil fuel combustion continues to emit greenhouse gases (GHG's) into the atmosphere. In Canada, recent shifts in the political ideologies of the provincial and federal governments bring to question how Alberta's energy sector will manage to be a viable source of income for Canada's richest province due to new regulations and taxes.[1] Maintaining a prosperous industrial sector while balancing the emissions of GHG's and other pollutants to fit into the framework set out by the new governments will be no easy task. Methane in particular is a potent GHG emitted in large concentrations in the oil and gas sector and can have a global warming potential up to 86 times that of carbon dioxide (CO_2) over a 20-year span.[2] The global warming potential of a GHG is determined by its atmospheric lifetime and its tendency to break down and form other GHG's.[3]

Methane has many anthropogenic sources other than the oil and gas industry, however, no other industry (agriculture, for example) is as easy to regulate.[4] Biogenic sources of methane also contribute to the current high concentrations of GHG's (eg. / Wetlands, soil bacteria, termites, etc.). Any attempt to alter large biogenic sources of methane could result in drastic effects to the ecosystem or have unexpected long-term effects. Therefore, it falls on governments to control the oil and gas sector and minimize greenhouse gas emissions using the most economically viable method available; that is, regulation. However, governments are elected by the public and, as such, are elected based on the public's understanding of pertinent

issues. Can national elections and legislative votes result in biased collective decisions? It is believed that media, individual inference and social learning can pave the way for biased beliefs to arise.[5] It is therefore insightful to consider political ideology when comparing a political hot topic like regulation.

Recently, the Intergovernmental Panel on Climate Change's fifth assessment has put pressure on governments to take action to mitigate the impact of climate change. One example in Canada is that Vancouver is expected to be affected by sea level rise in the form of coastal flooding and storm surges as well as other weather phenomenon including heat waves, heavy rains and their associated flooding, air pollution and heat island effects.[6] Further, the Conference of the Parties (COP21) meeting in Paris in 2015 built a foundation for international collaboration on taking political action towards mitigating GHG emissions. The magnitude of this historical stride in international action may, arguably, end up being one of the most significant events in the history of mankind.

Canada reported an estimated 726 Mega tonnes (Mt) in 2013 (Figure 1).[7] A large and commonly unregulated emission source of GHG's in the energy sector are fugitive emissions. These are defined as fugitive equipment leaks, process venting, evaporation losses, disposal of waste gas streams (e.g., by venting or flaring), and accidents and equipment failures.[8] The government of Canada estimates that regulating fugitive emissions is one of the most affordable strategies to reducing GHG's and in many cases can save operators significant loss of product in the long-term, resulting in a net benefit to the operator. Fugitive emissions in Canada make up a significant percentage of the total annual GHG emissions (8%).

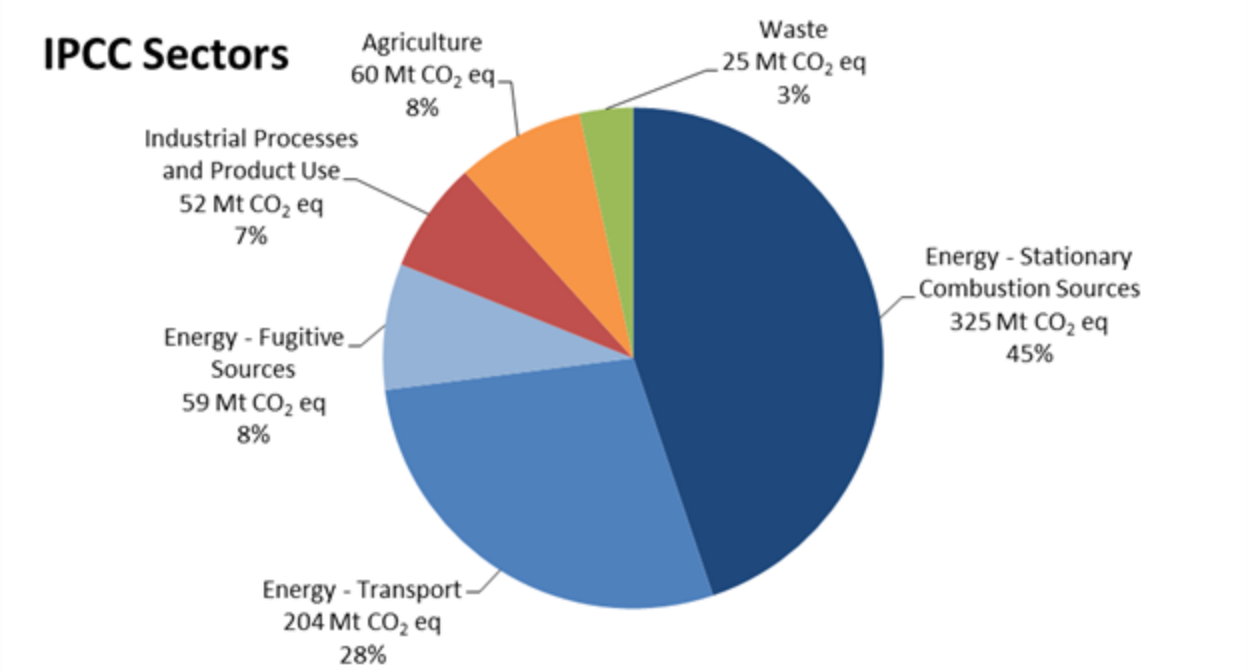

Figure 1. A pie chart of the IPCC sectors in Canada. The energy sector is broken down into 3 subsectors: stationary combustion, transport and fugitive emission sources.[7]

In this manuscript, a qualitative comparison is made between states' and provinces' political ideologies and their policies on methane regulation. In particular, the focus will be on oil and gas producing states and provinces in North America and how their governments address fugitive emissions. Due to the recent ideological shift, Alberta will be discussed in greater detail and current policy related to fugitive emissions will be compared with historical policy. The historical and current federal regulations of Canada and the United States will also be discussed and compared to help put state and provincial policy into context.

A brief review of methane emission policy in Canada and the US

Canada's first federal regulations surrounding clean air comes from the Clean Air Act in 1971. The goal was to achieve a uniform approach to air pollution across Canada.[10] By that time, the U.S. had already made large strides in air pollution mitigation including the Air Pollution Control Act of 1955, the Clean Air Act of 1963 and the National Environmental Policy Act (NEPA)of 1970. However, none of these federal regulations included methane as a mandate; the focus of these regulations were to minimize risk to human health. It is currently understood that methane is a pre-cursor to tropospheric ozone; However, until 1970 and the introduction of National Ambient Air Quality Standards (NAAQS) under NEPA, ozone was not required to be monitored in the U.S. or Canada.[12]

In terms of greenhouse gases, Canada was the political stage for the signing of the Montreal protocol, an agreement made in 1987 to phase out the use of Chlorofluorocarbons (ozone depleting substances and strong GHG's).[13] Since 1987, the U.S. Pollution Prevention Act (PPA) of 1990, the Canadian Environmental Protection Act (CEPA) in 1999, the Canadian Environmental Assessment Act (CEAA) in 2012 and the U.S. Clean Power Plan (CPP) in 2015 were all developed with a focus on reducing pollutants emitted into the atmosphere. It is noteworthy to mention the Canada-United States Air Quality Agreement in 1991. This was agreed upon by Canada and the U.S. in an attempt to reduce emissions of SO_2 and, subsequently, the impact of acid rain development near the Canada-U.S. border. Lastly, in March 2016, the U.S. and Canada publicly agreed to cut methane emissions by setting a goal of reducing them by 40 to 45 per cent below 2012 levels by 2025.[15] This is expected to be written into legislation in the coming years.

Methane regulation in Alberta

In Alberta, the primary legislation regarding regulation of air pollution is the Environmental Protection and Enhancement Act (EPEA). The EPEA is supplemented by the Alberta Land Stewardship Act and more recently in 2013, the Protecting Alberta's Environment Act from Bill 31, this resulted in the formation of an "arm's reach" organization called Alberta Environmental Monitoring, Evaluation and Reporting Agency (AEMERA) whose main goal was as a reporting agency to make Alberta reporting procedure more transparent.[17] Further, the Alberta Energy Regulator (AER), an organization fully funded by industry, took on the regulatory role of the province. Prior to 2013, the regulatory role of Alberta belonged to Alberta Environment and Sustainable Resource Development (ESRD) (now Alberta Environment and Parks (AEP)). In February, 2015, AEMERA disbanded and the New Democratic Party (NDP) took office on May 5, 2015. Currently, the AEP enforces, the AER regulates and develops frameworks and report through the Alberta Department of Energy (AE), and the AE also grants permits and manages Alberta's non-renewable resource development.[18]

In May of 2016, Bill 20, the Alberta Climate Leadership Implementation Act, was announced and received royal assent later that year.[19] The bill describes many ambitious goals including the reduction of methane emissions by targeting fugitive emissions. The goal is to reduce methane emissions from oil and gas operations by 45% by 2025. This will be done by applying new emissions design standards by focusing on the planning stage to reduce costs. Alberta will also improve the measurements and reporting of methane emissions and focus on leak detection and repair. Lastly, to develop a joint initiative on methane reduction and verification for existing facilities.[20]

Comparison with other states and provinces

Alberta has been under conservative leadership for the past 40 years and is a good model representation of a province with a politically right of center ideology. This is contrasted with Saskatchewan who was under NDP leadership for 16 years (1991 – 2007), while Saskatchewan is currently under right-of-center leadership, it is used as a model left-of-center ideology because it is the only comparable province in terms of fossil fuel development (Figure 2).[21] Nova Scotia and Ontario have had a less stable political ideology over the past few decades and so were not considered in this analysis.

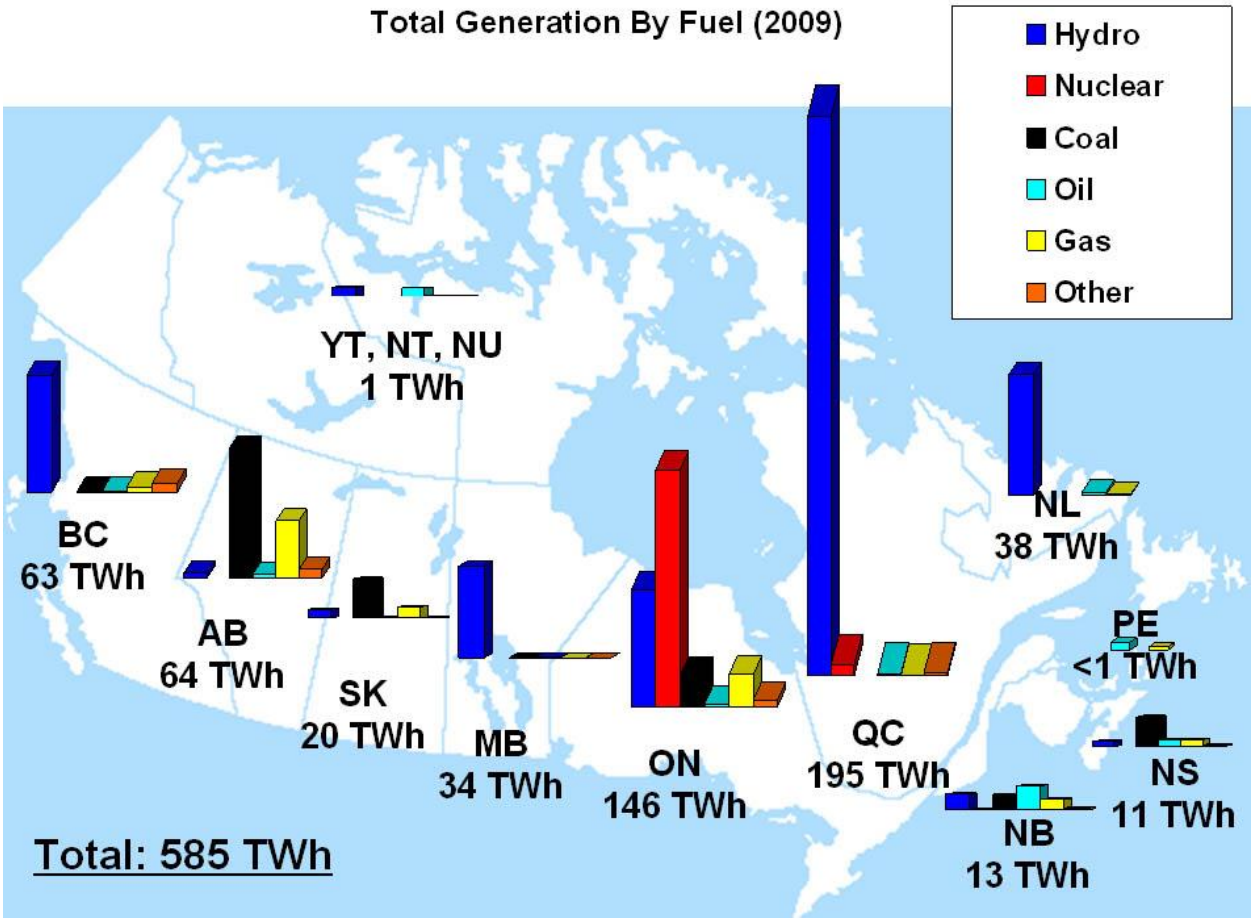

Figure 2. Electrical generation by energy sector.[21]

In the U.S., California is taken as a model state for a left-of-center ideology while Texas is used as the right-of-center model. It was particularly challenging to find a consistent left-of-center state that also relies on the fossil fuel industry for its economy.

Currently in Alberta two carbon offset protocols exist now to support methane reductions in the oil and gas sector: an offset protocol to encourage converting existing pneumatic equipment to highly efficient options and an offset protocol for solution gas conservation. The offset protocol is a way of crediting those companies that register and demonstrate a reduction in GHG emissions.[23] This is a great benefit that the other model states and provinces don't seem to adopt, in particular to focus on fugitive emissions. California does require that all operations exceeding a 25,000 metric ton CO_2 equivalent threshold must report all venting and fugitive emissions.

Saskatchewan and Texas have very little regulation in regards to methane emissions. No incentives exist for companies to address their fugitive emissions and their governments only recommend conservation. This is in stark contrast to other forward thinking states like Colorado who require fugitive emissions to be reduced by 95% under enforcement.[24] One argument against regulation of fugitive emissions is enforcement because many states and provinces don't have the resources to investigate, follow-up and shut down non-compliant operations.

Conclusions

Interestingly there seems to be no evidence to suggest that political ideology can have an effect on the regulations of a regions fugitive methane emissions. The information here is

limited by the small sample of fossil fuel economy states and provinces to compare with. The analysis is further complicated because the chosen states and provinces operate very differently from one another. For example, Alberta regulation occurs through an industry funded organization whereas in Texas, Saskatchewan and California emission regulations are controlled by the government. Future studies should focus on comparing regions on a more international scale. This could include a more in-depth analysis of federal legislation in South America and the Middle East, where the governments rely mainly on fossil fuels for their economies.

It is quite apparent that regulations surrounding fugitive methane emissions will be incorporated into provincial legislation in the coming decades in Alberta and Canada as a whole. Understanding how topics of environmental sustainability and climate change affect the viewpoint of voters is a topic of great concern with the rise of social media as source of news for much of the population. A deeper investigation into the relationships of environmental understanding, political ideology and action is needed to better understand how beliefs of the public are swayed from scientific evidence.

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