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Final Project Presentation

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*The Northern Challenge of Sustainable, Green, Energy*

The safe disposal of preservative-treated railway ties has long been a sustainability issue, and one that is of pressing importance currently in the City of Williams Lake. Atlantic Poweris a biomass fuel plant in Williams Lake, British Columbia that generates electricity by burning wood waste, and currently 5% of the waste burned is railway ties. They are currently appealing to the City of Williams Lake to increase the percentage of rail ties to 50% of the wood it burns. Emissions from burning railway ties will increase air pollution and CO2 emissions, contributing to global warming.

Atlantic Power began the limited burning of railway ties in 2015, but with recent forest fires and a reduced supply of wood waste, they fear an economic downturn if they are not allowed to burn additional railway ties.The potential economic gains from burning the rail ties will exceed the ecological boundaries of the region, weakening the link between environmental, social, and economic systems of Williams Lake. By jeopardizing the local environment, Atlantic Power will place future residents at risk. Stakeholders are concerned with negative environmental and social implications if Williams Lake becomes a railway tie burning city. These groups are approaching local leaders, requesting that they consider the connection between economic, social, and environmental consequences if chemical emissions increase. The organization ‘Rail Ties Be Wise’ has researched the potential ecological damages of burning railway ties and is suggesting solutions that will allow the citizens of Williams Lake to continue healthy, productive, and meaningful lives.

In my examination of this controversial issue, the criterion is determined to be the maintenance of good air quality in the City of Williams Lake while encouraging sustainable development. The indicators for Atlantic Power Corporation in this controversy are described by increases in wood supply for the co-generation plant, and an enhanced economic bottom line. Indicators important to the opponents of the proposal include the measurement of emissions over time from Atlantic Power’s smokestacks, and the testing results of soil and water samples in the vicinity of the waste ash pits.

There are many stakeholder groups involved in the rail tie debate. Local mills in Williams Lake are producing the fuel for Atlantic Power, either in the form of mill by-product or roadside logging debris. They want to start charging Atlantic Power for this biofuel so they can generate more income and pay shareholders. Atlantic Power wants the product for free. There is now a reduced allowable cut from the government forestry division, so there is less wood for Atlantic Power to burn (Nicholls 2019). There is an economic benefit to the plant if they can start utilizing the rail ties. Atlantic Power WL Division’s contract with BC Hydro to produce green, renewable energy currently limits the number of ties burned. They are petitioning to have a higher volume of rail ties placed under the clean category so they can use them as fuel for their co-generation plant (Forbes 2019).

The group Rail Ties Be Wise, from Williams Lake, is a coalition of concerned citizens that opposes Atlantic Power’s petition. According to RTBW, the rail ties contain either creosote or pentachlorophenols. They do not want these chemicals, and their by-products, released into the atmosphere within the Williams Lake City Limits, especially since the topography of the city often allows temperature inversions that trap emissions. The wind is not usually strong enough to blow away these contaminants (RTBW 2019). RTBW wants to ensure that chemically treated wood does not become included as clean energy fuel under BC Hydro’s Clean Energy Act.

West Coast Environmental Law is working with Rail Ties Be Wise to prevent Atlantic Power’s application to change BC Hydro’s criteria for clean energy. Environmental lawyer, Patricia Webber, feels that Atlantic Power seeks to create jobs and increase profits without adequate consideration for sustainable energy and potential damage from air pollution. In an interview, she expressed her concerns about ongoing declining air quality in Williams Lake, adding that the burning of additional railway ties will increase carbon emissions from Atlantic Power. (Webber 2019).

Rail Ties Be Wise spokesperson, Mary Forbes, stated that a cogeneration plant in Kamloops applied for a permit to burn rail ties, and local doctors spoke out against the idea because of increased air pollution and the resultant breathing issues (Forbes 2019). Interior Health has stated concerns about the emissions from burning rail ties. Greg Baytalan, Air Quality Specialist with Interior Health, is requesting data for emissions from the burning of creosote. He wants to be sure that all emissions are free of non-biomass material (Baytalan, 2015).

Local First Nations groups were consulted on their position regarding air pollution and emissions from Atlantic Power. According to an assessment report by Peter Lawrie, The Williams Lake Indian Band supported the proposal as long as it met with environmental standards, while many other bands provided no feedback (Lawrie 2016).

**Systems Diagram**

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Figure 1 (Helmer, 2019)

On Tuesday, April 30th, 2019, I attended the Williams Lake City Council meeting, chaired by the acting mayor, Craig Smith, that heard submissions regarding Atlantic Power’s proposal. A delegation from Rail Ties Be Wise was in attendance, represented by Angie Delaney, a School District 27 board trustee. In addition to information that I had already researched regarding this issue, her presentation included the specific plans of Atlantic Power. She reported that Atlantic Power will arrange for rail ties to comprise 25 to 33% of all wood burned each year, which represents 200,000 tonnes of rail ties annually (Delaney, 2019). She also explained that British Columbia operates under Ambient Air Quality Objectives that are not legally binding, and only gauge historical and current air quality. Any decisions based on air shed, and the Air Shed Management Plan, expired in 2016 (Delaney, 2019). The expiry is concerning because there is no legally binding document that restricts Atlantic Power from burning railway ties. Trustee Delainey sumitted her report to the Williams Lake City Council, who agreed to review her documentation. They did not publicly dispute or support her proposal, but would consider it further in a closed session.

*Impacts*

If Atlantic Power is permitted to burn railway ties, it will benefit financially, as they will be paid for accepting rail ties for burning, in turn increasing their fuel supply. They will be able to continue supplying electricity and steam to BC Hydro, and perhaps even increase production. However, the proposal does not promote procedures that will sustain clean air in Williams Lake, and it will contribute to increased greenhouse gas emissions.

Atlantic Power is currently generating clean energy from biomass fuel that produces minimal fossil fuel emissions. With an increase in the percentage of railway ties burned, an increased discharge of CO2 and SO4 from the creosote will lead to the deteriorationof air quality in Williams Lake.

It is crucial to consider the air pollution history of Williams Lake. Between the 1960s and 1990s, beehive burners spewed ash over the city. In 1987, residents needed to scrape ash off their cars, and a reported 10kg of ash fell on a town block-sized area every month (RTBW 2019). The ash became a public health disaster, leading to respiratory ailments that decreased the quality of life for residents. Knowing the effects of poor air quality in the past should be strongly considered when deciding whether future emissions may enter the local atmosphere. The last beehive burner ceased to operate in 1995, solving the ash problem, however the advent of climate change began to affect Williams Lake, ushering in an era of dry conditions and forest fires.

Fires have affected air quality in the area to the present day, and the topography of the city has exacerbated the situation. This knowledge plays an essential role in informing the controversy surrounding the burning of chemically-soaked railway ties. Adding emissions into the Williams Lake airshed will further deteriorate a declining environment. It also contributes negatively to the global goals of reducing carbon emissions. Williams Lake needs to contribute to atmospheric sustainability by burning clean wood waste.

The ash from burnt railway ties is different from the ash of clean wood waste. Atlantic Power's current permit allows for ash disposal above Frizzi Road, located near Soda Creek and tributaries leading to the Fraser River. The creosote from the ties contains polyaromatic hydrocarbons and pentachlorophenols that could leach into the creek and contaminate the water supply (Kim, Ki-Hyun, et al.,2013) Furthermore; there is no base underneath the ash piles so underlying soil could become contaminated.

Climate change has already presented challenges to sustaining ecosystems in Williams Lake. Arid land has made agriculture more complicated, and reduced freshwater in streams has affected local fish habitats. Climate-induced extreme rainfall events could wash this ash into nearby residential areas and streams, which will not happen if the rail ties remain in solid form. The construction of impermeable containment structures around the existing ash would ensure that mass wastage does not occur.

Increasing local food production is a way to decrease outsourcing of carbon emissions from having to import food. Local agriculture may be affected by ash-infused soil. The Soda Creek area of Williams Lake is a local supplier of corn, with fields situated near Atlantic Power and the ash disposal area. Contamination from the ash could affect anyone who consumes corn grown in this soil. Soda Creek corn is sold widely in the Cariboo region. Climate change will potentially limit these corn crops, and as such, limits the local production of food.

If drought conditions worsen over time, stored ash may end up in Soda Creek due to mass wastage. The dry ground will not be stable, and extreme rainfall may push the ash into local waterways. Contaminated water may end up in the Fraser River, which is fed by Soda Creek, eventually affecting downstream ecosystems. Wildlife who drink the contaminated water and fish species that live in the river may be affected. The immediate environment is already facing sustainability issues due to climate change. Air, soil and water contamination will worsen these conditions.

Climate Change is a driving force for Atlantic Power to pursue clean energy options. Burning wood is carbon-neutral, but the emissions from creosote are a concern. Creosote emissions add approximately 39 pounds of CO2 into the atmosphere (Smith & Bolin 2010). Despite the fact fossil fuel emissions from creosote are less than other traditional sources, the people of Williams Lake are still concerned about a decreased quality of life. If Atlantic Power proceeds with their plan, the residents of Williams Lake will become exposed to SO2, PAH, and HClemissions as well as CO2. Sulphur dioxide links to respiratory problems and disease in plants, animals, and humans. PAH (polycyclic aromatic hydrocarbon) causes cancer, cardiovascular disease, and poor fetal development. Hydrochloric Acid is corrosive and an irritant (RTBW, 2019). The inhabitants of Williams Lake will be unable to sustain a healthy lifestyle with continued exposure to these chemicals. Adding fine particulate matter from forest fire smoke to even small emissions from burning railway ties will lower air quality further. The present rate of global warming indicates that there is no room for further carbon dioxide or other air contaminants to make their way into the atmossphere.

Williams Lake does not want to be known as a location for burning railway ties. The delegation of Rail Ties Be Wise fears this will deter migration into the city and have long-term implications for the growing economy of Williams Lake (Forbes 2019). There are now some larger stores that are making the city more self-sufficient. People from distant places visit for the yearly Stampede festivities. Environmental hazards like emissions from burning creosote and ash runoff will discourage tourism, hampering the ability of Williams Lake to sustain economic independence. If people refrain from moving into the area, thriving businesses may have to close. People will need to relocate to find employment.

Since the long-term environmental impact of burning railway ties is undetermined, it is essential to consider both scientific and social implications. While the emissions may not cause harm to current residents of Williams Lake, the future effects are unknown. Atlantic Power and BC Hydro will benefit financially in the short term, but if emissions damage local ecosystems, land value in Williams Lake will decrease and cause a demoralizing of society. The city may become a place where only poor people can afford to live and has the potential to become a polluted, industrial slum. Also, Williams Lake is the traditional home of many First Nations groups. The land is their home, and sacred areas abound. Many will not want to leave their lands and heritage, even if the environment no longer sustains a healthy life, leading to feelings of regret, resentment, and low self-esteem.

If Rail Ties Be Wise and other stakeholders are successful in stopping the rail tie burn, it will establish barriers in other alternative sites. On the other hand, allowing Atlantic Power to burn the ties may encourage other regions in Canada to do so, causing increased emissions from creosote on a national, and even global scale. Currently, Pinnacle Pellet, a wood pellet manufacturer operating in Williams Lake, is awaiting the decision on Atlantic Power’s submission, as they too hope to increase their operations by processing railway ties, amounting to 130,500 tonnes each year, further compromising the environment. This will defeat the movement to decrease fossil fuel emissions. Setting a community-based goal of stopping creosote emissions is an expression of global thinking regarding climate change. If Williams Lake can promote its position as a sustainable city and recognize environmental limits, then it will hopefully set an example for other communities with emissions debates.

*Decisions*

The Government of British Columbia issued Atlantic Power’s Air Emissions permit #8808 (Gov’t BC 2018) allowing 5% of their total burn to be made up of railway ties. In its decision, the Ministry of Environment would allow Atlantic Power to increase the number of rail ties subject to various terms and conditions. For example, the decision reduces allowable particulate matter emissions from 50 mg per cubic meter to 20 mg per cubic meter. They have also set limits for discharge of HCl and SO2 that were not previously regulated (Gov’t BC 2018). While the Ministry is willing to control the emissions from burning creosote, this does not alter the fact that these emissions still contain harmful CO2.

Ultimately it is the Provincial Government who holds the clout regarding the tie issue. A report states that the Ministry, under the previous Liberal government, applied to dismiss the nine appeals to their decision on December 9, 2016. The appeals raised concerns about the air quality in Williams Lake, human health, and the environment (Gov’t of BC, 2018). The decision appeared to uphold the government’s pro-business outlook.

The changed political landscape provincially adds a new dimension to the debate. The New Democrats under John Horgan are somewhat more environmentally aware, and are more likely uphold environmentally-based appeals that reach their level of government. However, Williams Lake is still closely tied politically to the previous Liberal government, has a Liberal MLA, and its City Council is firmly business minded.

According to the reports, meetings, and interviews that I have engaged in, I feel that the City, Lawyers, and Rail Ties Be Wise have thoroughly consulted a wide variety of stakeholders. Reports from the previous Liberal government also indicate that they have invited stakeholder involvement on the issue, however, it is alarming to read that they attempted to dismiss appeals of those in opposition. Sustainability needs to come from authorities and leaders of the community. They need to set the example, and not dismiss the concerns of the public and other stakeholders.

*Solutions*

The solution proposed to the City of Williams Lake by Rail Ties Be Wise is to forbid the burning of railway ties beyond the current 5% of Atlantic Power’s wood waste. Their proposed solution takes both environmental and social impacts into consideration: Wood treated with creosote or pentachlorophenols is neither renewable nor clean, and their burning goes against the intent of the Clean Energy Act (RTBW 2018). Residents of Williams Lake worry about the long-term effects this will bring. The social impact is the stress of unknown future air quality, potential health hazards, and possible decreased standard of living. The emission control models presented by the government do not consider exaggerated data values resulting from a lengthy temperature inversion, which is a reality in Williams Lake, where inversion events have been known to last up to five days.

According to the government assessment report, SO2 will be the highest increased emission if Atlantic Power burns 50% rail ties. SO2 will reach 47% of the allowable 200 gm-3 (Adams and Lawrie, 2016). This number is nearly half of the permissible sulphur dioxide emission levels. If there is an inversion or forest fire, trapped emissions could take levels well beyond maximum, endangering the health of Williams Lake residents. Furthermore, the report discusses increasing the height of the smokestacks, so fewer emissions remain near ground level. Changing smokestack height is a superficial choice; it will not stop emissions from entering the atmosphere!

In opposition, Atlantic Power wants the solution of an amended permit at their Williams Lake facility. They feel that increasing restrictions on specific emissions, such as SO2, will keep the air in Williams Lake clean. They argue that the amendment keeps the cogeneration plant operating with clean energy and low emissions. Burning the rail ties is cheaper than disposing of them in a landfill: US$15-25/ton, with revenue of US$25/tonne – as opposed to an average cost of US$36/tonne to place them in a landfill. Also, some railway companies will pay a tipping fee if the Atlantic Power purchases their ties for energy (RTBW 2014). The company’s motivation is based purely on economic sustainability and financial gain.

Kamloops and Saskatchewan had also considered the burning of creosote-soaked railway ties. Kamloops is a logical comparison to Williams Lake since both cities are prone to inversions. A report states that an Aboriginal Cogeneration plant had signed a 10-year contract with CP Rail to send 250,000 rail ties to Kamloops each year. However, there was no air-permit in place (Pollon 2009). Residents of Kamloops expressed similar concerns as those of Williams Lake, indicating that the plant is near a mostly-residential area, and the long-term effects of creosote emissions are not yet known.

Interestingly, the federal government gave the company $2.7 million, plus another $1.5 million, to develop the Kamloops project (Pollon 2009). Residents resented the government investing in a project with no clean air standards. They also presented an excellent point, suggesting that tie burn testing should happen in a non-residential area. Then the air can be monitored without endangering human life and other ecosystems. The toxicity of burning creosote remained the concern for Kamloops, and the debate appeared to be economic versus sustaining environmental and social health.

The proposed facility in Saskatchewan is also a cogeneration biofuel plant recommended by the First Nations Power Authority, a non-profit organization to get First Nations into the power business. Curiously, the Kamloops company was also a First Nations cogeneration plant. If the government wants First Nations groups to invest in the power business, they should be guiding them toward a green energy sector. This investment presents an ethical dilemma, choosing between financial success and possibly harming the environment.

The Saskatchewan GTH project, like the other two, is focused on financial gain. The plant will create employment and generate power. All stakeholders raised concern because of emissions and proximity to a city (figures 2 & 3). There is an opportunity here for Williams Lake reference Kamloops and Saskatchewan as examples of potential dangers of burning railway ties. All three cities express the same concerns regarding future poor air quality. It stands to reason that much more testing needs to happen before Atlantic Power wins their appeal.

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Figure 2 (Leo, 2018).

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Figure 3 (Google Maps, 2019).

*Note: The Kamloops project to burn railway ties stopped due to public protest.*

The delegation of Rail Ties Be Wise is considering solutions for the future of the cogeneration plant. It is possible that Tolko or West Fraser Mills could purchase Atlantic Power, ensuring that the plant continues to burn only clean wood waste while keeping the forest clear of fire-fuel debris. The local Mills would then be contributing to clean energy and helping to sustain the environment by lowering carbon emissions. If the Mills expand, there would be more employment opportunities and higher migration into the area, providing jobs for millwrights, teachers and doctors. Young families would be moving into a healthy, clean, community (figure 4). Rail Ties be Wise has also suggested that First Nations to the North and South create airshed reports to monitor emissions from the current Atlantic Power (RTBW & Delaney, 2019).



Figure 4

*Outcomes*

After studying the economic, environmental, and social impacts on the burning of railway ties in Williams Lake, I stand firm on my opposition to the proposal by Atlantic Power to increase their allowable burn to a 50% level. While I fully support the concept of a biomass plant, I feel that it should remain as an asset, not detriment, to environmental and social health. I understand the need for disposing of railway ties, but it is safer to keep them safely contained in a landfill. Burning more than 5% rail ties at Atlantic Power is too risky for air quality standards, especially when the long-term effects are unknown. The government must not allow any increase for Atlantic Power's burning percentage. At a time when there is a global plea to reduce all carbon emissions, companies like Atlantic power have no right to demand a project that will increase such emissions. Monetary gain must not come at the price of environmental and human health. Social and Physical science needs to collaborate on this issue. If the ultimate goal is genuinely to slow climate change, the British Columbia government must intervene and prevent high-volume burning of creosote-soaked railway ties.

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