Yes In My Backyard: Planning For The Development of Contentious Infrastructure

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Abstract:

Waste management is a prevalent and highly contentious issue in modern society. People are often very sensitive about decisions on where and how municipalities choose to dispose of their waste. While it is generally understood that waste disposal facilities such as incinerators and landfills are needed to manage waste that cannot be recycled or composted, there nevertheless seems to be significant opposition in response to any such proposal. This paper will be exploring how communities are currently being engaged in Ontario during the development approval process for incinerators, what motivates communities to actively oppose incinerators, and what can be done to mitigate this opposition. To do this I will be making a case study out of the development approval process for the Durham York Energy Centre (DYEC). The DYEC is a waste-to-energy incinerator in Clarington, Ontario that began operations in 2015. This facility received a significant amount of opposition from the community, which will be explored in detail in this paper. While I focus on incinerator development my goal was to learn the best methods for engaging communities for any undesirable development including landfills and nuclear power plants.

My research findings suggest that incinerator opposition cannot be mitigated through basic consultation. No amount of consultation will convince people to approve of something they do not want, especially when they feel that it is being forced on them. The goal of community communications plans should not be mitigating opposition but rather should be engaging communities to find optimal strategies for handling communal problems such as waste management or energy.

This paper will also be looking at alternative waste disposal options for municipal solid waste that cannot be recycled or composted. Having an understanding of the alternatives will allow for a more educated discussion on how municipalities can best manage their waste.

Foreword:

This major paper is being submitted to partially fulfill the MES Planning degree requirements. The research involved in the composition of this major paper relates to my area of concentration, components, and fulfills a number of learning objectives outlined in my Plan of Study. For component 1, waste management planning, this research contributed to my goal of meeting the program requirements of the Canadian Institute of Planners and Ontario Professional Planners Institute for Candidate membership (Learning Objective 1.1). It allowed me to enhance my understanding of Canada's waste management practices and policies (Learning Objective 1.2). It also enhanced my understanding of regional infrastructure planning (Learning Objective 1.3). For component 2, community engagement, this research enhanced my understanding of Ontario's community engagement policies and practices (Learning Objective 2.1). It also explored popular community engagement theories (Learning Objective 2.2). For component 3, social and environmental justice, this research explored Ontario's risk environmental assessment policies and practices (Learning Objective 3.1). It explored the environmental impact waste disposal facilities have on human and environmental health as well as mitigation strategies (Learning Objective 3.2). It also explored the health impacts towards communities living near waste disposal sites (Learning Objective 3.3).

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Chapter 1 – Introduction:

Waste management is a prevalent and highly contentious issue in modern society. People are often very sensitive about decisions on where and how municipalities choose to dispose of their waste. While it is generally understood that waste disposal facilities such as incinerators and landfills are needed to manage waste that cannot be recycled or composted, there nevertheless seems to be significant opposition in response to any such proposal. Significant opposition such as this was seen during the development approval process for the Durham York Energy Centre (DYEC). The DYEC is a waste-to-energy incinerator in Clarington, Ontario. It began operating in 2015 and processes 140,000 tonnes of Durham and York Region's municipal solid waste (MSW) per year (Durham Region 2010). The facility produces a net output of 14 MW-hr, which is approximately enough energy to power 10,000 homes (Durham Region 2010). The proponent felt that building this incinerator was the most logical option to manage the Region's waste. It minimized the Region's need for landfill capacity and it allowed waste, which would otherwise have simply been buried underground, to instead be used as an energy source. Despite this enthusiasm for the technology, thousands of people came out to voice opposition to it over the course of the development approval process. They voiced concerns about the impact the incinerator would have on environmental and human health, economic concerns, and concerns that an incinerator would compete with recycling initiatives.

Objectives and Organization of the Paper:

The question I wanted to research was, what was driving opposition to incinerator

development and what could be done to mitigate the opposition? While I focus on incinerator development my goal was to learn the best methods for engaging communities for any undesirable development including landfills and nuclear power plants. To answer this question I first needed to understand how communities are currently being engaged when a contentious facility is being proposed. I analyzed the practices used during the development of the DYEC for my case study because it is the first and only large-scale municipal solid waste incinerator built in Ontario since 1992 (Carter-Whitney 2007). I then explored the various options for disposing municipal solid waste in order to have a more educated understanding of the incinerator debate. Once I had a deeper understanding of the waste disposal alternatives I looked at the opposition to the DYEC. I explored the arguments and methods used by the opposition as well as the response they received from the proponents of the project. I did not focus on the accuracy of their arguments but rather tried to develop an understanding of what they believed and how they felt their concerns were being addressed. I followed this up by researching theory that tries to explain what motivates people to oppose incinerators. I validated this theory with examples from the DYEC opposition movement. I looked at community engagement theories to develop an understanding of the thought behind the community engagement practices of the DYEC and whether or not they addressed the motivations behind incinerator opposition. Finally I use the theory to find a possible solution to the problems of modern community engagement practices.

Limitations:

The findings of this research are limited because the paper only focuses on one

case. While it is a noteworthy case that adds to the broader discussion of public involvement experience, it is not definitive. One cannot make generalizations about all community engagement practices from the study of a single case.

Research Design and Methodology:

I used a "Case Study Design" for my research, using the development approval process for the DYEC as my case study. This research design allowed me to get a strong understanding of how communities are currently being engaged leading up to the development of municipal solid waste incinerators. For my methodology, I started by reading the various public documents and publications related to the DYEC such as the environmental assessment, health risk assessments, regional and municipal council meeting minutes, advisory committee minutes, complaint logs, and media releases. This gave me an understanding of the project as a whole and the justifications for its development made by the proponent. I used newspaper articles and blog posts from community groups to learn about the public's reactions and opinions to the DYEC. I then read academic journals and books relating to the topics of incinerator development, NIMBYism, community engagement, site planning, and waste management in order to gather a strong understanding of the academic thought surround my topic.

Academic Context:

As mentioned above, the DYEC is the first large-scale municipal solid waste incinerator to be built in Ontario since 1992. This paper supplements gaps in existing academic literature by analyzing modern community engagement practices for

incinerator development in Ontario. This paper makes use of incinerator opposition theory and community engagement theories from various authors. Some of these authors include Armour, Petts, Lawrence, and Miraftab.

Chapter 2 – Developing Waste-To-Energy Incinerators in Ontario:

In this chapter I will be looking at the process for developing waste-to-energy incinerators in Ontario. I start by looking at the regulations and policies that govern the development of new incinerators in Ontario. I then examine the history of incineration in Ontario and the DYEC in order to understand the genesis towards the decision to develop an incinerator. I end by looking at the environmental assessment process for the DYEC in order to understand the steps that were taken to turn a proposal into a completed incinerator.

Regulations and Policies for Incineration in Ontario:

Environmental Protection Act:

In Ontario, the Ministry of the Environment and Climate Change (MOECC) administers waste management. Their waste management powers are established under Part V of the Environmental Protection Act (EPA) (Carter-Whitney 2007). The EPA requires that all waste management systems and waste disposal sites in the province receive a certificate of approval from the MOECC before being developed. MOECC also has the power to impose terms and conditions on the certificate of approval as well as suspend or revoke them (Carter-Whitney 2007). Non-hazardous waste incinerators are subject to approval under sections 9 and 27 of the EPA. Section 9 requires that conditions for approval on discharges to the air are met. Section 27 requires that the conditions for approval on waste management systems or waste disposal sites are met (Carter-Whitney

2007). The actual environmental conditions that must be met in these two sections are prescribed in Reg. 346, 347, and Guideline A-7 (Carter-Whitney 2007). Reg. 346 of the EPA lays out the general air pollution rules for the province. The province's general standards for incinerators, which include the rules surrounding their location, maintenance, and operation are found in Reg. 347 (Carter-Whitney 2007). Guideline A-7 is used in addition to Reg. 346 and 347. It establishes the "minimum design and operating parameters, emission control systems, and emission limits" for incinerators in Ontario (Carter-Whitney 2007).

Environmental Assessment Act:

Proposals for new incinerators are subject to the Environmental Assessment Act (EAA) in addition to the EPA. Municipalities must obtain approval under the EAA before they can go ahead with their project. This means that they cannot enter into contracts or make arrangements to utilize the services or facilities of third parties (Carter-Whitney 2007). The EAA requires that an environmental assessment (EA) be prepared for all new waste projects (Carter-Whitney 2007). An EA must include, "a description of the purpose of the undertaking, the rationale of the undertaking, as well as the alternative methods of carrying out the undertaking" (Carter-Whitney 2007). The EA must include an analysis of the environmental impacts of each of the proposed options. Finally, the EA also needs to include an evaluation of the advantages and disadvantages of each option (Carter-Whitney 2007).

Waste disposal processes are separated into three categories within the EAA. The categories dictate the level EA that each type of facility needs to complete in order to obtain approval (Carter-Whitney 2007). The lowest category includes projects with minimal environmental effects. This includes landfills that are smaller than 40,000 cubic metres, energy-from-waste incinerators that process less than 100 tonnes of waste per day, as well as waste transfer, handling, and composting facilities that process less than 1000 tonnes of waste per day (Carter-Whitney 2007). Projects that fall under this category do not require approval under the EAA (Carter-Whitney 2007). The second category is for projects with predictable environmental effects. Projects under this category do require approval under the EAA and must undergo a standard class EA (Carter-Whitney 2007). This includes projects such as landfills that are between 40,000 and 100,000 cubic metres, energy-from-waste incinerators that process more than 100 tonnes of waste per day, as well as transfer, handling, and composting facilities that process more than 1000 tonnes of waste per day (Carter-Whitney 2007). The final category is for projects that have the potential to cause significant environmental impacts. These include hazardous waste facilities, landfills that are larger than 100,000 cubic metres, and incinerators that do not have an energy-from-waste component (Carter-Whitney 2007). These types of facilities are required to undergo an individual EA, which tend to have significantly more stringent requirements than a class EA (Carter-Whitney 2007).

History of the Durham York Waste to Energy Centre:

(See Appendix Fig 3 for chronology of key events related to the DYEC)

The province of Ontario has a long history of incinerating their municipal solid waste. The City of Toronto built its first garbage incinerator in 1881. By 1917 incinerators managed 50% of the city's waste. (Anderson 1997) Incinerator use continued in Toronto to varying degrees until 1988 when Toronto ceased its use of incinerators due to environmental and public health concerns. (Eyles, Boyce, Hibbert 1992) The rest of the province continued to use and develop incinerators to dispose of their municipal solid waste until 1992, when a ban on new incinerators put forward by the Ontario Ministry of the Environment, then under the New Democratic Party (NDP), came into effect (Carter-Whitney 2007). The NDP were concerned that developing new incinerators ran counter to their position of waste reduction. They felt that their proposed waste reduction efforts would reduce the province's waste output to the point where there would not be enough waste left to fuel any additional incinerators (Carter-Whitney 2007). New incinerators would only be viable if they did not fully commit to their waste reduction program. The ban on new incinerators was lifted in 1995 when the Progressive Conservative party took power (Carter-Whitney 2007).

In December 1999 the Region of Durham released their "Long Term Waste Management Strategy Plan: 2000 - 2020". The goal of this plan was to develop a 20-year waste reduction and disposal strategy for the region. (Region of Durham Works Department Waste Management Services 1999) At the time this document had been published, Durham Region had a need to secure an alternative waste disposal site because the one that they had been using for 64% of their waste, the Keele Valley Landfill, was set to close in the fall of 2002. (Region of Durham Works Department Waste

Management Services 1999) The waste disposal strategy laid out in this plan was:

1) "Continue to Participate with the other Greater Toronto Area Regions to Search for waste disposal capacity."
2) "Search for waste disposal capacity outside the Region in preparation for the closure of the Keele Valley Landfill site in the year 2002."
3) "Not support the development of any new landfill site or landfill site operation within the Region of Durham"
4) "Support the development of "Energy From Waste" type facilities to generate steam and/ or electricity from the disposal of residual garbage wastes."
5) "Support the development of proven new and emerging waste disposal facilities for the disposal of residual garbage wastes." (Region of Durham Works Department Waste Management Services 1999)

This plan was the first step toward the region's eventual development of the Durham York Energy Centre. They had a two-pronged strategy. First, Durham would seek to dispose of their garbage outside of region. Second, they would support the development of a waste disposal facility within the region so long as it was not landfill. They had specifically stated in strategy 4 (above) that they would support the development of an "energy from waste" type facility.

In keeping with their waste management strategy, Durham Region began seeking out waste disposal capacity outside of the region. In 2003 Durham Region, in addition to

various other municipalities in Ontario, began to ship their solid waste across the border to the State of Michigan. Since that time Ontario has shipped anywhere between 1.5 to 4.5 million tons of trash per year to Michigan (WMW 2011). Michigan residents were not happy to be taking in Canadian garbage and raised various concerns including: "environmental contamination from the landfills; traffic congestion; damaged roads from truck traffic; and border security issues" (Carter-Whitney 2007). In 2006, this opposition finally bore fruit when U.S. Senators Debbie Stabenow and Carl Levin negotiated an agreement with the Ontario's Minister of the Environment that ensured that Ontario municipalities would cease their shipments of municipal solid waste to landfills in the State of Michigan by the end of 2010 (WMW 2011). In exchange for their cooperation in ceasing garbage shipments, the agreement assured Canadian municipalities that the state of Michigan would not put forward any legislature or legislative amendments that would prevent the shipment of waste from Ontario to Michigan between 2006 and 2010 (Carter-Whitney 2007).

In 2004 Durham Region began the "Durham Residual Waste Disposal Study EA". The purpose of this study was to determine the most effective way for the region to locally manage their non-hazardous solid waste that could not be disposed of either through recycling or composting. (The Regional Municipality of Durham 2010) This name of this study was later changed to the "Durham/ York Residual Waste Study" in May 2005, when York Region partnered with Durham Region in the development of this project.

The Environmental Assessment Process for the DYEC:

Choosing a Waste Management Solution:

Durham and York hired 'MacViro Consultants Inc.' and 'Jaques Whitford', two engineering and environmental science consulting firms, to identify and evaluate different ways of managing post diversion waste (MacViro 2006).

Alternative Waste Management Options and Evaluation:

The consultants were tasked with finding the optimal way to recover resources, both material and energy, and to minimize the amount of material requiring landfill disposal for the residual municipal solid waste for Durham and York Regions (MacViro 2006). To this end they set out to find the optimal technologies to manage the region's residual waste.

The following are the technologies considered by the consultants:

- Additional Diversion at Source
- Mechanical Treatment
    - Mechanical treatment to create an Alternative Fuel
    - Mechanical treatment for material recovery
    - Steam treatment for material recovery
- Biological Treatment
    - Aerobic compositing
    - Anaerobic digestion
- Thermal Treatment
    - Advanced Thermal Technologies
        - Fixed-bed gasification
        - Fluidized-bed gasification
        - High temperature gasification
        - Plasma arc gasification
        - Pyrolysis
    - Conventional Combustion Treatment
        - Single Stage Mass Burn
        - Two Stage Incineration
- Chemical / Other Treatment

    - Chemical Treatment
    - Treatment requiring special feedstock
- Landfilling of Residuals (MacViro 2005)

The consultants reviewed each of the above-mentioned technologies in order to see which ones best met the requirements laid out in the EA Terms of Reference. They concluded that waste reduction and at-source diversion of MSW are the most preferred components of an integrated waste management system. The consultants recommended that Durham and York set waste diversion target of 60% by 2011 and 75% by 2045 (MacViro 2006). By 2014 Durham Region had managed to achieve a diversion rate of 55% (Region of Durham Works Department Waste Management Services 2015). In Comparison, York Region has achieved a diversion rate of 64% by 2014 (Committee of the Whole Environmental Services 2015). For the waste that could not be diverted, the consultants produced a short list of four optimal technologies that had the least environmental impact, diverted the most waste from landfill, and were economically and commercially viable. The four short listed systems were:

System 1 - Mechanical and Biological Treatment with Biogas Recovery:

Mechanical and biological treatment (MBT) of waste involves removing organic and recyclable materials from the waste stream before sending it to a landfill for final disposal. Out of the 4 proposed systems, this one requires the most landfill space and thus poses the greatest threat to the ground and water environment but it is the least harmful to the air environment (see chapter 3 for more information on this technology).

System 2(a) - Thermal Treatment of Mixed Waste (conventional combustion) with Recovery of Materials from the Ash / Char

This system is proposing the use of a traditional mass burn system. It is the most cost efficient and technically proven system. It also has the least amount of reliance on landfill space. It does have the greatest potential harm to the air environment out of the presented options (see chapter 3 for more information on this technology).

System 2(b) - Thermal Treatment of Solid Recovered Fuel:

System 2(b) is proposing the use of an advanced thermal treatment facility, either gasification or pyrolysis. This technology is relatively new and isn't as proven as mass burn. It is also more costly to build and run. It does have fewer air emissions than mass burn and the potential to recover more recyclables (see chapter 3 for more information on this technology).

System 2(c) - Thermal Treatment of Solid Recovered Fuel with Biogas Recovery

This system is a combination of system 1 and 2(b). Organics and recyclables are sorted before being sent to an incinerator. Biogas is recovered through the processing of the organics in addition to energy being captured from the incineration of the remaining waste. The ash that results from the incinerator is then sent to landfill. It is the most expensive and technically complex option but offers the greatest potential for the recovery of energy and recyclables. It is also the least harmful to the natural environment.

The alternative processing systems were evaluated using a seven-step method outlined in the 'Terms of Reference' of the EA. The steps are as follows:

1) Perform public consultation to receive additional input on the proposed evaluation steps and evaluation criteria presented in the EA Terms of Reference.

2) Create a list of all the alternative waste processing systems that can manage the entire projected residual waste stream.

3) Collect data on each of the suitable alternatives. This data would be used to analyze how well each alternative would meet the criteria laid out in the Terms of Reference. Interested agencies and the public have the opportunity to give input on acceptable data sources in 'Step 1' of this process.

4) Use the data to analyze each alternative using the comparative evaluation criteria laid out in the Terms of Reference and identify the potential effects of each technology.

5) Determine the 'net effects' of each alternative by considering what measures are available to mitigate potential negative effects of each technology (identified in 'Step 4') and the available measures to enhance their potential benefits.

6) Compare the net effects of each alternative and produce a list of the relative advantages and disadvantages associated with each technology.

7) Consider the advantages and disadvantages of each alternative in the context of the priorities established in 'Step 1'. The preferred system will be the one that is best able to meet those priorities (MacViro 2006).

On April 19, 2006 the consultants began a 30-day consultation period with the public and interested agencies to review their draft report and submit comments, pose questions, and make suggestions on potential modifications to the results. The consultants reported that 80% of the public who participated in the consultation process agreed with

their recommendation. Public agreement was verified through the use of questionnaires that were filled in by the attendees of the consultation. A total of 83 people completed the questionnaire (MacViro 2006). The 'Joint Waste Management Group', a sub-committee of the Durham Region Works Committee and the York Region Solid Waste Committee, hired a public polling firm, Ipsos Reid to make a survey available online to determine the residents' priorities relating to a new waste management facility. The online survey received responses from 449 Durham residents and 423 York residents. The results found that respondents were most concerned with 'natural environmental considerations', followed by 'social/ cultural considerations', 'economic/ financial considerations', 'technical considerations', and were least concerned with 'legal considerations' (MacViro 2006).

Using the above mentioned criteria as a guide, the consultants brought forth the recommendation that the region's interests would best be served through the use of system 2(a) - thermal treatment of mixed waste (conventional combustion) with recovery of materials from the ash / char (MacViro 2006). They explained that system 2(a) and 2(b) offer similar benefits but the technology used in system 2(a) is more proven and less likely to have unexpected problems. System 2(a) is the most cost effective system and minimizes the region's need for landfill space.

The consultants relayed this information to the public through six public information centres (PICs) in May 2006. The PICs gave the public an opportunity to provide feedback about their preferred waste disposal technology. Sixty advertisements

informing the public of these meetings ran from February 22 to May 8 2006 in community newspapers, theatres, radio, major Toronto dailies, and buses in both York and Durham Region (The Regional Municipality of Durham 2010). Around 300 residents attended the six sessions. Input received at these sessions determined that residents were in favour of the consultant's recommendation for a thermal treatment facility (The Regional Municipality of Durham 2010). Both Durham and York Regional Councils accepted the consultant's recommendation in June 2006 (The Regional Municipality of Durham 2010).

Choosing a Site:

In September 2006, Durham and York started obtaining public feedback about what criteria should be prioritized when selecting a site for the incinerator (The Regional Municipality of Durham 2010). This was done through six PICs. They found that the public felt that the health and safety of the public and natural environment should be the most important criteria followed by social considerations, economic considerations, technical considerations, and finally legal considerations (The Regional Municipality of Durham 2010). The consultants then eliminated all the sites that were unsuitable for environmental and legislative reasons. This included, "lands protected by provincial/ federal legislation; designated residential areas; natural heritage lands; prime agricultural lands; designated parks and recreation areas; existing and designated institutional facilities; federally regulated airport lands" (MacViro 2007). Out of the remaining lands the consultants looked for a site that was 10-12 hectares in size and allowed for on-site ash processing, storm water management, parking, road infrastructure, and adequate buffer zones (MacViro 2007). They looked at both sites that were publicly owned by

Durham and York Regions as well as sites from "willing sellers" (MacViro 2007).

In March 2007, the consultants brought forth a short list of 5 potential sites (The Regional Municipality of Durham 2010). Four of the sites were located in Durham Region and the other was in York. The four Durham Region sites were all located in the Municipality of Clarington, one of which was publicly owned (MacViro 2007). The site in York Region was located in the Municipality of East Gwillimbury and was also municipally owned (MacViro 2007). The public was given the opportunity to voice their opinions and concerns about this list at four PICs. Hundreds of residents came out to these PICs to voice their concerns about the facility's impacts on humans, the environment, and technology just to name a few (The Regional Municipality of Durham 2010).

The short listed sites were evaluated to determine the impact an incinerator would have using the 'Generic Human Health and Ecological Risk Assessment' (GHHERA) (The Regional Municipality of Durham 2010). As the specific size and technology for the incinerator had not been chosen yet, the GHHERA was based on the potential chemicals emitted from a generic energy-from-waste incinerator. Additionally, the study used regional air modeling data, not site-specific data. This meant that it was not able to determine how the facility would impact the air shed of each site. The study was designed to determine potential issues and concerns that would later be addressed in a site-specific study. The GHHERA found that an incinerator would not have significant adverse effects to the short listed sites (Jacques Whitford 2007). As all the sites were deemed to be

environmentally suitable the short listed sites were largely evaluated based on their proximity to necessary infrastructure and whether or not they were publicly owned.

The consultants ultimately recommended the publicly owned site located in Clarington. Out of the potential sites this one allowed for the shortest travel times for waste collection vehicles, which minimized total air pollution (Jacques Whitford 2007b). It had the lowest water quality impact, as it was furthest away from a watercourse (Jacques Whitford 2007b). It also had no wooded areas present on the site, which means no trees would need to be removed to develop the facility (Jacques Whitford 2007b). The consultants did note that the site's proximity to the highway and other industrial facilities would make it a burden on an already stressed air shed. East Gwillimbury held the advantage in this category but the consultants felt that the Clarington location was the better choice overall (Jacques Whitford 2007b).

Three PICs were held to notify the public of the consultant's recommendation. Approximately 380 residents attended these meetings (The Regional Municipality of Durham 2010). Durham and York Regional Councils accepted the recommended preferred site in January 2008 (The Regional Municipality of Durham 2010).

Choosing A Build/ Operator:

Durham and York Region put out a request for proposal (RFP) for the design, construction, operation, and maintenance of the energy-from-waste incinerator in August 2008 (The Regional Municipality of Durham 2010). They received the submissions in February 2009. The Regions announced that they had accepted the proposal from

Covanta Energy Corporation in April 2009 (The Regional Municipality of Durham 2010). They were given the contract to design the facility and a conditional contract to build and operate it. The condition being that the EA receives approval from Ontario's MOECC (The Regional Municipality of Durham 2010).

Site Specific Studies:

Once the site had been selected the consultants started performing many site-specific studies. Some examples include air quality, archaeological, and soil contamination studies. These studies aimed to find if there were any significant issues on the site (The Regional Municipality of Durham 2010). The studies found that there were no issues with building the incinerator on the site. Although it was not required in the EA, Durham and York Region performed a human health and ecological risk assessment to determine if the facility would pose a risk to human and ecological life at the preferred site. The report found that, "the EFW facility would not lead to any adverse health risks to local residents, farmers or other receptors in the Local Risk Assessment Study Area (LRASA)" (The Regional Municipality of Durham 2010). The report also found that, "the results of the ecological risk assessment indicated that chemical emissions from the EFW Facility would not lead to any adverse ecological risks to receptors or species at risk in LARSA" (The Regional Municipality of Durham 2010).

EA Submission, Approval, Construction, and Operation:

Durham Region Council approved the EA in June 2009 and submitted it to the MOECC on July 2009 (The Regional Municipality of Durham 2010). The MOECC approved the EA in November 2010. The construction of the facility began in August 2011 (The Regional Municipality of Durham 2010). The facility began processing waste

in February 2015. It is designed to process up to 140,000 tonnes of municipal solid waste per year and generates 17.5 gross megawatts of energy, which is enough to power 10,000-12,000 homes (The Regional Municipality of Durham 2015). Pictures of the completed facility can be seen in ‘Appendix Fig 1’.

In this chapter I discussed the regulations surrounding incinerator development in Ontario, the history of the DYEC, and the environmental assessment process for the DYEC. It was a long process that began in 2004 with the residual waste study and ended in 2015 when the facility started its operations. In the next chapter I will be discussing the various options for managing residual solid waste.

Chapter 3 - Understanding Modern Waste Disposal Facilities:

In this chapter I will be discussing the most widely used waste disposal technologies and systems in order to get an understanding of the various options governments have to manage their residual waste. I will be looking at incineration (both mass burn and advanced thermal treatment), mechanical and biological treatment, and landfilling. I will explain what each one is, what they are used for, their processes, and their advantages and disadvantages compared to one another. I will be focusing on incineration, as it is the main topic of this paper.

Incineration

Incineration is a technology that allows waste to undergo complete combustion by burning it at temperatures of around 900 - 1100 degrees Celsius (Ramachandra 2006). The complete combustion of solid wastes eliminates odours, produces a virtually inert residue, and reduces the weight and volume of the product going to landfill by up to 90%. (Ramachandra 2006) In this section I will be discussing the benefits of using incineration for solid waste management, the negatives, the different kinds of incineration technologies, as well as planning considerations when developing new municipal solid waste incinerators.

Durham York Energy Centre. Digital Image. PLANT. Accessed September 2016. http://www.plant.ca/features/cleaner-burn/

Benefits of Incineration

Volume Reduction:

Incineration reduces the volume of MSW by an average of 90% and the weight by 70-75% (Ramachandra 2006). Reducing the volume and weight of the MSW minimizes a municipality's need for landfill space, which has both a cost saving and environmental benefit. Additionally the environmental impact and costs of transporting the MSW are reduced as a result of fewer trucks being needed to move the ash, as opposed to the untreated MSW.

Stabilization of Waste:

Many of the environmental impacts caused by landfilling such as air emissions and the production of leachate, which pollutes groundwater, result from the decomposing of the organic compounds in the waste stream (Ramachandra 2006). Incinerating MSW before sending it to landfill as ash reduces these issues because ash is significantly more inert than untreated waste (Ramachandra 2006). This is mainly due to the "oxidation of the organic components in the waste stream" (Ramachandra 2006).

Recovery of Energy from Waste:

The heat generated from burning the MSW is used to generate steam, which is used for on-site electricity generation. It can also be exported to local factories or used for district heating (Ramachandra 2006).

Sterilization of Waste:

The incineration of MSW ensures the destruction of all the pathogens in the waste stream prior to its final disposal in a landfill (Ramachandra 2006).

Environmental Impact of Incineration

Air pollution:

Incineration results in the formation of flue gas, which is comprised of the following gaseous pollutants.

- Carbon Dioxide
- Carbon Monoxide
- Sulphur Oxides
- Nitrogen Oxides
- Particulates
- Hydrochloric Acid
- Hydrogen Fluoride
- Heavy Metals
- Dioxins and Furans (Ramachandra 2006)

There are three primary technologies that are used to clean the flue gas. These are electrostatic precipitators, fabric filters and scrubbers. Electrostatic precipitators (ESP) are used for particle control. The gas is filtered through an ionized field, which negatively charges the particles (Ramachandra 2006). The negatively charged particles are then forced to the walls using an electric field (Ramachandra 2006). The particles, which are trapped against the wall, are then washed away using a continuous stream of water (Ramachandra 2006). This technology has 99% removal efficiency in an optimal environment. Efficiency decreases with changes to the size of the particles, the temperature of the gas stream, gas stream composition, particle composition, and particle surface characteristics (Ramachandra 2006).

Fabric Filters are the most common technology used for controlling particulate matter (Ramachandra 2006). The gas is directed to flow through a number of bags that catch dust and particulate. The material collected on the bags works to help increase the efficiency of the system at filtering small particles (Ramachandra 2006). Incinerators that use this technology must cool the gas before sending it to the filters to prevent damaging the fabric (Ramachandra 2006).

Scrubbers are used to control both particulate matter and acid gases. The flue gas is directed to pass through a vat that contains a slurry of chemicals that have been designed to absorb specific compounds (Ramachandra 2006). When acid gases are absorbed they react to form solid salts. The heat from the flue gas causes the liquid in the slurry, with the absorbed particulate and salts, to evaporate and eventually precipitate to the bottom of the unit where it is collected and disposed of (Ramachandra 2006). This system can efficiently remove particles in a wide range of sizes from 0.1 - 200 μm (Ramachandra 2006).

Water Pollution:

Incineration facilities produce a significant amount of wastewater. The water used to wash the tipping floors that feed the MSW into the incinerator, water that is used to quench the hot ash, and water that is used in pollution control systems all become polluted (Ramachandra 2006). Most incineration facilities recycle their wastewater in a closed loop system (Ramachandra 2006). Wastewater is collected and stored in a tank and then reused for ash quenching (Ramachandra 2006).

Land Retained Pollution:

Pollutants emitted from the incinerator stack bio-accumulate into the environment over the course of the plant's lifetime (Ramachandra 2006). Despite being released in minuscule amounts that are non-harmful, the pollutants will eventually be ingested by plants, animals, and humans (Ramachandra 2006). The introduction of these pollutants to the food chain may eventually have negative effects as they accumulate over time. These effects are very difficult to monitor as they slowly build over many years in conjunction with pollutants from other sources (Ramachandra 2006).

Residue Disposal:

Certain metals within the waste stream if improperly handled can negatively impact human and environmental health. Particularly lead, cadmium and mercury (Ramachandra 2006). Special care bust be taken to remove these metals from the waste prior to combustion and ensure that they are properly disposed of (Ramachandra 2006).

Noise Pollution:

The two primary sources of incinerator noise pollution come from truck traffic and the emission control fans within the plant (Ramachandra 2006). Noise from the trucks can be minimized through proper truck maintenance and responsible operation (Ramachandra 2006). Noise from the fans can be minimized through the use of walls, fences, trees, and landscaped earthen barriers (Ramachandra 2006).

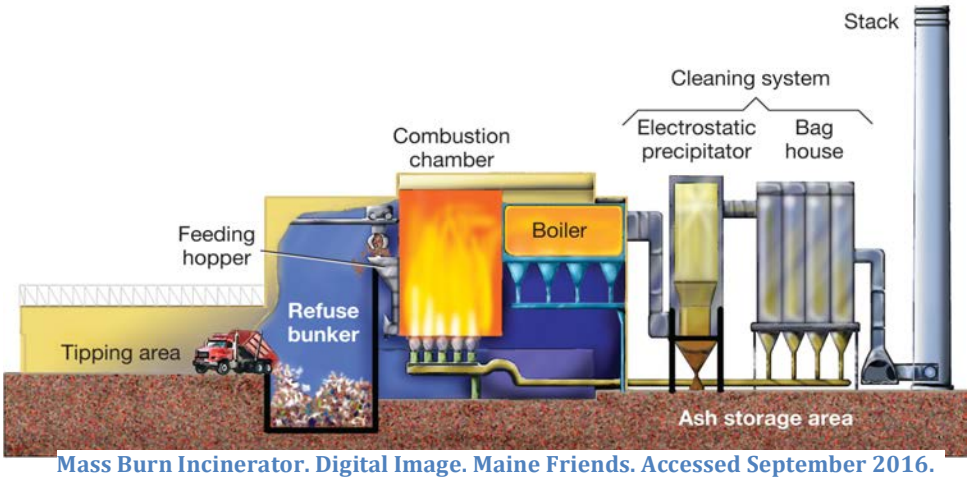
Aesthetic Impact:

Two aesthetic concerns when developing incinerators are their odour impact on the surrounding environment as well as their physical appearance, which some may find unpleasant. Odour concerns can be addressed by, keeping the process building at negative pressure and using internal air for combustion (Ramachandra 2006). This will prevent undesirable smells from escaping outside of the building. Concerns over the appearance of the building and the emission stack can be addressed by developing the facility in an industrial area (Ramachandra 2006). This will allow it to blend with the rest of the neighbourhood.

Incineration Technologies

Modern incinerators come in two forms, either mass burning systems or advanced thermal treatment facilities.

Mass Burn:



Mass Burn Incinerator. Digital Image. Maine Friends. Accessed September 2016. https://mainefriends.wordpress.com/page/2/

Mass burning systems are the most widely used and technically proven incineration technology. It is a waste incineration process where the waste is burned in a large furnace with no significant pre-processing of the raw waste (MacViro 2006). Recyclable metals are recovered from the bottom ash after combustion (MacViro 2006). The only required pre-processing is the removal of oversized items such as mattresses that cannot fit into the incinerator's feeder (Ramachandra 2006). Mass burn systems are used to generate energy and heat from the incineration of waste, recover recyclable metals from the waste stream that would otherwise be lost in landfills, and minimize the amount of land needed for waste disposal (Psomopoulos, Bourka and Themelis 2009).

In a mass burn system post-recycled waste is received in an enclosed tipping area, which is designed to minimize dust, odour, and noise emissions (MacViro 2005). Waste is then dumped into a receiving pit where it is inspected by the feed crane operator for any visibly unacceptable materials, such as objects that are too large to fit into the combustion chamber. Unacceptable materials are removed and waste is then fed via a grabble crane into the combustion chamber (MacViro 2005). The combustion chamber uses an inclined moving grate system, which moves the waste through the drying, ignition, and combustion stages of the incineration process. Air is added to the chamber to optimize combustion in each of the above-mentioned stages (MacViro 2005). Water is circulated throughout the walls of the boiler, which creates steam that is used to drive turbines that produce energy. Ash is discharged from the bottom of the grate and is cooled with water. This ash (known as bottom ash) is then processed to recover any metals within (MacViro 2005).

The combustion gas that is produced during the burning of the waste is called 'flue gas'. "Flue gases contain mercury, dioxins/ furans, particulate matter, acid gases, and oxides of nitrogen (NOx)" (MacViro 2005). The flue gas is treated to remove hazardous components and neutralizes noxious gases. This process involves: Controlling acid gases such as oxides of sulphur (Sox) and hydrochlorides (HCI) with either a lime slurry scrubber or a dry lime scrubber (MacViro 2005). Nitrogen oxide (NOx) emissions are reduced using a urea injection into the flue gases. This process is known as 'Selective Non-Catalytic Reduction (SNCR) or a 'Selective Catalytic Reactor' (SCR) process (MacViro 2005). Mercury and dioxins/ furans are controlled using a 'Powdered Activated Carbon System' (MacViro 2005). Particulate matter is removed using a high-efficiency fabric filter or bag house. The cleaned exhaust gases are then discharged to the atmosphere via a stack. (MacViro 2005) The treatment of the flue gas produces a byproduct called fly ash, which is comprised of water and salts. The fly ash is a solid hazardous waste and is disposed of accordingly (MacViro 2005).

Advantages of Mass Burn Systems

- Lowest potential impacts to water and land (MacViro 2006).
- Least potential to disrupt sensitive habitats (MacViro 2006).
- Greatest energy generation - both renewable and total (MacViro 2006).
- Higher reliability due to minimum dependence on export to landfill (MacViro 2006).
- Costs, although high are comparable to mechanical and biological treatment

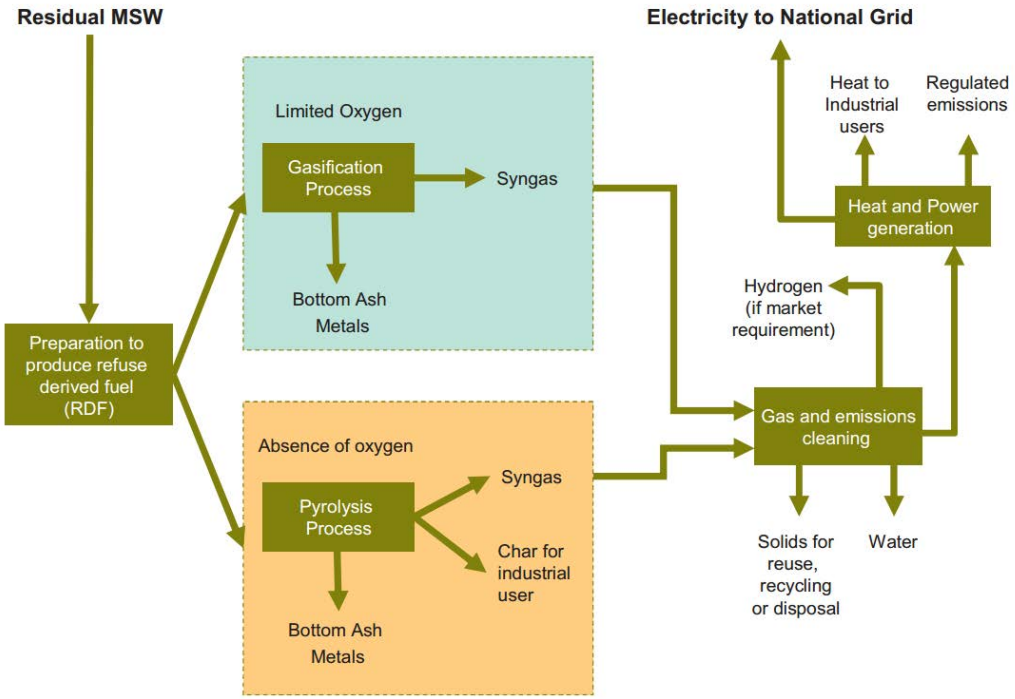
systems (MacViro 2006).

- Most widely used and reliable thermal treatment technology. It is used in over 80% of the waste-to-energy facilities in the USA (Psomopoulos, Bourka and Themelis 2009).
- Less costly than advanced thermal technologies (MacViro 2006).

Disadvantages of Mass Burn Systems

- Highest potential impacts on the air environment
- Requires management of hazardous residues from the pollution control system (MacViro 2006)

Advanced Thermal Treatment Facilities:



Advanced Thermal Treatment Process Flow. Digital Image. KRR ProStream. Accessed September 2016. http://www.krrprostream.com/blog/energy-from-waste-advanced-thermal-treatment/

Advanced thermal treatment facilities use either a technology called pyrolysis or gasification. These two processes are very similar, the main difference being that pyrolysis processes the waste in a oxygen free environment whereas gasification involves the partial oxidation of the waste (Department for Environment Food & Rural Affairs 2013). Unlike traditional combustion units advanced thermal treatment facilities do not put the waste directly into heat source. Instead it utilizes external heat to process the waste, which has been placed in either an oxygen free or minimally oxidized containment unit (Department for Environment Food & Rural Affairs 2013). Advanced thermal treatment units cannot handle unsorted municipal waste. Glass, metals, and inert materials such as rubble must be removed prior to processing (Department for Environment Food & Rural Affairs 2013). These materials are removed through mechanical treatment. This system reduces the volume of waste going to landfill to approximately 10-15% of what it was initially (MacViro 2006).

The processing waste using advanced thermal treatment technologies results in two by-products, a solid residue (char) and a synthesis gas (syngas) (MacViro 2006). The char is made up of the non-combustible materials in the waste stream and carbon. The syngas is comprised of a mixture of gasses (MacViro 2006). The syngas can be cooled and condensed in order to produce oils, waxes, and tars that can be used as fuel for reciprocating engines, gas turbines, or as an alternative to natural gas for steam boilers (MacViro 2006). This gas has a much lower calorific value to natural gas ‘4 - 10 MJ / Nm3’ as opposed to ’38 MJ / Nm3’ (Department for Environment Food & Rural Affairs 2013). Most commercial gasification facilities utilize a secondary combustion chamber to

burn the syngas and recover energy via a steam circuit. (Department for Environment Food & Rural Affairs 2013)

Advantages of Advanced Thermal Treatment

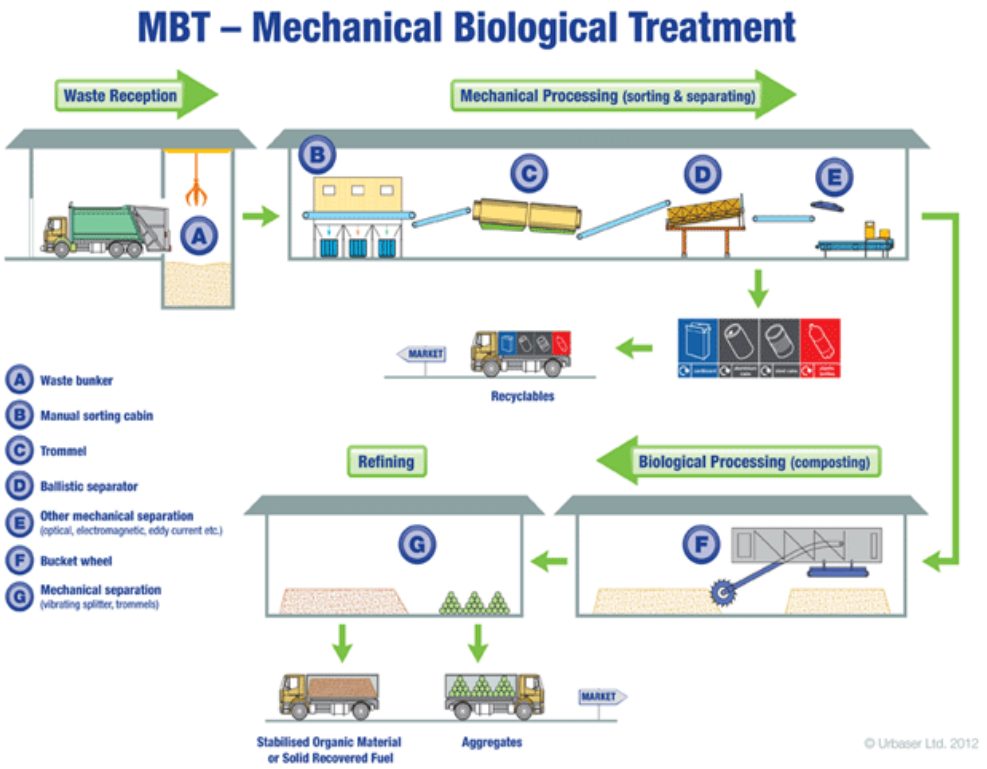
- Identical advantages to a mass burn system with the additional benefit of:
    - Potential to recover more recyclables such as plastics and metals, than a mass burn system.
    - Potential improvements in air emissions (MacViro Consultants Inc. 2006).

Disadvantages of Advanced Thermal Treatment

- Identical disadvantages to a mass burn system with the addition of:
    - Technology is less proven than mass burn.
    - More expensive to build and operate than mass burn (MacViro 2006).

Other Waste Disposal Technologies:

Mechanical and Biological Treatment:



Mechanical and Biological Treatment Flow. Digital Image. Science Pole. Accessed September 2016. http://sciencepole.com/mechanical-biological-treatment/

Mechanical Biological Treatment (MBT) is a waste treatment process that involves integrating several types of waste management processes such as materials recovery and anaerobic digestion into a single facility. The different types of processes can be incorporated into an MBT facility in a variety of ways in order to best meet a desired function (Department for Environment Food & Rural Affairs 2012). MBT facilities divert around 33% of the waste that will ultimately go to landfill. (MacViro 2006). MBT facilities are typically used for pre-treatment of waste and diverting recyclable and biodegradable materials away from landfill.

MBT facilities can be configured in a variety of ways each with their own unique process. A typical process involves three steps.

Step 1: Preparation of MSW - This stage involves preparing the MSW so that it can easily processed by the machines in the subsequent steps (Department for Environment Food & Rural Affairs 2012). This involves removing all large bulky items that could cause problems with the processing equipment, such as mattresses and rugs, splitting open garbage bags to release the items inside, and shredding the waste to make it smaller and more suitable for later processes (Department for Environment Food & Rural Affairs 2012).

Step 2: Waste Separation - This stage involves sorting the waste into different groups using mechanical means. Waste is separated into different materials, which are suitable for different end uses such as material recycling, biological treatment, energy recovery through the production of RDF/ biomass, and landfill (Department for Environment Food & Rural Affairs 2012).

Step 3: Biological Treatment - The organics from the sorted MSW is then biologically treated to produce a stabilized output for disposal and biogas, which can be captured and used for energy (Department for Environment Food & Rural Affairs 2012). There are three options for biological treatment of MSW. Option 1 is ‘aerobic bio-drying/ bio-stabilization’. This involves the partial composting of the waste (Department for Environment Food & Rural Affairs 2012). Option 2 is ‘aerobic in-vessel composting’. This option is used to either bio-stabilize the MSW for landfilling or process organic rich MSW that has been sorted into workable compost (Department for Environment Food &

Rural Affairs 2012). Option 3 is ‘anaerobic digestion’. This option is used to process organic MSW into compost (Department for Environment Food & Rural Affairs 2012).

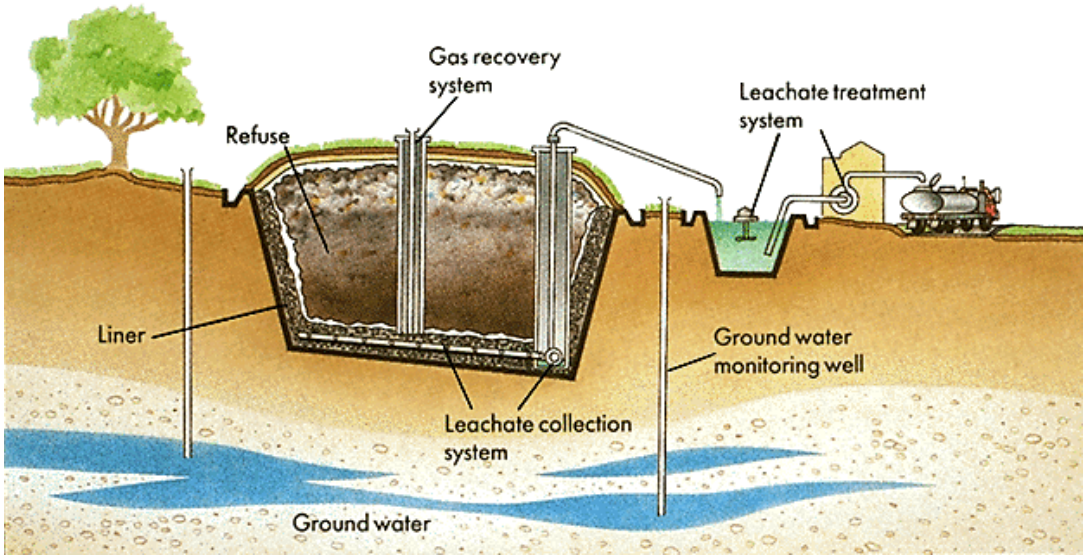
Advantages of Mechanical and Biological Treatment:

- This system has the lowest potential impacts on the air environment (MacViro 2006).
- Flexible to changes in waste quantities and composition (MacViro 2006).
- “Potentially lower overall system costs provided low cost landfill capacity can be obtained from a third party” (MacViro 2006).
- Potential to increase diversion rates through the recovery of additional recyclables. Advanced thermal treatment systems share this advantage (MacViro 2006).

Disadvantages of Mechanical and Biological Treatment:

- Greatest potential to disrupt sensitive habitat due to heavy reliance on landfill (MacViro 2006).
- Lowest energy generation (MacViro 2006).
- Greatest potential social impact on the landfill host community (MacViro 2006).
- Least reliable due to dependence on large amounts landfill space (MacViro 2006)

Sanitary Landfill:



Basic Sanitary Landfill. Digital Image. Ateneo Green Juris. Accessed September 2016. http://www.oocities.org/green_juris/landfil.html

Sanitary landfills are simply landfills that are designed to mitigate the effects of leachate and gas production, which are the major hazards associated landfilling. Leachate is the polluted water that flows from landfills. If improperly managed it can contaminate the land, surface water, and groundwater surrounding the landfill (Ramachandra 2006). The anaerobic decomposition of the organic matter within the landfill results in a methane rich gas to be produced. This gas is toxic and contributes to global warming (Ramachandra 2006).

Sanitary landfills control gas emissions by restricting the amount of organic waste that is allowed within the site as well as the moisture content within the waste (Ramachandra 2006). They also place vents called extraction wells within the waste to

remove the gas from the site and reduce gas pressure (Ramachandra 2006). Leachate is controlled through the use of natural and synthetic liners that prevent the leachate from escaping from the landfill into the surrounding groundwater. Natural liners refer to land that is minimally permeable and resistant to chemical attack such as compacted clay or shale (Ramachandra 2006). Synthetic liners made of either high or medium density polyethylene are used in combination with the natural liners in order to enhance the overall efficiency of the containment system (Ramachandra 2006). Synthetic liners form the base of the landfill. Drainpipes, collection pipes, and sumps are installed above the liner to collect the leachate (Ramachandra 2006).

Advantages of Sanitary Landfills:

- This system has a relatively low potential impact on the air environment.
- The most flexible to changes in waste quantities and composition.
- Lowest overall system costs.

Disadvantages of Sanitary Landfills:

- Wind can blow litter and dust outside of the landfill causing a nuisance (Ramachandra 2006).
- Waste collection vehicles moving in and out of the vicinity can be noisy and disruptive to the surrounding neighbourhood (Ramachandra 2006).
- Disease carrying birds, vermin, insects, and animals are often attracted to the landfill, which has the potential to cause a public health problem (Ramachandra 2006).
- Water during heavy rain has the potential to run-off the landfill and enter

nearby bodies of water if drains and ditches have not been properly designed and constructed (Ramachandra 2006).

- Aesthetically unpleasing (Ramachandra 2006).
- Requires a large amount of land (Ramachandra 2006)

In this chapter we looked at different waste disposal options, their processes, and the positives and negatives associated with each. Incineration technologies were found to be the most cost effective do to minimal land requirements, had the greatest energy recovery potential and were the least damaging to sensitive habits as well as the ground and water environment. Incinerators were however found to pose the biggest threat to the air environment. Mechanical and biological treatment (MBT) was the most costly option but offered the greatest recyclable material recovery and the lowest impact on the air environment. Sanitary landfills have a relatively low impact on the air environment and a low system cost. They do however require a lot of land and have the biggest social cost. Both incineration and MBT will ultimately require their byproducts be deposited into a landfill. An ideal system would utilize all three systems. It would start with at source separation such as home recycling and composting programs. This would be followed by MBT to sort out and recycle anything that was improperly disposed of at source and compost the organics. The residuals would then be sent to an energy-from-waste incinerator, which would cause significantly less harmful to the environment if all of the feed was properly sorted beforehand. Finally the ash from the incinerator would then be sent to a sanitary landfill. Doing all this would minimize damage to the environment and produce the most energy, recyclables, and compost. It would however be the most costly

by a significant margin.

In the next chapter I will be looking at the opposition towards the DYEC in order to understand the public's perceptions of incinerators as well as how their concerns are responded to by decision makers.

Chapter 4 - Community Opposition To Incinerators:

In this chapter I will discuss the opposition to the DYEC. I will go over the opposition's arguments against the development of incinerators, how they attempted to stop the development of the incinerator, and their proposed waste management alternative to incineration. I will explain how incineration proponents reacted to the arguments of the opposition movement. I will discuss the post-development controversy surrounding the DYEC. Finally, I will explain what the opposition movement accomplished through their actions.

Arguments Made By DYEC Opposition Movement:

Incinerators Harm Human and Environmental Health:

'Prevent Cancer Now' an advocacy group working to eliminate preventable causes of cancer throughout Canada spoke out against the development of the DYEC. They argued "even the most technologically advanced incinerators release dioxins and other hazardous pollutants" (Gasser 2009). The International Agency for the Research on Cancer (IARC) has recognized dioxins as a class 1 carcinogen. This means that their research has found that dioxins have a high potential to cause cancer in humans (IARC 2016). Studies on people living near incinerators in various counties such as France, Japan, Italy and Sweden, found that they were significantly more likely to have stomach, colorectal, liver, and lung cancers than those who did not live near an incinerator (Gasser 2009). Studies were also done on children living near incinerators in the United

Kingdom. These studies found an increased risk of “childhood cancer, childhood leukemia, and solid tumors of all kinds” (Gasser 2009). The citizens environmental lobby ‘DurhamCLEAR’ argues that incineration emissions negatively impact more than just the immediate area surrounding the facility. These emissions spread over lakes, rivers, and farms where they become absorbed into the food chain (DurhamCLEAR 2010).

According to DurhamCLEAR, “air pollution is the principal cause of asthma and a leading contributor to heart disease, cancer and other diseases” (DurhamCLEAR 2010). They explain that even before the development of the incinerator, Clarington had one of the most polluted air sheds in Ontario largely due to the presence of a cement manufacturing facility (DurhamCLEAR 2010). Additionally, Durham Region as a whole had some of the highest numbers of reported asthma cases (DurhamCLEAR 2010). DurhamCLEAR argued that the addition of the incinerator would only make a bad situation worse.

Waste Incinerators are also a significant contributor to greenhouse gas emissions according to ‘Durham Environment Watch’. This group explained that mass burn incinerators produce more grams of greenhouse gases per kWh than coal fired power plants (Durham Environment Watch 2010). Coal fired power plants are notorious for their negative environmental impact. The Province of Ontario banned coal-fired energy generation in 2015 (MOECC 2015).

The Algonquin Power Facility (now called Emerald Energy From Waste) is a

waste-to-energy incinerator located in Brampton, Ontario. It processed 174,000 tonnes of the Region of Peel's waste annually from 1992 until 2012 when Peel's contract ended (Javed 2015). Opponents of the DYEC sited Brampton's 2006 Air Emissions Monthly Summary, which reported that the city's air shed had exceedances of carbon monoxide, hydrogen chloride gas, and nitrogen oxides (Bracken 2009b). These opponents believed that this data debunked the myth of "clean" incinerators that produce no negative emissions.

The Region's pledge to Clarington in their host community agreement to monitor the "total particulate matter emissions from the incinerator" was not included in certificate of approval (CofA) that was issued by the Ministry of the Environment (Hatherly 2011). The CofA only contained guidelines about monitoring the filterable particulate matter. Total particulate matter includes both filterable and condensable matter (Hatherly 2011). This became an issue when it was revealed that the incinerator could emit up to 21 micrograms per cubic metre of total particulate matter (Hatherly 2011). This far exceeded the 9 micrograms that was agreed upon in the host community agreement. The health risk assessment done during the approval process for the facility studied the risk up to 10 micrograms per cubic metre would have on human health (Hatherly 2011). Clarington council requested that the health risk assessment be redone to understand the effects these higher levels of emissions will have. The Ministry of the Environment denied this request on the grounds that there was "no difference in health risk between the two levels" (Hatherly 2011). Residents were upset by the Ministry's response, saying that if the Ministry is going to claim that there is no difference in health

risk between the two levels of emissions they need to support that claim with data. These residents also reported feeling that the Ministry was not acting in their best interest (Hatherly 2011).

Incinerators are Expensive:

Opponents of the DYEC criticized the ever-ballooning costs of the facility. The cost of the facility grew from the initially projected $197 million to over $284 million (Joyce 2010). The former president of CUPE Ontario, Sid Ryan, explained that it is common practice in public private partnerships for companies to underbid on the tenders just to get the project going, “then the taxpayer is on the hook for the cost overruns” (Joyce 2010). The Federal Gas Tax Reserve Fund financed $100 million of the projects costs. Durham and York planned on getting additional funding from tipping fees and energy sales (Joyce 2010). Tipping fees, which were set at $140-per-tonne, is what Durham and York charge for accepting waste at the site. The energy produced at the site would be sold to the Ontario Power Authority at a rate of “8 cents per kilowatt-hour”. (Joyce 2010) This is almost three times the rate the Ontario Power Authority would charge its customers for using that energy (Joyce 2010). The Ontario Power Authority was directed to purchase this energy at that high rate by George Smitherman, who was Ontario’s Energy and Infrastructure Minister (Joyce 2010). Critics argue that this purchase order effectively acts as an additional subsidy on the facility paid for by taxpayers (Joyce 2010).

Incinerators Compete With Diversion Programs:

Opponents of incineration argue that incinerators create a disincentive for improving waste diversion as they compete with recycling programs for resources. Incinerators depend on a steady flow of garbage in order to run efficiently, this inherently undermines a municipality's incentive to bolster diversion programs. Aside from the sheer quantity of waste needed, the amount of energy produced at a waste-to-energy incinerator depends on the content of the waste used as feedstock (Nelson 2009). Recyclables such as plastics, wood waste, and paper have the highest energy potential. The higher the percentage of these materials in the feedstock, the more energy the incinerator will produce (Nelson 2009). This gives yet another disincentive to improve waste diversion programs. Critics argue that despite being a high energy source of fuel for the incinerators, recycling these materials would conserve more energy than what would be gained by using them as a fuel source (Nelson 2009). A paper put out by the Recycling Council of British Columbia confirmed this argument (Nelson 2009). That being the case, it would make sense to forgo incineration as an energy production system and instead increase recycling programming.

Another disincentive for bolstering recycling programs and reducing waste is a financial one. The Region signed a "put or pay" contract with the facility operator (Nelson 2010). In the contract the Region agreed to supply 140,000 tonnes of waste to the facility every year. "Put or pay" means that the Region would have to pay the facility operator anywhere between $200-$400 for every tonne of garbage that is missing from

the agreed upon 140,000 (Nelson 2010). This is a major financial disincentive for the Region to encourage people to reduce the amount of garbage they produce.

Insufficient Emission Monitoring Programs:

Representatives of the community group 'Zero Waste 4 Zero Burning' criticized Durham and York regions after they voted to reject the use of ambient air monitoring around the DYEC (Gasser 2009b). This vote came after recommendations coming from a study on the pollution control technologies and emission standards done by the project consultants that recommended the technology not be used. The report explains that the majority of ambient air monitoring and environmental monitoring (vegetation and agricultural products) studies done on modern incinerators were "unable to find significant chemical concentrations that would adversely affect human health" (Jacques Whitford 2009). Therefore they said that they were unable to justify recommending the use of these monitoring systems. The consultants ultimately recommended that the region implement chemical emission standards that were more stringent than those set out by both Ontario and the European Union's (EU) guidelines (Jacques Whitford 2009). They also recommended including a stack sampling technology to collect samples of dioxin and furans that can later be measured at regular intervals (Jacques Whitford 2009). Unlike the combustion gases CO, O_2, NO_x, HCI, and SO_2, dioxins and furans cannot be continuously monitored at source (Jacques Whitford 2009). The sampling technology allows for more frequent measuring of these emissions. The consultant's study concluded that these two recommendations go beyond what would be considered good practice

(Jacques Whitford 2009). Despite this justification, community groups still voiced that they would feel safer with ambient air monitoring put in place.

Choosing a Site Prior to Choosing a Technology:

Durham and York regions were criticized for selecting a site for the incinerator before they had selected the technology to be used. Clarington City Council passed a motion to ask that the site selection be delayed until a technology had been selected, as did Durham region's own health and social services committee (Szekely 2008). Dr. Tony van der Vooren, an engineering and development consultant, explains that one would need to know what technology will be used before they can determine how the development of an incinerator will affect the air shed of the site (Stone 2007). He says that certain technologies may not be suitable for particular sites. The best practice is to first select the technology and then choose two potential sites and do studies on both to find out the impacts of the development (Stone 2007). What may seem like an ideal site at first glance may turn out not to be after the completion of the studies. According to Vooren, the information on air quality indicators available to consultants prior to performing site-specific studies are often too old and basic to allow decision makers to make the best possible choice (Stone 2007). Cliff Curtis, the Durham Works Director, responded to Vooren saying, "carrying two sites forward into technology selection would be too costly" (Stone 2007). Vooren agreed that it would be more expensive but not unreasonable so (Stone 2007).

Issues with Covanta:

Covanta Energy Corp. is the builder and operator of the DYEC. They are also the primary funders of the Canadian Energy From Waste Coalition, an incineration lobbyist group (Nelson 2010b). They are the world's largest waste-to-energy (WTE) company, owning 44 WTE facilities in the United States and more internationally (Nelson 2010b). Durham Council voted to award the project to Covanta at a regional council meeting in June 2009. This decision was made after council heard from over 80 delegates over the course of a 16-hour committee meeting on June 25th (Pietroniro 2009). An overwhelming majority of the delegates came to speak out against the incinerator (Nelson 2010b). The delegates concerns revolved around the incinerator's impact on human and environmental health, effects on real estate prices and taxes, as well as Covanta's environmental track record (Pietroniro 2009). Several cities in the United States have fined Covanta for unsafe labour practices and toxic emission exceedances. The municipality of Pittsfield in Massachusetts fined Covanta in 2008 after tests found their incinerator was emitting dioxins and furans that were 350% greater than the allowable rate (Funston 2009). Chester, Pennsylvania and Newark, New Jersey also fined Covanta in 2008 for violating air pollution regulations (Funston 2009). In May 2008, the 'U.S. National Labour Relations Board' issued a complaint against Covanta for, "maintaining illegal work rules at 46 of its facilities" (Funston 2009). In April and again in June 2009, Covanta was charged by the 'Occupation Health and Safety Administration' for various workplace safety violations including "exposing workers to electrical hazards" and "storing combustible acetylene cylinders next to oxygen cylinders" (Editorial 2009). Covanta became a point of controversy again in 2011 after they were charged $400,000

for emitting unsafe levels of dioxin emissions at its waste incinerator in Connecticut (Nearing 2011).

Incinerators Effect On Property Values:

One concern repeatedly raised by citizens at council meetings was the effect the incinerator would have on their property values. Clarington resident Dr. Maria Lit referenced a study that aimed to find out how incinerators affected nearby housing markets in the United States (Gilligan 2009). According to Dr. Lit, this study found that "house values dropped 10% in the vicinity of an incinerator" (Gilligan 2009). While some citizens brought up this concern at council meetings, it was not used as an anti-incineration argument by the various NGOs fighting the facility.

How Incinerator Opponents Fought the Development of the DYEC:

Residents Formed Anti-Incineration Groups and Collaborated With NGOs:

Residents of Durham Region formed community groups in order to better mobilize against the incinerator. These groups were DurhamCLEAR, Zero Waste 4 Zero Burning, and Durham Environment Watch. These groups worked in conjunction with other NGOs to help spread their message. Notable NGOs that worked to prevent the DYEC were Prevent Cancer Now, Durham Region Labour Council, Canadian Union of Public Employees (CUPE), Canadian Auto Workers Union (CAW), and Greenpeace Canada.

Voiced Opposition at Public Meetings:

Droves of opposition attended every municipal and regional council meeting, and PIC from the time it was announced that Durham and York Regions were considering building an incinerator in 2006 until development of the facility finally began in 2011. These meetings had an overwhelming number of incinerator opponents versus supporters. An example of one of these meetings occurred in May 2007, shortly after it was announced that Clarington was on the short list of potential sites for a proposed waste incinerator, Clarington city council hosted a public meeting for citizens to voice their opinions on the matter. Out of the 18 delegates that came forward to speak on the issue, 17 were against the development (Stone 2007b). They said that Clarington should refuse to be a willing host to an incinerator. They voiced concerns about emissions and "potential toxicity of ash left after the incineration process" (Stone 2007b). They argued that the city's goal should be to improve waste diversion instead of develop an incinerator, which requires large amounts of waste for fuel (Stone 2007b). Dr. Debra Jefferson, a family physician based in Newcastle, explained at the meeting that there are various studies in reputable medical journals that showed increased mercury levels for those who live near incinerators. She also said that, "there are two cancers that are particularly associated with incineration: non-Hodgkin's Lymphoma and soft-tissue sarcoma" (Stone 2007b).

Another example of overwhelming opposition to the incinerator occurred at a meeting in September 2007. At this meeting the Durham/ York Residual Waste Study Joint Management Group voted to accept the project consultant's recommendation to

build the waste incinerator in Clarington at the corner of Hwy. 401 and Courtice Road (Willoughby 2007). The group, which is made up of members from both York and Durham regional councils, chose this site from a short list that included 1 site in East Gwillimbury and 4 sites in Clarington (Willoughby 2007). They committee explained that they chose the site because it minimizes the distance trucks needed to travel in order to transport the waste from the two regions. The site also has the least number of residences living within a 1-kilometer radius (Willoughby 2007). The consultant's report did note that the site's proximity to Hwy. 401 already caused it to have air quality issues as a result of the heavy traffic, which would only be made worse with the addition of the incinerator. The report explained that while the East Gwillimbury site did not have the pre-existing air quality issues that were found in Clarington, the remoteness of that site would make it very inefficient to transport the waste (Willoughby 2007). The Joint Management Group heard from members of the public before making their decision. Every delegate that came up voiced opposition to the development of the incinerator (Willoughby 2007). Their opposition was not directed at the chosen location but rather to the very idea of developing an incinerator (Willoughby 2007).

Clarington Residents Hosted Their Own Public Information Sessions:

Residents of Durham hosted their own community information sessions to inform the public about the development proposal and the risks associated with incineration. The organizers felt that the public information sessions hosted by the Region were too one sided in favour of incineration and did not explain the full story (Bracken 2009). They explained that the Region had not "fully considered the health risks and financial

implications incineration, which is one of the most costly methods of disposing of municipal waste" (Bracken 2009). The first of these information sessions took place in November 2008 and had over a hundred attendees. One attendee, Dianne Cross, said that she had no idea that an incinerator was being proposed until being informed about this community run information night (Bracken 2009). Other groups also hosted their own public forums including the Canadian Auto Workers Union. Their event ran as an expo, with various organizations setting up information tables, including the Region of Durham (Szekely 2008b). The Durham Region booth gave out information about their blue box and green bin recycling and competing programs, not their proposed incinerator (Szekely 2008b). The event included lectures from various speakers explaining the dangers of incineration as well as options to increase waste diversion such as through the use of clear plastic bags.

Organized Protests Against Incinerator:

(See Appendix Fig 2 for photos from protests and PICs)

Protestors came out in force to voice their opposition against the DYEC at many key events leading up to the project. In February 2008, a protest group of over 100 people gathered outside of a council meeting in Clarington Ontario (Liebregts 2008). This group mobilized in response to Mayor Jim Abernathy's decision to invite several pro-incineration delegations to speak at the meeting, while opting not to invite any incineration opponents (Liebregts 2008). Mayor Abernathy defended his actions by saying that "there will also be experts in other forms of waste management, including landfill and Zero Waste strategies, invited to future meetings" (Liebregts 2008).

In May 2009, protestors were again seen outside of the Clarington municipal building in response to an announcement that Clarington councilors would be voting on whether or not to reverse their previous decision that they would be an unwilling host to the DYEC (Gilligan 2009c). This vote was put forward after Clarington received a proposal that they would receive a $650,000 payment in-lieu of property tax and $10 per tonne for the waste sent to the incinerator from outside of Durham and York regions if they agreed to rescind their unwilling host status (Gilligan 2009c). The municipality would also receive sewer upgrades for the energy park (Gilligan 2009c). CUPE Ontario, Canadian Auto Workers Union (CAW), and Prevent Cancer Now organized the rally (Gilligan 2009). Dr. Aubrey Kassirer, a family doctor in Clarington who attended this rally said, "Physicians around the world are opposed to incinerators. Clarington councilors who support an incinerator were selling out the community" (Gilligan 2009c). Dave Renaud, the president of CAW's environmental council said, "all labour unions across Canada are opposed to incineration". The protestors reported that they felt that their health was being traded for financial considerations (Gilligan 2009c).

A second protest was held in May 2009, this one in front of Durham Regional headquarters (Gilligan 2009b). Approximately 40 people attended the rally (Gilligan 2009b). They were there in advance of the Regional council's June 24th vote on whether or not to go forward with the development of an incinerator in Clarington (Gilligan 2009b). At that point only 10 out of the 28 regional councilors had publicly voiced opposition to the incinerator (Gilligan 2009b). The group was there to show the

remaining councilors that the public did not want the incinerator either and convince them to vote no.

A large protest was held at Queen's Park in Toronto in May 2010 prior to the DYEC receiving approval of their environmental assessment (PCN 2010). Protestors were calling on the Ontario Minister of the Environment John Gerretsen to reject the EA (PCN 2010). Protestors included citizens and non-governmental organizations (NGOs) from all around the GTA (PCN 2010). Speeches were heard from representatives from various NGOs including, Prevent Cancer Now, The Toronto Environmental Alliance, and Greenpeace Canada (PCN 2010).

Protestors attended the Durham Waste Fair in March 2011 (O'Meara 2011). They mobilized because they felt that the Region was using the fair to "promote its garbage policy, which includes incineration" (O'Meara 2011). They acted as a point of contact for attendees who wanted to hear the other side of the debate, not just the pro-incineration propaganda being pushed by Covanta and the Region.

Over one hundred protestors showed up to the groundbreaking ceremony of the DYEC. They wore facemasks to symbolize their fear of the toxic emissions that would be emitted by the facility. Doug Anderson, the president of DurhamCLEAR, explained that they were protesting, "to show that opposition is still strong" (Vyhnak 2011). Oshawa councilor John Neal joined the protestors and stated, "this will go down in history as one of the worst decisions ever made" (Vyhnak 2011). There were 135 politicians who

attended the groundbreaking as guests. They were treated to a large catered party inside air-conditioned tents erected at the site. All attendees were also given miniature shovels to commemorate the event. Twenty police officers were hired to act as security for the event (Vyhnak 2011). The party cost $75,000, and the bill was evenly split between Durham and York Regions, and Covanta Energy (Gilligan 2011). The cost was highly criticized by residents of Durham. They voiced anger that taxpayer money was used to fund a private party (Gilligan 2011). A review was requested by two regional councilors to examine "where the money for the event came from, who authorized it and how much it cost to have Durham Regional Police provide security". Durham Regional Council ultimately voted not to do the review in a 13-11 vote (Gilligan 2011).

Attempts to Stop Incinerator Through Litigation:

In July 2011, DurhamCLEAR, a lobbyist group that was formed to fight the development of the DYEC attempted to halt the development through the judicial system. They argued that the facility could not be developed at the chosen site because it was not compatible with the zoning in Clarington's Official Plan (Gilligan 2011b). Stephen Waque, Durham Region's lawyer argued that the zoning by-law does not apply in this situation because the Region has a "public use exemption" (Gilligan 2011b). Eric Gillespie, DurhamCLEAR's lawyer, countered by arguing, "the 'public use exemption' can't be used by the Region because Covanta will be building and operating the facility". "The exemption can only be used by a public authority". "Covanta is a private company. It does not appear to be, to our client, to be a public entity" (Gilligan 2011b). Waque countered by arguing that DurhamCLEAR does not have the right to bring this case to

court as it is not a taxpayer (Gilligan 2011b). He explained that, "you have to have an economic stake in a municipality to be able to bring a suit against a municipality. The applicant doesn't have capacity or standing to bring an application" (Gilligan 2011b).

The case ended before it came to a court hearing after Justice Peter Lauwers accepted Covanta's request that DurhamCLEAR put up a 'security of costs' of $40,000 (Follert 2012). If DurhamCLEAR were to lose the case against the Region and Covanta, this money would be used as security in the situation that the defendants sought to recover some of their expenses. DurhamCLEAR's lawyer argued that the judge should deny the request for security of costs because there was no precedent for it in Canadian law in public interest litigation (Gilligan 2011b). Julie Parla, Covanta's lawyer, countered saying, "there's no legal rule that public interest litigants are immune from costs at the end of the day, nor for having to post securities" (Gilligan 2011b). Justice Laurders agreed with Parla saying, "[DurhamCLEAR] was trying to get a free crack at this, at the 11th hour. There's a price to be paid to put a wrench in this. You need to put some skin in the game. This thing has been aired publicly in a serious way" (Gilligan 2011b).

DurhamCLEAR was forced to drop the lawsuit after they were unable to secure the funds to pay the $40,000 security of costs set by the judge (Follert 2012). After dropping the case the group announced that they would continue their fight to protect Durham from the incinerator by switching their focus to "monitoring the construction and operation of the energy-from-waste facility, to ensure it complies with the commitments that have been set out" (Follert 2012). Stacey Leadbetter, the vice-president of

DurhamCLEAR explained that the group's experience fighting the DYEC has taught them that in order to be successful "you have to get onto issues at a very early stage or else they get away from you" (Follert 2012)

Incinerator Opposition's Proposed Waste Management Alternative:

Zero Waste:

As an alternative to incineration, opponents of the DYEC suggested that steps be taken to move the region towards zero waste. Doing this involves, "designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them" (ZWIA 2004). Advocates of zero waste believe that is possible to divert 90% of all waste while only landfilling the remaining 10% (ZWIA 2004). Some concrete steps that can be done to realize this goal are the utilization of consumer and producer stewardship programs, and the privatization of waste collection and disposal (Anderson 2001).

Consumer stewardship programs involve making citizens bare the cost of disposing the waste they create. This will create a financial incentive for people to purchase products with minimal packaging, and in the case of electronics and appliances, more durable and longer lasting to reduce their disposal fees (Anderson 2001).

Producer stewardship programs involve making regulations that standardize the types of product containers manufacturers are allowed to use and the utilization of bottle

deposits (Anderson 2001). These types of programs are important in bolstering the effectiveness of recycling programs. Both glass and plastics need to be carefully sorted by colour and in the case of plastics type as well in order for them to be recycled into high value products (Anderson 2001). Mixed glass and plastics are essentially worthless to a secondary market (Anderson 2001). Standardizing packaging and utilizing bottle deposit programs will greatly enhance the reuse potential and marketability of recycled packaging (Anderson 2001).

Finally, cancelling municipal garbage collection programs to be replaced by private collection will have several effects on a person's waste production habits. First, private collectors would charge people for each bag of garbage produced. People will be incentivized to reduce their waste to save on money (Anderson 2001). Second, private contractors can refuse to do business with anyone who is not complying with garbage/ recycling by-laws. Government owned waste collectors are not able to do this because the uncollected garbage would create health compliance issues (Anderson 2001). In the situation that a collector cancels their contract with a homeowner, they would report the cancellation to the government who has a registry of all taxpayers and the operators that have been contracted to handle their garbage. The government would then hire a garbage collection company to collect that persons waste and charge them a rate that is much higher than the going rate (Anderson 2001). Collection companies that accept waste that does not comply with garbage/ recycling by-laws could face the penalty of having their licenses taken away. Third, by being a privatized industry, collection companies can offer a range of services that municipal collection could not. For example, for an extra charge

they can offer to sort your garbage in your place, or collect the garbage from a designated location of the customer's choice such as their backyards (as opposed to curb pick up) (Anderson 2001).

Incinerator Proponents' Response To Opposition:

Downplayed Opposition As 'Minimal':

The public information sessions held as part of the Durham / York waste management study included open houses, presentations by the project consultants, and question-and-answer periods (Hatfield 2007). The public most commonly came with questions relating to air emissions, health impacts, traffic impacts, and concerns about the facility competing with waste diversion targets (Hatfield 2007). There were four information sessions held in April 2007 to inform the public about the short list of potential sites for the waste incinerator. Around 400 people attended these four meetings (Hatfield 2007). Jim McKay, one of the project consultants explained that those numbers signify relatively low levels of opposition. Around 1000 people would signify a high level of opposition according to the consultants. McKay explained that, "usually at this stage of a land-filling process we would have two or three thousand people out" (Hatfield 2007).

Opposition Was Dismissed As NIMBYism:

In response to delegations calling for zero waste initiatives instead of incineration at a public consultation meeting in May 2007, Regional Councilor Charlie Trim said, "He

had been at a meeting about a year ago [2006] where only 12 people — four of them from Port Hope — attended. It's only now, with the announcement that Clarington may play host, that people are getting involved" (Stone 2007c). Contrary to Trim's comments, it is clear from information obtained from the Durham York Energy Centre website that there was already significant public interest in 2006. Hundreds of people attended the three PICs that were held in 2006 (Durham Region 2010). In March 2006, a PIC was held to discuss how to manage the Region's residual waste, which had 215 attendees (Durham Region 2010). A PIC was held in May 2006 to obtain feedback from the public about their preferred technology, which had 300 attendees (Durham Region 2010). The third PIC in 2006 was held in September. "Hundreds" of people attended this PIC that aimed to obtain feedback about, which criteria should be prioritized when siting thermal treatment facilities (Durham Region 2010).

Region Decided Consent Was Unnecessary:

Durham Regional Chairman, Roger Anderson, at a council meeting in September 2007, told delegates, "it would be nice if we could have a willing host, but it is not essential" (Stone 2007d). He goes on to say that "if Clarington were to declare itself an unwilling host now, it would have absolutely no effect whatsoever on the site selection process, which is part of the ongoing EA" (Stone 2007d). In Ontario's EA process for waste-to-energy incinerators the willingness of the host community is considered but it is not a determining factor (Stone 2007d). Attendees at the council meeting reported leaving with the feeling that the public consultation process was a farce. Kerry Meydam, a

Clarington resident said, “It seems like it’s a done deal and has been for a long, long time and we feel a little helpless” (Stone 2007d).

Durham Regional Councillor from Oshawa, Brian Nicholson, attempted to pass a motion that would require municipalities pass a resolution accepting the facility in their community before that municipality could be considered as a host (Gilligan 2006). He explained, "It has always been the policy that we would not impose a landfill; I think we should extend that policy to this process," (Gilligan 2006). This motion failed, with only 3 of the 28 councillors voting in favour of it.

Region Put Limits On Public Delegations at Council:

On Dec. 14 2011 Durham Region council voted on and passed a motion to reduce the amount of time delegates are allowed to speak at council meetings from 10 minutes down to 5 (Follert 2011). This motion also set a limit on how often a person can speak on a matter. Before the vote there were no limits to how often a delegate could speak on a topic, now they are only permitted to speak once on a topic in a six-month period (Follert 2011). Linda Gasser, a frequent speaker at regional council meetings said that she felt this new change “limits public access to raise concerns or provide information to elected officials” (Follert 2011). From her experience, she says most delegates needed the full 10 minutes to fully explain themselves. She also criticized the restriction on how frequently a person can talk about an issue. She explained that often information about complex issues, such as the development of an incinerator, grows and changes over time. People should be able to speak to council to respond to new information they have received even

if they have recently spoken on the topic (Follert 2011). Gasser believes that Durham regional council put these restrictions in place to "limit negative feedback on their actions" (Follert 2011).

Post-Development Controversy Over Incinerator:

Criticisms Over Increasing Emission Allowances in Closed Meetings:

On December 23, 2015 Durham Region announced that the DYEC had failed its emissions acceptance testing. The facility produced more ash than was acceptable under the contract between the region and the operator (McNaughton 2016). This announcement was made a day after a closed meeting between the regional committee of the whole, where councillors received a verbal update on the incinerator's acceptance testing (McNaughton 2016). The committee of the whole had another closed meeting on Jan 27, 2016 where they voted to amend the contract between Durham and Covanta. This amendment gave Covanta permission to produce more ash at the DYEC (McNaughton 2016). Members of the public and community groups expressed concern over not being allowed to attend these meetings. The region violated their trust by allowing the DYEC to produce more ash without consulting them first or even allow them to listen in on the discussion. Two formal complaints were issued, which triggered an investigation into whether the two meetings should have been open to the public (McNaughton 2016). The investigation found that the two meetings were improperly closed to the public. The report notes that there were parts of the two meetings that were rightfully done in a closed session, specifically, the settlement proposal from Covanta (McNaughton 2016b). The

report states, “members of council needed to hear the without-prejudice settlement proposal, and accompanying legal advice, in order to determine whether or not to settle the proceeding” (McNaughton 2016b).

The meeting minutes from these two sessions were released alongside the investigation report. The sections that were found to have been appropriately discussed in a closed meeting were blacked out. Members of the public argued that some of these blacked out sections should have been left untouched. For example, two of the four principles of acceptance testing were blacked out and hidden from public viewing (Editorial 2016). The question that was raised was, “why can’t residents know the principles that were being tested?” (Editorial 2016). Veils of secrecy such as this, only work to grow the public’s distrust in government.

DYEC Boiler Shut Down Due to Excessive Emissions:

One of the two boilers in the Durham York Energy Centre had to be shut down after testing in July 2016 found that it was emitting dioxins and furans that were 1363% higher than allowable limits (Gilligan 2016). Operating data did not detect this problem (Gilligan 2016). This resulted in many residents feeling concerned about the health of those living near the facility and the effects those emissions could have on the surrounding agriculture (Gilligan 2016). During the approval process the public had been told that “there is no health risk” and that the incinerator would be “the best of the best” (Gilligan 2016). Members of the public have reported feeling a lack of trust and confidence in the incinerator, the operating company, and the government as a result of

this boiler failure (Gilligan 2016). Covanta was ordered to take the boiler offline and conduct a full investigation into why it was producing such high emissions (McNaughton 2016c). The tests on the second boiler found that it was producing emissions below the allowable rate (McNaughton 2016c).

Covanta's investigation found that the high emissions were the result of unplanned operational changes. On May 5th 2016 a mattress blocked one of the incinerator's feed chutes. The boiler had to be shut down in order to remove the mattress and clean the chute. The unplanned shut off and the cleaning of the boiler likely caused the problem according to the report (McNaughton 2016d). Despite Covanta's claims that such exceedances would not happen again, many members of the public and several regional councillors voiced a lack of faith that "Covanta will get things right in the future" (McNaughton 2016d). The region's commissioner of health, Dr. Robert Kyle, who had tried to reassure the public that the incinerator posed no risk to human health during the development approval process, voiced some concern over the high levels of emissions. He explained, "sustained excessive emissions of dioxins and furans are a potential human health hazard, primarily by entering the food chain" (McNaughton 2016d). He said that he was surprised that the Ministry of the Environment and Climate Change (MOECC) were not planning on taking any regulatory action to find out the root cause of the problem and take corrective action to prevent it from reoccurring (McNaughton 2016d). He suggests that, "more tests like the ones that detected the exceedance are needed in the future" (McNaughton 2016d).

Accomplishments of DYEC Opposition Movement:

Opposition Discouraged The Development of Other Incinerators:

While the opponents of the DYEC failed to prevent its development their efforts had significant consequences elsewhere. Durham Region's announcement that they were planning on developing an incinerator to manage their waste resulted in other municipalities looking into doing the same thing. In 2013, the Regional Municipality of Peel approved a $500 million dollar budget to be put towards a waste incinerator. They cancelled their plans for this development in January 2016 (Javed 2016). Mississauga Councillor Carolyn Parish explained that that she had voted to cancel the plan as a result of ballooning costs, and that she was concerned that an incinerator in Peel Region would suffer from similar delays, controversy, and high emissions that plagued the Durham York Energy Centre (Javed 2016). To manage their waste problem, Peel Region has decided to increase their waste diversion targets from 60% to 75%. As of January 2016, their actual diversion rates were sitting at 46% (Javed 2016). If Peel were to meet these diversion targets they would not be able to supply enough waste to feed their proposed waste incinerator, which would have required 300,000 tonnes of garbage per year. A 75% diversion rate would only leave 150,000 tonnes of residual waste for the incinerator (Javed 2016).

In 2004 The Regions of Halton and Hamilton started looking into developing a shared garbage incinerator (McGuinness 2008). Despite recommendations from their consultants that an incinerator would be the best method to manage their waste, the two

municipalities abandoned this plan in 2008 after strong opposition from the public (McGuinness 2008). Hamilton said that their current landfill capacity would be sufficient until the year 2050 so long as waste diversion increased to 65% by 2011 (McGuinness 2008). At the time of this announcement in 2008, the city was diverting 42% of its household waste away from landfill (McGuinness 2008).

A proposal to build a private for-profit incinerator in Port Hope, Ontario was turned down in 2014, after a 5-year environmental assessment process (Cruickshank 2015). The rejection was the result of a very large anti-incineration campaign run by the people of Port Hope (Cruickshank 2015). The municipal council listened and subsequently voted to not make the zoning changes needed to develop the incinerator (Cruickshank 2015). The proponents, Entech-REM, took the case to the Ontario Municipal Board (OMB) to appeal the council's decision (Argyris 2015). The OMB decided not to overrule Port Hope council's decision stating, "In the absence of a report on human health and ecological risk assessment council could not have been expected to rule favourably on the proposal. The OMB would not stand against council in these circumstances" (Argyris 2015).

Helped Shape Ontario's Current Waste Management Strategy:

In June 2016, the province of Ontario passed the 'Waste-Free Ontario Act' and a draft waste diversion strategy called the 'Strategy for a Waste-Free Ontario: Building the Circular Economy' (MOECC 2016). This act incorporates many of the waste management alternatives suggested by incineration opponents and zero waste advocates.

The act was designed to improve waste diversion by incentivizing innovative recycling processes and increasing producer responsibility over their products and packaging (MOECC 2016b). The only mention of EFW incinerators in the draft strategy is to clarify that waste sent to these facilities will no longer contribute to diversion targets (MOECC 2016b). The development of EFW is allowed in the new act but is not promoted as a sustainable alternative to landfilling as it once was.

In this chapter I discussed the opposition to the DYEC. I went over the opposition's arguments against the development of incinerators, how they attempted to stop the development of the incinerator, and their proposed waste management alternative to incineration. I explained how incineration proponents reacted to the arguments of the opposition movement. I discussed the post-development controversy surrounding the DYEC. Finally, I explained what the opposition movement accomplished through their actions. While the incinerator opponents were not able to stop the development of the DYEC, their actions made other municipalities apprehensive to go ahead with their own incinerator plans. They also encouraged the province to prioritize recycling and other waste diversion programs in their 2016 waste management strategy.

In the next chapter I will be looking at Judith Petts' theoretical framework that tries to explain the motivations behind incinerator opposition and attempt to validate the theory using examples from the DYEC opposition movement.

Chapter 5 – Motivating Factors Behind Incinerator Opposition:

In this chapter I will be looking at Judith Petts' theory explaining the motivating factors behind public opposition to incinerator development. These factors are perceptions of risk, lack of trust, ineffective communication, and problems with the decision making process. I will also explore the events that occurred during the development process of the DYEC and connect them to the factors described by Petts.

Public Perception of Risks:

The public's perceptions of an incinerator's risks are the starting point behind incinerator opposition. According to Petts, people tend to experience "stress, social conflict, and direct opposition" when they believe their living situation is at risk (Petts 1994). Incinerators tend to bring up fears of human and environmental health, fears of potential nuisances such as odours, dust, noise, and fears of declining property values (Petts 1994). These fears are what drive people to become actively involved in the decision making process and can be seen in the arguments made by the opponents of the DYEC.

Loss of Trust:

The public's loss of trust is the second motivator behind incinerator opposition. There are two primary facets behind the public's loss of trust. The first is distrust in governments and industry to effectively manage and control the waste disposal facility's environmental impacts (Petts 1994). The public does not trust that private industry will

consider public safety and the environment as seriously as generating a profit (Petts 1994). They also do not trust that governments are able to effectively monitor and enforce their own environmental protection regulations (Petts 1994). The second facet behind the public's loss of trust comes from socially ingrained perceptions of the credibility of certain groups. Politicians and for-profit consulting firms are seen as significantly less credible than groups that do not have a stake in the project such as physicians or academics from local universities (Petts 1994). The public puts a lot of weight in where information came from before blindly accepting it as the truth.

There are many instances where one can point to a lack of trust in government and industry as motivation for the actions of the opposition movement. The opposition's lack of trust in industry can be seen by their criticism of Covanta as the builder and operator of the project. Incinerator opponents spoke out about the company's track record of exceeding emission allowances and multiple workplace safety violations. Further exploration of these criticisms can be found in the previous chapter of this paper. Another example of their lack of trust in industry can be seen by the DYEC opponents' criticisms of the choice of consultant for the project. Durham and York Region hired the consulting firms 'Jacques Whitford' and 'Genivar' to undertake a study aimed at finding the best long-term solution to manage their waste locally (Bracken 2009b). Both of these firms are members of the Canadian Energy-From-Waste Coalition. The coalition's mission statement states, "we stand for the promotion, adoption and implementation of energy-from-waste technology for the management of residual materials" (Bracken 2009b). These firms ultimately recommended that a thermal treatment facility be used to manage

the Region's waste. Incineration opponents argued that the selection of thermal treatment to manage the Regions' waste was a foregone conclusion when the decision was made to hire these consultants (Bracken 2009b).

The opposition also showed distrust in government throughout the development process. The opposition's distrust in government can be see through their response to a public statement made by Durham Region's medical officer of health, Dr. Robert Kyle. Dr. Kyle stated that incinerator would, "not pose an unacceptable risk to persons living in the vicinity of the site" (Gilligan 2009). The public clearly did not trust this attempt to reassure them, as health concerns were the primary topic brought up at council meetings and PICs. While doctors are generally seen as having more credibility than politicians, the fact that the Region directly employed him diminished some of this credibility. On the other hand members of the public rallied behind a group of 47 Clarington physicians who unanimously approved and addressed a letter to the Ministry of the Environment, which condemned the construction of the incinerator in Clarington. The Nurse Practitioners Association of Ontario also endorsed this letter (Hatherly 2011). These medical professionals had more credibility in the public eye because they were not affiliated with the project. Another example of the opposition's distrust can be seen from their response to the results of a 2008 phone survey asking residents whether or not they supported the development of an incinerator. The research company Ipsos Reid ran this survey (Hatherly 2011). They surveyed 200 Durham Region residents and found that 77% of residents were in favour of building the incinerator (Hatherly 2011). Several residents reported that they did not believe the approval rating for the incinerator was as

high as the survey results suggested. Pam Callus, an incinerator opponent ran her own survey with the help of four other residents to verify the Ipsos Reid results. Callus said that her survey "was inspired by a lack of belief in the Ipsos Reid survey" (Hatherly 2011). Callus' survey found that only 38% of Clarington residents were in favour of the incinerator (Hatherly 2011). These are just a few examples that point to the distrust residents felt towards government and industry. Opinions and data from people associated with the project were seen as biased and those that came from outsiders were seen as credible.

This distrust in government was likely the result of the public's past experiences with incinerators in the province. The Solid Waste Reduction Unit (SWARU) was a solid waste incinerator located in Hamilton, Ontario. SWARU opened in 1972 and operated until it was closed in 2002 (Carter-Whitney 2007). It burned approximately 40 to 60 percent of Hamilton's municipal solid waste. SWARU faced significant opposition from Hamilton residents starting from the late 1980s right until it was closed in 2002 (Carter-Whitney 2007). Residents were concerned that the facility's emissions such as dioxins, furans, and other toxins posed a significant health risk to those living in the community. (Carter-Whitney 2007) The Environmental Commissioner of Ontario reported that SWARU emitted approximately 5.5 grams of dioxins and furans (measured as 'Toxic Equivalent Quotient') in the year 2000. This amounted to 60 percent of the total dioxin and furan emissions from all municipal solid waste incinerators in Canada that year (Environmental Commissioner of Ontario 2002). SWARU was able to operate with these high levels of emissions because the facility's original approval that had been issued by

Ontario's Ministry of Environment and Energy in 1972 contained no restrictive conditions. (Carter-Whitney 2007) Community groups argued that the original approval did not meet modern environmental standards and should thus be repealed (Carter-Whitney 2007). These arguments won the battle for the opponents and eventually led to the facility shutting down. It was decided that it was too costly to update the facility's air pollution control systems so that they could meet the new Canada-wide standards (Carter-Whitney 2007). Despite this victory, it took years of using public processes such as applications under the Environmental Bill of Rights to persuade the municipal and provincial governments to respond to their concerns. (Carter-Whitney 2007) The length and difficulty of getting the government to close down this clearly dangerous and outdated facility may explain one of the reasons why so many people tend to resist the development of incinerators. They know how difficult it will be to move the government into action if the facility does not meet up to its health and safety promises. Events like this break the trust that people have that the government is truly working for the public interest.

Lack of Effective Communication:

The third motivator behind incinerator opposition according to Petts is a lack of effective communication (Petts 1994). Industrialists tend to claim that the NIMBY (Not In My Back Yard) syndrome arises when the public has "irrational" fears of threats to their health and safety that aren't supported by any data (Petts 1994). If this were true then NIMBY opposition should be able to be mitigated simply by providing the public with more information about the safety of the facility. However, when researchers tested

this theory they found that people were actually more likely to exhibit NIMBY attitudes when they had more issue relevant (non-technical) information such as risk assessments (Petts 1994). This is because the results of risk assessments do not address the broad range of concerns held by the public (Petts 1994). The public is also interested in the technical aspects such as safety systems and operational details of the plant, a breakdown of the risks versus the benefits of using this technology, whether or not the facility is actually needed, and alternative waste management options (Petts 1994). Audrey Armour explains that when it comes to determining whether to approve or restrict a proposed project, citizen concerns about the potential risks and their views regarding what is acceptable often appear to be of little importance in the public policy debate (Armour 1993). The views of experts are welcomed, and listened to even if they contradict one another, while the views of the people who will be exposed to the potential risks are denied legitimacy (Armour 1993). The system of risk assessment prevents a meaningful exchange of ideas and concerns and results in the marginalization of those who are most affected by the decisions (Armour 1993).

A lack of communication was not a major issue during the development approval process for the DYEC. All of the documents and reports for the project were made accessible to the public on the project website. This includes consultant reports such as, facility management plans, and environmental monitoring plans and reports. Complaint logs were also made available on the project website. These logs tracked every email and phone call made to York and Durham Regions that either complained or inquired about the DYEC. These logs allowed residents to read what complaints and inquiries had been made and follow up if they were dissatisfied by a response or lack there of. Logs of

comments made at public consultations and council meetings were also made available. The pubic was consulted prior to every stage of the project. They were consulted when the region decided to do a study on how to manage their residual waste. They were later invited to give input on which criteria should be used and prioritized when evaluating waste disposal technologies and potential sites. The public continued to be consulted at every milestone throughout the project. It is clear that a major effort was placed on ensuring there was sufficient public communication throughout this project.

While a lack of communication was not a problem during the project, Petts' theory suggests that it is a lack of 'effective' communication that spurs community opposition. While the public had plenty of opportunity to voice their opinions on the project, it was not necessarily the case that their opinions were given much weight. Public suggestions were frequently rejected not because they were not valid but because of aversions to adding to the cost of the project. While money is a significant consideration, it seems like it was frequently prioritized over other considerations such as public health. Prohibitive costs seemed to be the catchall scapegoat to ignore public suggestions. For example, in the previous chapter I discussed the public's criticism to a site being selected before the incineration technology. It was suggested that a technology be chosen first followed by a study on two potential sites in order to determine which would be more environmentally suitable for the facility. This suggestion was dismissed on the basis of cost. Another example, also found in the previous chapter is the public's criticism that the Region voted not to use ambient air monitoring around the incinerator. In this instance the consultants did give a more sound explanation as to why they did not recommend the use of that technology beyond simply stating that it would be too costly. Despite this explanation

from the consultants, members of the public made it clear that they felt the technology was important for their safety. The Region ultimately decided to accept the consultant's recommendations, while the public was left feeling that their concerns were not being addressed. Despite the Region's claims that there was not enough money in the budget to implement these types of suggestions made by the public, they still managed to find the money to throw a $75,000 party to celebrate the groundbreaking of the facility. This type of extravagant spending only grew the public's distrust.

Problems in the Decision Making Process:

The last factor leading to public opposition according to Petts are problems in the decision making process. Facility siting often follows the "decide-announce-defend" model, in which the public is only engaged after key decisions about the project have already been made (Ducsik 1981). Key decisions such as choosing the type of process and technology that will be used, site selection, as well as fundamental policy issues such as acceptable environmental and health standards (Petts 1994). Not only is the public excluded from participating in these key waste management decisions, those decisions are also being made by groups who they do not trust (Petts 1994). Miraftab argues that public participation processes create illusions of equality and the redistribution of decision-making power, when in reality it constrains what people can debate, how they do it, where they can do it, and when (Miraftab, 2004).

While the public had plenty of opportunity to comment before any formal decisions had been made, nothing they said seemed to affect the outcomes of the process. The decision makers made it clear how much they valued or rather did not value all the negative feedback they were receiving at council meetings. This was seen when Durham

Regional Council passed a motion that reduced the amount of time delegates were allowed to talk at council meetings and limited how often they could address council on a single topic. This event, which was discussed in greater detail in the previous chapter, reduced the public's opportunity to get involved in major decisions, which in turn minimized the effectiveness of the decision making process. Another flaw in the decision making process of the DYEC was the fact that the municipality's willingness to be a host for the facility was only a consideration to the final decision. Taking the position that they were an unwilling host would not have prevented the development of the facility. A motion was passed to change this at Durham Regional Council but the motion failed with only 3 out of the 28 councillors voting in favour of it. This motion would have put incinerators in line with the regulations for landfill development, which requires a willing host. With this major imbalance of power in the decision making process it is clear why the public felt the need to form rallies to protest the facility. Engaging with decision makers through the formal channels would have no bearing on the final outcome of the facility.

In this chapter I looked at Judith Petts' theory on the motivating factors behind incineration opposition. These factors are perceptions of risk, lack of trust, ineffective communication, and problems with the decision making process. After analyzing the arguments made by the DYEC opponents it is clear that these were in fact the motivators behind their actions. In the next chapter I will be looking at community engagement theory in order to find out how the engagement process could have been improved.

Chapter 6 - Community Engagement Theory:

In this chapter I will be looking at the community communications plan for the DYEC. I will first give an overview of the plan. I will discuss the planning theory that has inspired modern community engagement practices. This will be followed with an explanation of collaborative IAs and their use in the DYEC community communications plan. I will discuss the problems with modern community engagement practices. Finally, I will address the most prominent solution discussed in planning theory, which are democratic IAs with voluntary facility siting.

Overview of the DYEC Community Communications Plan:

In Ontario, project proponents are required to create a community communication plan as a condition of environmental assessment approval. These plans must include details on how information concerning the infrastructure development will be disseminated to interested members of the public. This information includes reports and records that were required to obtain project approval, details on the activities involved in the project, as well as information on the complaint protocols for the development. They must detail when public meetings will be held to discuss the design, construction, and operation of the project (The Regional Municipalities of Durham and York 2012). Community communications plans must also include a breakdown of the objectives it aims to achieve through the engagement process. The objectives of the DYEC Community Communications Plan are to convey that the two regions are dedicated to ensuring the safety and protection of human and environmental health; that they will continue to encourage and enhance waste diversion and recycling programs; that they are

dedicated to presenting factual information and engaging with the public and Aboriginal communities about the facility (The Regional Municipalities of Durham and York 2012).

In order to monitor the effectiveness of the plan the Region tracked all inquiries, comments, and complaints it received regarding the project. The areas of the project that were found to have received the most attention were reviewed periodically prior to construction of the facility in order to determine if there was a need to implement mitigation measures. Monthly complaint logs were posted to the project website detailing all of the complaints and inquiries related to the incinerator. (The Regional Municipalities of Durham and York, 2012) This was done to increase the Region's accountability by allowing the public to see what concerns had been voiced and to check on whether or not the Region had followed up on them.

Planning Theory That Inspired Modern Community Engagement Practices:

The use of 'environmental impact assessments' (EIA) in infrastructure development proposals is a product of rational comprehensive planning. Rational comprehensive planning, which is grounded in scientific rationalist theory, involves identifying a need, devising multiple solutions, using objective data to determine the most effective solution, and consulting with the public about the project (Healey 1992). These factors are all reflected in the required components of the EIA. The grounding in scientific rationalist theory has resulted in EIAs favouring quantitative methods and feedback loops to justify plans but the integration of public consultation shows a departure from purely scientific decision-making (Healey 1992).

Scientific rationalism was originally conceived as a progressive and democratic way to plan cities. The idea was that human happiness and welfare could be maximized by rationally making decisions using scientific knowledge (Healey 1992). Unfortunately, instead of being utilized for utilitarian purposes, scientific rationalism was used to justify putting the needs of capital before those of citizens or the environment (Healey 1992). For example, economic criteria were used to justify the development of large road projects. These projects were designed specifically to benefit industrial companies and those working in them but were not functional for other groups such the elderly, and disabled (Healey 1992). All decisions on how cities should be designed and therefore how people should live were made by groups of predominantly white middle class men who were considered "experts" (Rahder and Milgrom 2004). The people who the space was being developed for were not given an opportunity to contribute their voices to the discussion on how or what would be developed (Rahder and Milgrom 2004). These voices are often coloured by values and ways of knowing that are significantly different from those of the "experts" (Rahder and Milgrom 2004). For example, some groups may prefer to use moral or aesthetic discourses when deciding how to develop certain spaces instead of discourses surrounding maximizing capital. By excluding these voices, experts are failing to utilize a vast amount of knowledge from the decision making process (Rahder and Milgrom 2004).

The departure from pure scientific rationalism came about through the recognition that cities are comprised of complex interconnected systems (Webber 1963). One change

to a policy or a physical landscape, as would happen through the development of a large waste disposal facility, can potentially cause a domino effect of changes to the social, psychological, economic, and political environments in which it is placed (Webber 1963). These changes can have lasting influences on the welfare of the people who live there. With so many interconnected factors involved, comprehensive theorists understood that it would be impossible to gather perfect information on all possible effects of each development option (Webber 1963). On top of that, the groups and individuals that make up the general public tend to have competing interests. No plan could satisfy everyone and not many people are willing to make sacrifices for the public good (Webber 1963). This puts decision makers in a tough situation where they are asked to prioritize the interests of certain groups over others. In order to minimize social backlash, planners started being more open to the public about what was being considered in the decision making process and why (Webber 1963). This removed the veil of secrecy that had surrounded town planning. This openness also had the effect of making decision makers more accountable to the general public thus reducing the potential for corruption (Webber 1963). Additionally, planners started inviting the public to participate in forums that would give them an opportunity to voice their opinions regarding new developments (Webber 1963). In doing this planners were able to learn what social consequences the general public felt would arise as a result of certain decisions. (Webber 1963) The information received from public consultations could be used to adjust plans and provide decision makers with a means of justifying the approval of contentious developments (Webber 1963).

These inclusionary ideas were derived from communicative planning theory. On the contrary to scientific rationalism's expert driven approach to planning, communicative planning theory advocates building consensus between stakeholders (Watson 2002). Planners are charged with facilitating a forum that allows for the different groups to communicate their ideas to one another, put forward arguments in favour of their causes, and debate issues with the end goal of reaching consensus on a course of action. (Watson 2002) Communicative theorists argue that the planners should primarily be concerned with ensuring that the planning process is just and inclusive (Watson 2002). They claim that if the planning process is just, then the outcome of that process will be as well.

Communicative planning does not reject the use of reason. On the contrary, it claims that reason is necessary in order for people to sympathize with perspectives other than their own (Healey 1992). Unlike scientific rationalism that has a subject-object conception of reason (where individuals reason from their personal perspectives), Habermas argues that we need to shift our perspectives and instead form our reasoning within inter-subjective communication (Healey 1992). Doing this involves utilizing all the ways we come to acquire knowledge when choosing our actions, not just pure logic and knowledge that can be empirically gathered scientifically (Healey 1992). Ideas are validated through discursively established principles, which may be the same as those found in scientific rationalism, but is not necessarily the case (Healey 1992). It is those who participate in the dialogue who ultimately decide what information and types of knowledge should be considered relevant for the particular situation, and what actions

should be put forward in response (Healey 1992). In addition to this, Habermas stipulates that all claims must be assessed in terms of their, "comprehensibility, integrity, legitimacy, and truth" (Healey 1992). Agreements made as a result of argumentation in one situation at a particular time cannot automatically be applied to another at a different time. Claims must be re-validated and re-assessed and agreements revised. This is to avoid having the process of collective argumentation fall into a potentially dominatory consensus (Healey 1992).

Proponents of public participation report that it has a wide range of benefits to both the project itself and the host community as a whole. The inclusion of the voices from outside the project's team provides project managers more ideas to learn from, which can improve the design of the development (Lawrence 2013). It ensures that the EIA has a significant focus on stakeholder issues, which helps mitigate miscommunication and conflict between the public and the development team (Lawrence 2013). This in turn increases the public's support and acceptance of the project, which has the follow-up consequence of increasing the project's legitimacy in the eyes of the regulators who have approval authority (Lawrence 2013). The inclusion of public participation also makes the decision making process more transparent and thus less susceptible to lobbying by vested interest groups (Lawrence 2013).

The Use of Collaborative IAs in the DYEC:

The Durham York Energy Centre Community Engagement Plan was developed using a collaborative impact assessment process. This process was highly influenced by

communicative planning theory. Collaborative IA makes the public an active an ongoing participant in the development process. Its goal is to ensure that the public is provided information throughout the project and given a forum to voice their comments and concerns (Lawrence 2013). Collaborative IAs try to get the public involved early in the project as well as to get them involved in aspects of the project approval process that they have been traditionally left out of (Lawrence 2013). These aspects include IA screenings, scoping, and post approval decisions. Public concerns and comments are posted and responded to publicly, which in turn makes the project proponents more accountable and demonstrates to the public the impact they have had on the decision making process (Lawrence 2013). In addition to voicing their concerns, collaborative IAs give the public a forum to share their values, perspectives, and preferences with decision makers before final decisions are made (O'Faircheallaigh 2010). The public tends to understand the environmental and social conditions of their own communities better than outside consultants. This gives them greater insight into the potential impacts a new facility would have in their community and thus make them a great source of information for project proponents (O'Faircheallaigh 2010). Utilizing this type of high quality information in decision-making results in better and more effective decisions.

There are 5 main elements that make up collaborative IAs. Those elements are consultation, communications, mutual education, negotiations, and collaboration (Lawrence 2013). Consultation involves informing the public about project proposals and giving them the opportunity to express their views before any decisions are made (Lawrence 2013). Communications refers to the approach undertaken to reach out to

communities. For collaborative IAs the approach is one that advocates for capacity building and outreach. This is done by allowing the public to participate in a variety of ways to make it as easy as possible for them to get involved (Lawrence 2013). This generally means utilizing online forums as well as community meetings (Lawrence 2013). Communications also involve using several different forms of media to inform the public about current issues and involvement opportunities. Newspapers, radio, and online social media are potential options for reaching out to the public (Lawrence 2013).

Mutual education is an approach to community engagement where the proponents both educate and are educated by the public. The proponents educate the public on the regulatory and scientific aspects of a proposal and the public educates them with personal experimental knowledge (Lawrence 2013). Both forms of knowledge are given equal weight in the decision making process. Negotiations in collaborative IA practice can either be aided or unaided. If they are aided they will either utilize court litigation or they will use a form of alternative dispute resolution (ADR) (Lawrence 2013). ADR is a negotiation system where stakeholders voluntarily work together to find mutually acceptable solutions. Its goal is to resolve conflicts without resorting to litigation (Lawrence 2013). Opponents of a facility tend to want to avoid litigation because it is very costly and is often ineffective at helping them achieve their goals. Neutral mediators are usually used to assist parties in finding acceptable solutions but final decision making authority remains unchanged (Lawrence 2013). Finally, collaboration is something that is utilized throughout the entire process in order to find the best solutions that work for everyone (Lawrence 2013). One of the key facets of collaboration is the use of working

groups that brings members from all interested stakeholder groups together to resolve problems before, during, and after the development of the project (Lawrence 2013).

A collaborative IA process that is done properly will result in all stakeholders accepting the final outcome but not entirely happily (Lawrence 2013). It aims to find the middle ground that works for the majority, not one group or another. For example, project proponents would likely be happy that their proposal was approved but unhappy that they are being required to implement what they would consider to be rigorous and demanding environmental protection measures. Similarly, environmental groups would likely be happy that many of their concerns had been listened and responded to but feel like the final mitigation measures were still not entirely sufficient (Morrison-Saunders 2013).

Problems With Current Community Engagement Practices:

While it is widely acknowledged that public participation has many benefits some theorists believe that it is not being used to empower the public. Miraftab argues that the participatory processes put forward by comprehensive rationalism are ultimately used to push forward anti-democratic agendas (Miraftab 2004). The public consultation process only offers a very limited type of public participation. It reduces discussions surrounding empowerment to nothing more than conversations about increasing access to resources and economic gains for individuals (Miraftab 2004). It does not create a space for people to challenge the status quo and question the oppressive systemic structures that have played a large role in forming their current social and economic situations (Miraftab

2004). Public participation processes create illusions of equality and that power is being redistributed, when in reality it constrains what people can debate, how they do it, where they can do it, and when (Miraftab 2004). This effectively depoliticizes the public's understanding of how to become politically engaged (Miraftab 2004). It stabilizes old social hierarchies by solely focusing on individual empowerment thereby shifting attention away from systemically ingrained inequalities in the status quo (Miraftab 2004).

Critics of traditional community engagement practices argue that the fact that grassroots movements continue to emerge and fight for change despite the existence of sanctioned forums where they can voice their opinions makes it clear that this form of engagement is inadequate (Miraftab 2004). These critics would argue that the failure of this type of participatory process could be seen in the public's reaction to the proposed incinerator in Clarington. Various grassroots movements formed to protest the development of the Durham York Energy Centre. These groups formed picket lines, ran surveys to test whether the government's public approval statistics were valid, and gathered information about incinerator safety as they did not trust the information provided by the government (Gilligan 2011b). Critics would argue that had the public participation been successful people would not have felt the need to form opposition groups and become engaged outside of the sanctioned spaces.

Correcting Power Imbalances With Democratic IAs:

Power imbalances can be corrected by focusing IA practices on the analysis and management of community conflict. Rahder and Milgrom explain that overcoming

systemic biases requires replacing the concept of liberal justice with the concept of redistributive justice (Rahder and Milgrom 2004). Liberal justice essentially advocates helping those in need so long as it does not impact the rights or living conditions of those who are better off. Redistributive justice on the other hand threatens to shake up the status quo by removing capitalistic assumptions from the decision making process that give priority to certain groups' interests over others (i.e. homeowners having a greater stake in planning issues than tenants, who have a greater stake than the homeless) (Rahder and Milgrom 2004). It calls for the elimination of all hierarchical distinctions, such as that of professional and user (Rahder and Milgrom 2004). Within every community there are many people who have different needs and values that compete with one another. It is not the planner's role to judge whose needs should be prioritized or to decide on which option would best meet the needs of the community (Rahder and Milgrom 2004). Rahder and Milgrom argue that, "It is up to the planner to clarify and acknowledge the implications for different groups of people, and to help politicize the process". (Rahder and Milgrom 2004) This is not to say that planners should be impartial. On the contrary they should use their position as advisors to advocate for the disadvantaged in order to close the ever-increasing gap in social equality and promote social justice (Rahder and Milgrom 2004). All community members should have the opportunity to actively participate in the planning and design process. This is opposed to being relegated to commenting on the designs and plans created by professionals. Marginalized groups are more likely to get involved in political and social life when they actually see changes occurring within the city as a result of their contributions.

Democratic IAs aim to fix the power imbalances found in traditional IAs. Democratic IA processes are designed with the goal of building public confidence, trust, and acceptance of a project by increasing the public's influence and control over major decisions that directly affect them (Lawrence 2013). This process aims to give the public influence and control over not only the final decision but also the formulation, implementation, and evaluation as well (Lawrence 2013). Proponents of democratic IA believe that all citizens should have the opportunity to participate in and be equally influential in decision-making. If there are power imbalances that make a group less influential than another, it is the responsibility of those in power to correct that imbalance (Lawrence 2013).

In a democratic IA, members of the public who are most directly impacted by the proposed project and the locally elected politicians lead the IA process (Todd 2002). Alternatively, a team of ordinary citizens can lead the project without the active participation of politicians. They would act under the assumption that that they would likely receive political support if they manage to achieve broad public agreement on the plan they devised (Todd 2002). These teams work with the various stakeholders involved in the project to jointly solve problems, control the process, and reach decisions. IA practitioners collaborate with the lead team and other stakeholders and act as facilitators (Armour 1990). Committees and workshops are used throughout the entire duration of the project in order to reach and retain consensus as well as maintain contact and support from the broader constituencies (Lawrence 2013).

The first step when beginning a democratic IA process it to establish a task force comprised of affected stakeholders who would volunteer to manage the IA (Lawrence 2013). Once established the task force would begin the process by identifying the key values and principles they want to use to guide their recommendations. If members of the task force have highly divergent ideologies they would split up into two separate groups that would devise recommendations independently from each other (Lawrence 2013). They would then identify the major issues at hand, the available choices for managing the problem, and formulate strategies on how to best facilitate public and agency participation (Lawrence 2013). The task force will utilize the knowledge provided by the public and relevant agencies to develop a proposed action for the problem as well as a list of alternatives (Lawrence 2013).

Any proposed facility would be sited using a voluntary siting approach. Voluntary siting is a five-step process (Munton 1996). Any interested municipality has the right to back out of the process at any time. The first step involves putting out an open invitation to municipalities within a region to become a host community for the facility (Munton 1996). In order to volunteer a city council would need to pass a resolution of interest to host the facility. Proponents of the facility do detailed assessments on the soil, hydrology, and terrain within the volunteer communities to determine which sites are ecologically suitable for the project (Munton 1996). Many municipalities initially volunteer for the sole purpose of having these assessments done because the project proponent takes on the cost. They have no obligation to proceed further as site hosts, and the resulting documents are useful for local needs such as for zoning purposes (Munton 1996). The

second step is to form local advisory committees who are tasked with hosting open houses that would give the public a forum to ask questions about the facility and any potential risks (Munton 1996). A showing of strong opposition from the community could motivate local councils to rescind their initial expression of interest in hosting the project. Strong community opposition may also lead to the siting task force unilaterally deciding to drop the community from the facility siting process (Munton 1996). The third step involves the recommendation from the local advisory committee (Munton 1996). If the advisory committee gives a negative report then their community would be removed from the list of potential host cities (Munton 1996). The fourth step is to run a referendum within the eligible communities in order to concretely determine the public's support (Munton 1996). A negative vote in the referendum equates a local veto for the project. The final step in the process is to negotiate the terms of the siting (Munton 1996). The community's concerns and preferences provide the basis for these terms, which include risk mitigation, local benefits, and compensation policies and measures. Commitment to individuals and communities are formalized in accords and agreements (Lawrence 2013). The community even has an opportunity to back out at this late stage if they are not able to come to an agreement with the proponent on these terms (Munton 1996).

Once a site has been selected using a voluntary siting process the democratic IA continues with the evaluation of facility design options, facility operations plans, as well as facility closure and post-closure options (Lawrence 2013). The evaluation is done using traditional impact analysis techniques. If multiple task forces were formed, it is at this point that they come together with their findings and work to reconcile their

differences (Lawrence 2013). Once resolved the public task force then puts together an overall impact management strategy. This strategy is devised using an extensive knowledge base including technical studies, applied research, visits to comparable facilities as well as community and traditional knowledge (Lawrence 2013). The task force works on an ongoing basis to include perspective, interests, and preferences of the overall public (Lawrence 2013). The IA process proceeds to approval only when there is clear community acceptance. The approval process is determined with the aid of public participation (Lawrence 2013). The ample amount of collaboration throughout the project with the public should assure that the final proposal is widely accepted. In the situation that this is not the case, an appeal procedure to an independent review body will be made available for people to contest the facility (Lawrence 2013).

Analysis of Democratic IAs:

Democratic IAs have the potential to relieve all the motivators that drive public opposition. They are able to rebuild the public's lost trust in government through the redistribution of power. Building trust has the simultaneous effect of reducing the public's risk perceptions on incinerators. This is because they are more likely to accept reassurances from the government about the facility's safety. Democratic IAs ensure effective communication by making all voices in public discussions equal. This is opposed to the current system, where the opinions of "experts" or government officials are prioritized over those from the public. Democratic IAs will also improve the current decision making system by making major decisions, as the name suggests, more democratic.

One concern with the use of democratic IAs is the use of voluntary site selection.

While being voluntary makes the process seem more equitable than traditional practices, it is likely to put an even greater burden on the most disadvantaged communities. Affluent communities are unlikely to be tempted by the benefits and compensation awarded to host cities. The poorest communities on the other hand would see a major benefit from the compensation packages and volunteer primarily as a result of economic need. This would result in undesirable facilities that pose a known health risk (regardless of how big or small) such as incinerators and landfills being frequently sited near the most disadvantaged groups. While this is a valid concern, in practice it is not inevitability. Voluntary siting was used to site a hazardous waste facility near Swan Hills, Alberta in 1982 (Baxter 2007). Swan Hills was not a disadvantaged or vulnerable bargaining position when they passed the referendum to allow the siting of the facility. A study was done on the community 15 years after the development of the facility that found the residents of Swan Hills were still in favour of being the host for the facility (Baxter 2007).

In this chapter I looked at the community communications plan for the DYEC. I gave an overview of the plan and discussed the planning theory that has inspired modern community engagement practices. This was followed by an explanation of collaborative IAs and their use in the DYEC community communications plan. I proceeded to about the problems with modern community engagement practices. I concluded with a discussion on democratic IAs and voluntary facility siting.

In the next chapter I will be concluding the paper with a summary and some final thoughts about the lessons learned from this paper.

Chapter 7 – Conclusion:

Summary:

This paper focused on the development approval process for the DYEC in order to understand how communities are currently being engaged in Ontario for the development of incinerators. It was seen that communities are consulted at every stage of the project before any approvals have been given. Community members were invited to give input on their preferred waste management solution, the criteria that should be prioritized when deciding what technology or site to use, and were given the opportunity to respond to the consultant's recommendations and speak before council before any decisions were voted on. Despite all of the consultation, the development of the DYEC still faced a significant amount of controversy and opposition. This was mainly the result of problems in the decision making process. Despite the quantity of consultation, the public's opinions had no impact on the final decisions made by the Region. The decision to go ahead with the incinerator was not even deterred by a motion by Clarington Municipal Council to take the position that the city would be an unwilling host. The public's feeling that they were not being listened to made the public consultations ineffective and reduced the public's trust in the regulators. The goal of the public consultation was ultimately to alleviate the public's preconceived perceptions that incinerators pose a significant risk to human and environmental health. Doing this would have increased the public approval for the project. The consultations failed to achieve this goal because the public did not trust the government to listen to them or act in their best interest.

A viable solution to the above mentioned problems could be found in democratic

impact assessment theory. Democratic IAs aim to correct power imbalances in the decision making process by giving ordinary citizens the opportunity to take the lead on projects. Task forces work with communities, regulators and consultants in order to find an optimal solution to communal problems. It is the task force that puts forward the final recommendations to decision makers, not the "experts" (Lawrence 2013). Once a solution has been decided on, communities that are ecologically suitable for the project are then asked to volunteer to be a host. Citizens are then given the opportunity to vote on whether or not they want to go ahead with the development (Munton 1996). This process gives communities significantly more power than they currently have, which in turn will legitimize the process and produce general acceptance of the final decision.

Incineration can be a valuable part of a municipality's waste management solution so long as robust recycling and composting programs accompany it. The majority of dangerous incinerator emissions come from the products it burns. Proper sorting of the incinerator's feed can significantly increase the safety of the facility and ensure that valuable materials that can be recycled are preserved. As of September 2016, Durham Region's manager of waste planning and technical services, Gioseph Annello, announced that the Region was looking into developing a mechanical and biological treatment facility to sort recyclables and organics out of the waste stream heading to the DYEC (McNaughton 2016e). If developed this facility would be used to compliment the existing curbside collection programs the Region runs for recyclables and organics. It will add an extra level of protection to ensure the feed going into the incinerator is as safe as possible.

Final Thoughts:

I started this project trying to find out how to mitigate community opposition to contentious facilities. I now realize that is not a realistic goal. No amount of consultation will convince people to approve of something they do not want, especially when they feel that it is being forced on them. The goal of community communications plans should not be mitigating opposition but rather should be engaging communities to find optimal strategies for handling communal problems such as waste management or energy. When people trust a process and believe that they have a say in decisions they are less likely to oppose the outcome. A good example of this would be a political election. While it is unlikely that everyone will be satisfied with the final result, people usually accept it because they trust the process that brought them there. The encouragement the public receives to get involved in politics during election season and the power they have to effect outcomes needs to be ever present in public decision-making processes, especially for decisions on things that are generally seen as being undesirable.

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Appendix

Fig 1 – Site Visit Photos:

Fig 1.1 – DYEC Frontage and Emission Monitoring Billboard.

Fig 1.2 – Tipping Floor and Feeder

Fig 1.3 – Feeder Controller

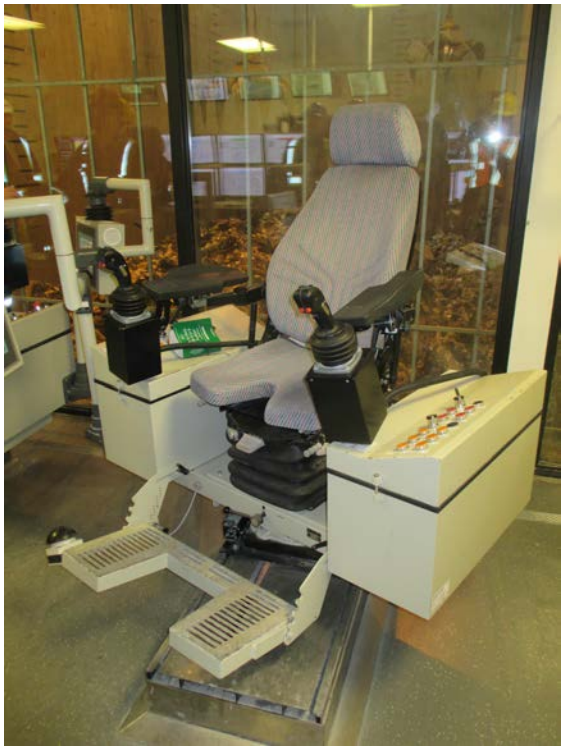

Fig 1.4 – Incinerator Control and Emission Monitoring Centre

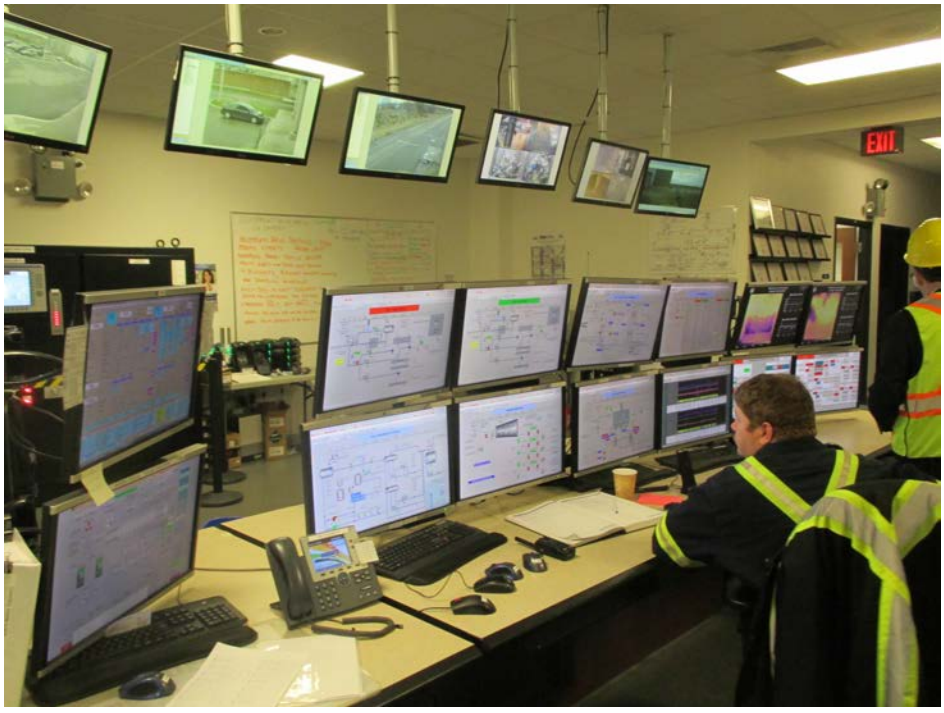

Fig 1.5 – Inside the DYEC

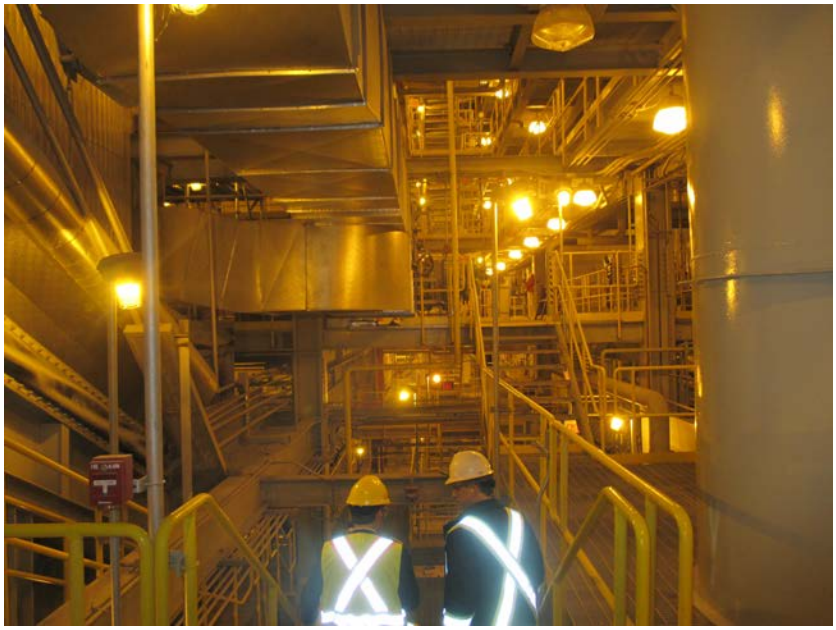

Fig 1.6 – Martin Grate System Boiler

Fig 1.7 – Incineration Viewing Window

Fig 1.8 – Bottom Ash Expeller

Fig 1.9 – Inlet Duct Sending Flue Gas to Emission Control System

Fig 1.10 – Fly Ash Hoppers

Fig 1.11 – Emission Monitor

Fig 1.12 – Pipes Sending Steam To Generators

Fig 1.13 – Switch Yard

Fig 1.14 – Bottom Ash

Fig 1.15 – Processed Fly Ash

Fig 1.16 – Recovered Ferrous Metals

Fig 1.17 – Recovered Non-Ferrous Metals

Fig 2 – Photos of Protests and PICs:

Fig 2.1 – CAW Sponsored Energy-From-Waste Public Forum (May 9 2007)

May 9 2007 Energy-From-Waste Public Forum. Digital Image. Durham Environment Watch. Accessed November 2016. http://www.durhamenvironmentwatch.org/photo_gallery.htm

Fig. 2.2 - First Anti-Incinerator Rally (July 30 2007)

July 30 2007 - 1st Rally Against Incineration. Digital Image. Durham Environment Watch. Accessed November 2016. http://www.durhamenvironmentwatch.org/July30_07Rally.htm

Fig 2.3 – Second Anti-Incineration Rally (September 4, 2007)

September 4, 2007 - 2nd Rally Against Incineration. Digital Image. Durham Environment Watch. Accessed November 2016. http://www.durhamenvironmentwatch.org/Sept4Rally.htm

Fig. 2.4 – Public Information Session (October 3, 2007)

October 3, 2007 – Public Information Session. Digital Image. Durham Environment Watch. Accessed November 2016. http://www.durhamenvironmentwatch.org/Oct3_07PIC.htm

Fig 2.5 – Public Information Session (October 9, 2007)

October 9, 2007 – Public Information Session. Digital Image. Durham Environment Watch. Accessed November 2016. http://www.durhamenvironmentwatch.org/Oct9_07PICCourtice.htm

Fig. 2.6 – Queen's Park Anti-Incineration Rally (May 13, 2010)

Queen's Park Rally. Digital Image. Durham Clear. Accessed November 2016. http://durhamclear.ca/taxonomy/term/33

Fig 2.7 – Queen's Park Anti-Incineration Rally (May 13, 2010)

Queen's Park Rally. Digital Image. Prevent Cancer Now. Accessed November 2016. http://www.preventcancernow.ca/queens-park-anti-incineration-rally-a-huge-success

Fig 2.8 – Protest at Durham Waste Fair (March 5, 2011)

March 8, 2011 – Clarington Citizens Protest Incinerator. Digital Image. Oshawa This Week. Accessed November 2016. http://www.durhamregion.com/news-story/3509858-clarington-citizens-protest-incinerator/

Fig. 2.9 – Protest at Incinerator Groundbreaking (August 17, 2011)

August 17, 2011 – Angry Protesters Disrupt Durham Incinerator Groundbreaking. Digital Image. The Toronto Star. Accessed November 2016. https://www.thestar.com/news/gta/2011/08/17/angry_protesters_disrupt_durham_incinerator_groundbreaking.html

Fig. 2.10 – Protest at DYEC Groundbreaking (August 17, 2011)

August 17, 2011 – Durham Breaks Ground on Controversial Incinerator. Digital Image. The Toronto Star. Accessed November 2016.
https://www.thestar.com/news/gta/2011/08/17/angry_protesters_disrupt_durham_incinerator_groundbreaking.html

Fig 3 – Chronology of Key Events Related to the DYEC:

Date:	Topic:	Public Outreach for PICs:	Number of PICs:
Dec 1999	Region Released The "Long Term Waste Management Strategy 2000-2010"		
Nov 2002	Keele Valley Landfill Closes		
2003	Durham begins shipping waste to Michigan		
2004	Durham began "Durham Residual Waste Study"		
Oct - Nov 2004	PIC - Introduced the Residual Waste Study and Ontario's EA Act	12 Ads Placed in Local Newspapers	8
Feb - May 2005	PIC - Notify public of alternatives available to manage waste, discuss the criteria for evaluating technologies and potential sites, and how the public should be consulted. (Used to develop the EA Terms of Reference)	25 Ads Placed in Local Newspapers and Local College Newspaper.	11
May 2005	York Region partners with Durham for the development of the residual waste study		

Date:	Topic:	Public Outreach for PICs:	Number of PICs:
May - Sept 2005	PIC - Discuss and obtain input on alternatives to manage waste and the methodologies and criteria for evaluating the alternatives during the EA study.	38 Ads Placed in Local Newspapers	11
Oct 2005	PIC - Obtain feedback from residents about the EA.	11 Ads Placed in local Newspapers	6
March 2006	PIC - Discuss possible solutions to the residual waste question.	**Unknown**	6
April 2006	Consultants began 30-day consultation period with public to review their draft report and submit comments.		
May 2006	PIC - Obtain feedback from the public about their preferred technology. Input received at these sessions determined that residents preferred thermal treatment.	60 ads ran from Feb 22 - May 8 in community newspapers, theatres, radio, major Toronto dailies, and buses in Durham and York Regions.	6
June 2006	Durham and York Regional Councils accepted the consultant's recommendation to build a thermal treatment facility.		

Date:	Topic:	Public Outreach for PICs:	Number of PICs:
Sept 2006	PIC - Obtain feedback on which criteria should be a top priority when siting a thermal treatment facility.	77 ads ran from Aug - Sept 2006 in community newspapers, theatres, radio, major Toronto dailies, and buses in Durham and York Regions.	6
March 2007	Consultants brought forth short list of 5 potential sites for incinerator.		
April 2007	PIC - Obtain feedback on the short list of potential sites.	10 ads ran from Mar 20 - April 10 in local newspapers, radio, and television.	4
June 2007	PIC - Give information on and receive feedback on the results of the 'Generic Human Health and Ecological Risk Assessment' (GHHERA)	7 ads were placed in local newspapers, and ongoing ads ran on local radio.	6
July 2007	First Anti-Incineration Rally outside of the Clarington municipal building		
Sept 2007	Anti-Incineration Rally in front of Durham Regional headquarters		

Date:	Topic:	Public Outreach for PICs:	Number of PICs:
Oct 2007	PIC - Notify the public of the consultants' recommended preferred site. Discuss the results and the evaluation process.	12 ads were placed in local newspapers and radio.	3
Jan 2008	Durham and York Regional Councils accepted the recommended preferred site for incinerator, Clarington, Ontario.		
Jan 2008	CAW hosts incineration public forum		
Jan 2008	Clarington declares itself an unwilling host for incinerator		
Jan 2008	Oshawa city council passes motion to reject incinerator		
Feb 2008	Anti-Incineration rally outside of Clarington Municipal Council Meeting		
Mar 2008	Pickering City Council passes motion to support Clarington's unwilling host status		
April 2008	Proposed emissions limits for incinerator released		

Date:	Topic:	Public Outreach for PICs:	Number of PICs:
Aug 2008	Regions put out RFP for the design, construction, and maintenance of the energy-from-waste incinerator.		
Feb 2009	Regions received RFP submissions from potential candidates.		
April 2009	Covanta Energy's chosen to be build/ operator of the DYEC.		
May 2009	Clarington rescinds unwilling host status.		
May 2009	Anti-Incineration Protest outside a Clarington municipal building and a second protest held outside Durham Regional headquarters.		
May 2009	PIC - Notify residents about the results of the further site specific studies completed for the EA.	Ads were placed in local newspapers	2
June 2009	Regional council approved the EA		
July 2009	EA submitted to the MOECC		
May 2010	Queen's Park Anti-Incineration Rally		
May 2010	Queen's Park Anti-Incineration Rally		
Nov 2010	The MOECC approved the EA		

Date:	Topic:	Public Outreach for PICs:	Number of PICs:
Dec 2010	Waste shipments to Michigan End		
March 2011	Protest at Durham Waste Fair		
July 2011	DurhamCLEAR files lawsuit over incinerator		
Aug 2011	Construction of the DYEC began		
Aug 2011	Protest at groundbreaking		
Dec 2011	Durham Council passes motion to reduce time and quantity delegates are allowed to speak at council.		
Aug 2012	DurhamCLEAR drops lawsuit due to insufficient funds.		
Feb 2015	DYEC Began Operations		
Dec 2015	DYEC fails emission testing.		
Jan 2016	Covanta's contract amended to allow them to produce more ash.		
June 2016	Ontario passes the 'Waste-Free Ontario Act		
July 2016	One of the DYEC's boilers had to be shut down after failing emission tests.		