

**FROM WASTE TO WORTH:**  
**THE ROLE OF WASTE DIVERSION IN**  
**THE GREEN ECONOMY**

Submission to the Ministry of the  
Environment Regarding the Minister's  
Report on the Waste Diversion Act 2002  
Review

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There is considerable merit to the ideas outlined in the document “From Waste To Worth: The Role Of Waste Diversion In The Green Economy, Minister’s Report on the Waste Diversion Act 2002 Review” (the Minister’s Report). The government should be commended for its commitment to foster a green and sustainable economy.

The Canadian Energy-From-Waste Coalition (CEFWC) supports the intent of both the Waste Diversion Act (the Act) and the Minister’s Report. The objectives are consistent with those of other international leaders that treat waste as a valuable resource when it is managed sustainably.

Our economy must protect and conserve natural resources while generating wealth and prosperity for Ontario, which is why we must do better for this and future generations than digging holes in the ground and burying our waste – for that is tantamount to burying our resources.

Indeed, the debate is about shifting our thinking from waste to worth. We look forward to working with the government as the process evolves.

## **1 Introduction**

Although the CEFWC applauds the intent of the Act and the Minister’s Report, we must also acknowledge, as you have, that the effort in Ontario to-date has been less than exemplary. A 22% recovery rate is one of the lowest in the developed world; even a 39% residential rate is poor by almost any standard, and a 12% recycling rate from work and recreational sources is a clear sign that the system is failing.

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Like you, the CEFWC is concerned that “the vast majority [of garbage/waste] is collected and carted away to landfills where it is buried forever,” and we concur that Ontario must do all it can to manage its waste through diversion, not disposal.

But you also acknowledge that, “today we face new challenges and opportunities, such as sustainable production and consumption, efficient use of resources, and addressing climate change.”

The Act and the Minister’s Report attempt to frame a discussion in these terms, understandably focusing on zero waste and extended producer responsibility (EPR), yet the Minister’s Report ignores the benefits of diversion technologies that successfully facilitate these challenges and opportunities in multiple jurisdictions around the world.

## **2 Errors of Omission**

In short, the Minister’s Report highlights the positive benefits of reduction, reuse, and recycling. It outlines some of the negative aspects to landfilling. Yet it fails to acknowledge the widely regarded and internationally recognized benefits of energy-from-waste (EFW). As a result, the intent of the Minister’s Report is unclear.

If EFW is to be considered a diversion technology only in terms of material recovery, then the Minister’s Report ignores the positive environmental attributes offered by EFW technology as the stage between recycling and final disposal, including increased recycling rates, greenhouse gas reductions, etc.

Every one of the jurisdictions held up as an exemplary model for Ontario to follow includes a significant utilization of EFW technologies in the context of an integrated waste management system. If EFW is considered by the government to be a final disposal technology this brings into question the credibility/objectivity of this Minister’s Report in that the case studies of progressive jurisdictions outlined here for public consumption do not offer full disclosure, failing to acknowledge the role that EFW plays in the jurisdictions cited.

The selective manipulation of these case studies tells only a partial, incomplete story, ignoring the high levels of public acceptance and program compatibility offered by EFW.

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In either case, by failing to recognize the energy value of residual waste, the Minister's Report is turning Ontario away from international best practices adopted in the most progressive and sustainable jurisdictions.

### **3 Waste Management and Climate Change**

Page 4 of the Minister's Report states that, "Recycling one tonne of paper would save enough energy to power the average home for six months...reducing greenhouse gases emissions by one tonne of carbon dioxide."

But elevating this argument to demonstrate the merits of recycling begs the question: If recycling one tonne of paper reduces greenhouse gas emissions by one tonne of carbon dioxide and processing one tonne of waste through an EFW plant results in one tonne of greenhouse gas reduction, why is one process considered inherently good and the other less so? Why attempt to extract every ounce of value from one system while diminishing the tremendous advantages offered by the other?

By comparison, an EFW plant can convert one tonne of trash into 750 net kilowatt-hours of electricity. A typical 2,000 tonne per day EFW facility generates about 60 net megawatts of electricity, which is enough energy to power about 60,000 homes.

There is no working example of a zero waste approach achieving perfectly calibrated results anywhere in the world, which means that zero waste is a laudable vision, even an admirable euphemism, but hardly a practical model for comprehensive and strategic waste management, particularly when it ignores and/or diminishes the proven benefits of EFW processes that enhance the environmental return for all material that cannot be managed in an optimum zero waste context.

To begin, we believe that the combustion of municipal solid waste (MSW) for energy recovery in energy-from-waste (EFW) facilities, whether of a mass burn or refuse derived fuel (RDF) design, should be considered both a waste diversion system and a renewable energy source, and we are deeply concerned about some of the assumptions implicit in the Minister's Report.

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EFW technologies satisfy all of the policy requirements typically advanced for diversion systems and as criteria for clean and renewable technologies.

- ≈ EFW facilities utilize proven equipment and processes, with 800 plants operating safely around the world.
- ≈ EFW is designated as a clean and/or renewable technology by the European Union, as well as by 25 US states.
- ≈ As the municipal solid waste (MSW) stream is up to 65% bio-genic, the vast majority of the feedstock is renewable.
- ≈ MSW is a renewable resource that displaces fossil electrical generation. In 2006, Canadians disposed of approximately 28 million tonnes of MSW, a ten-year increase of more than 23% and an annually average increase of 2.1%. This resource is generated every year in every community, yielding a virtually inexhaustible supply.
- ≈ Evidence around the world clearly shows that recycling rates increase in jurisdictions operating EFW plants, with US improvements ranging between 8-13% (in a country that already recycles almost 10% more waste nationally than Canada); European countries utilizing EFW technologies consistently have higher levels of recycling, including Germany, Sweden, the Netherlands, Austria, Belgium, Luxembourg, Switzerland, etc.
- ≈ EFW reduces greenhouse gases by approximately one (1) tonne for every tonne of waste processed.
- ≈ Each tonne of MSW is equivalent to one quarter tonne of coal or one barrel of oil, which means, for instance, that the city of Toronto is putting more than one million barrels of oil in the ground annually at an estimated “lost revenue” cost approaching almost \$100 million a year.
- ≈ Two independent reports from the US conclude that EFW in that country has the potential to produce each year between 49 and 91 billion kilowatt-hours of electricity - enough energy to power 4.5 to 8.3 million homes - while producing annual GHG lifecycle savings of 100 to 200 million tons of CO<sub>2</sub>E.
- ≈ Both US and EU regulators recognize that toxic emissions may exist in the most minuscule amounts (as in any waste or energy process), but these are generally at levels barely detectable with the most sophisticated equipment.
- ≈ Not only does EFW equipment meet all regulated standards wherever it operates, the technology continuously tracks and retains approximately 1,200 data points every second of every day, a level of reporting and transparency that is unavailable to almost every other form of waste and/or energy system.

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- ≈ Approximately one tonne of MSW yields ¼ ton of relatively homogeneous ash residue that occupies only 10% of the original MSW volume, thereby reducing by 90% the impact on land and water resources relative to traditional waste disposal practices. The residue is inert and does not decompose to form methane or organic toxics such as vinyl chloride or benzene.
  - ≈ Ash by-products continuously pass rigorous testing in every jurisdiction, thereby ensuring it is non-hazardous and safe for disposal and reuse.
  - ≈ Field tests show that metal levels in ash leachate are below drinking water standards and far lower than government toxicity criteria.
  - ≈ Through aggressive ferrous and non-ferrous metal recovery programs, EFW reduces the extraction of non-renewable resources from the mining sector, thereby limiting fossil fuel utilization and eliminating solid waste by-products.

The benefits outlined above are consistent with the stated intent of the Act, yet the Minister's Report fails to recognize these attributes with an appropriate diversion designation.

Moreover, extensive, properly accredited third party research exists demonstrating that the emissions from these technologies are safe and well within legislated limits. These include reports from American and European regulators; in fact, according to the US Environmental Protection Agency (USEPA), EFW is "a clean, reliable, renewable source of energy...with less environmental impact than almost any other source of electricity." These conclusions are supported by many prominent professional organizations, including the American Society of Mechanical Engineers (ASME) and the Solid Waste Association of North America (SWANA).

Commercially operating versions of EFW technologies have been generating electricity in production for more than five decades, and these technologies – whether in Europe, the US, or Asia - do not discharge environmentally harmful or unsafe levels of substances.

According to the Energy Recovery Council (ERC), EFW plants in the US have reduced 33,995,598 CO<sub>2</sub> equivalent tons of greenhouse gases since 1 January 2009. (See: <http://energyrecoverycouncil.org/>)

The performance of EFW technology is consistent with the goals of the Minister's Report in that it generates heat, steam, and/or electricity from a renewable fuel, thereby

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displacing non-renewable generation; reduces greenhouse gas emissions; has some of the lowest emission factors of any combustion-based energy source; reduces the amount of solid wastes going to landfill; mitigates the extraction of non-renewable resources; and reduces the impact on land and water.

In both the US and EU, EFW is a critical part of a low carbon energy future.

#### **4 Extended Producer Responsibility in Other Jurisdictions**

The Minister’s Report identifies a range of countries/states that utilize or have implemented EPR-based programs. The Minister’s Report describes these jurisdictions as “leading” and “progressive.”

Yet, the European Union, California, Minnesota, and Wisconsin (along with 22 other states) also extensively utilize EFW technologies, and recognize EFW as renewable energy.

##### States Defining Waste-to-Energy as Renewable in State Law

Alaska	Arkansas	California	Connecticut
District of Columbia	Florida	Hawaii	Indiana
Iowa	Maine	Maryland	Massachusetts
Michigan	Minnesota	Montana	Nevada
New Hampshire	New Jersey	New York	Oregon
Pennsylvania	South Dakota	Virginia	Washington
Wisconsin			

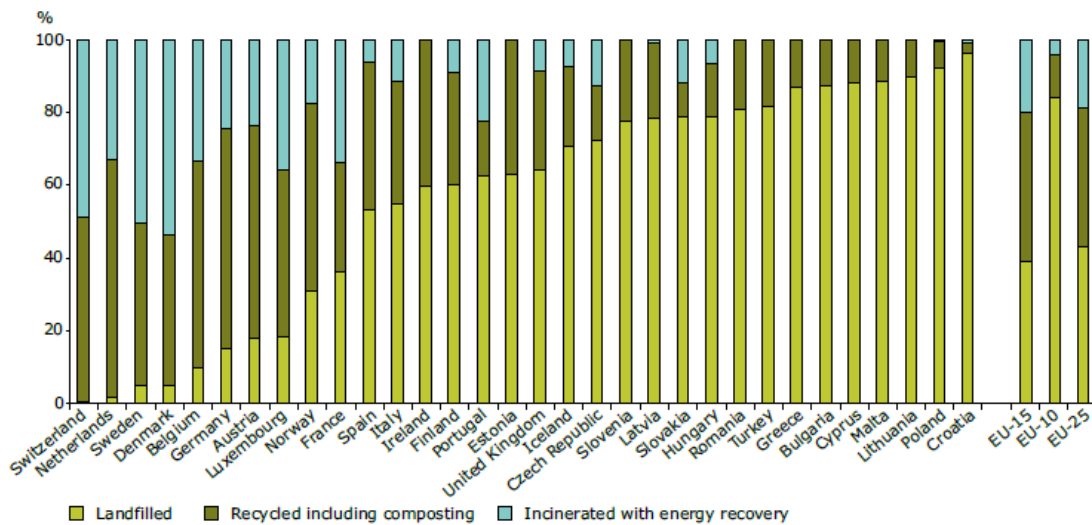
(See: <http://energyrecoverycouncil.org/userfiles/file/FactSheetState.pdf>)

Eighty-seven US EFW plants operating in these twenty-five states safely dispose of approximately 28.4 million tons of municipal solid waste per year (as much as all the Canadian waste going to landfill each year), recovering energy from household waste and generating approximately 17 million kilowatt-hours of clean, renewable energy per year - enough to supply an estimated two million homes. This accounted for approximately 20 percent of the nation’s non-hydroelectric renewable energy in 2006.

The Minister’s Report goes on to acknowledge the great recycling successes achieved in Austria, Belgium, Germany, and Sweden. And the discussion paper that preceded the Minister’s Report identified even more case studies of “leading” and “progressive” jurisdictions, including Germany, Japan, The Netherlands, Austria, the European Union, and California. Yet both documents failed to acknowledge that these jurisdictions have some of the highest rates of EFW utilization.

The chart below clearly shows that recycling and EFW are highly compatible.

**Figure 1. Allocation of MSW to recycling, Landfills and EFW as % of total**



Source: EEA-ETC/RWM calculation based on data from Eurostat, 2007d.

According to Dr. Nickolas Themelis of the Earth Engineering Center (EEC) at Columbia University, “Contrary to what opponents of EFW are saying, EFW does not compete but is complementary to recycling.”

Again, EFW is widely recognized as a net reducer of greenhouse gas emissions. A vast range of expert organizations recognize the greenhouse gas mitigation potential of EFW, including the World Economic Forum, the Intergovernmental Panel on Climate Change (IPCC), the United Nations Framework Convention on Climate Change (UNFCCC), the European Union and the European Environmental Agency, the Global Roundtable on Climate Change (GROCC) convened by Columbia University’s Earth Institute, and the U.S. Conference of Mayors.

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EFW facilities in developing countries are eligible to generate tradable greenhouse gas credits under an approved Clean Development Mechanism (CDM) methodology. These credits can be used by countries in the European Union to meet their Kyoto commitments.

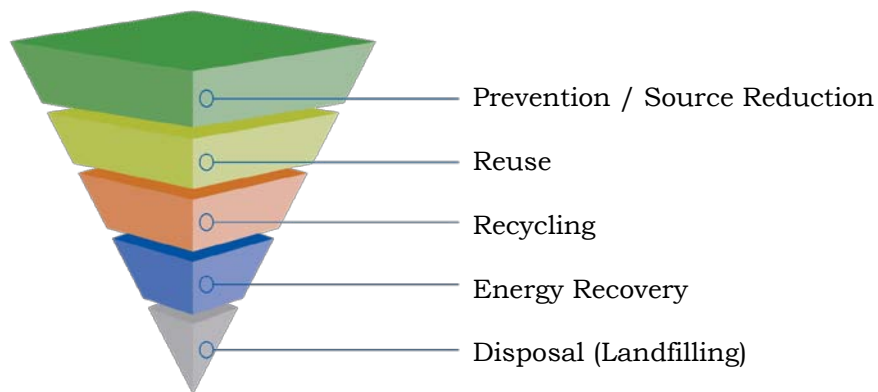
It is also worth noting that the UK Health Protection agency has concluded that there are no measurable health risks from living in close proximity to an EFW plant. (See: *The Impact on Health of Emissions to Air from Municipal Waste Incinerators*, UK Health protection Agency, September 2009)

More to the point, each of the jurisdictions highlighted in the Minister's Report publicly recognize in policy and legislation the productive and functional inter-relationship between EFW technologies and the effectiveness of EPR and recycling. Public acceptance for the technology in Europe, the US, and Asia is also extremely high.

### **5 Integrated Waste System**

The Minister's Report has omitted any discussion of the internationally-recognized Integrated Waste Management Hierarchy (IWMH).

**Figure 1. US EPA and European Union Waste Hierarchy**



This tool recognizes reduce, reuse, and recycling as priorities, followed by energy recovery and then landfill. It is commonly used in Europe to guide policy choices. It acknowledges zero waste as a legitimate vision, but it also recognizes that additional processes are required to manage residual materials before final disposal. Even the most recent European waste framework directive has up-graded the IWMH to treat EFW

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facilities with a certain energy factor (which all new installations are able to do) as recovery comparable with material recycling.

More recent iterations of the IWMH utilized in the US and EU employ an expanded perspective, which includes anaerobic and aerobic composting for source separated organics as a step before energy recovery, as well as “methane recovery and utilization” followed by “methane recovery and flaring” as important steps prior to “landfill without methane recovery.”

While the CEFWC recognizes that the Minister’s Report is intended to focus on the first part of the hierarchy - reduce, reuse and recycle - undertaking such a narrow discussion overlooks the proven diversion potential of viable energy recovery systems.

According to Bettina Kamuk of Ramboll Engineering in Denmark, “There is a huge gap between considering EFW as waste treatment only and the way of thinking in the recent EU waste framework directive where waste is also considered a resource.”

Again, according to Nickolas Themelis of Columbia University, “It is evident that the Ontario Ministry of the Environment is several years behind the USEPA. Until about 2003 the USEPA also lumped EFW with landfills as “Disposal.” But as a result of consultations with the Earth Engineering Center (EEC) of Columbia University and the Integrated Waste Services Association (now the Energy Recovery Council (ERC)), the EPA now shows “Combustion with Energy Recovery” in a different row and higher up than “Landfilling” in their Facts and Figures. In 2008, the EEC proposed that the EPA adopt the “Expanded Hierarchy of Waste Management (as described above) that distinguishes between landfills that collect landfill gas (LFG) and those that do not. The EPA will now show this IWMH in their new web page on energy recovery from MSW.”

## **6 Clarifying the Concept of Diversion**

It is important that the Minister’ Report clarify the concept of diversion to allow a wider range of processes and technologies to be used to meet diversion requirements and encourage innovations.

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It is appropriate that the Act should focus on diversion systems beginning with reduction, reuse, and recycling. However, it is unclear (and unexplained) why material recovery should be the sole standard for measuring EFW processes when these highly sophisticated systems offer so many positive environmental attributes that support the objectives laid out in Minister's Report.

Expert consensus is that the most successful implementation of reduction, reuse and recycling may achieve approximately 70% diversion, which is why the government must recognize the need for additional process to manage/treat the remaining 30% of the waste stream. It is possible to dispose of this material without further treatment, but it is a much better approach – one that is consistent with Act and the Minister's Report – to focus on processes that further enhance the 3Rs.

In short, EFW is a diversion technology that enhances the reduction, reuse, and recycling priorities.

First, EFW technologies reduce the amount of waste going to final disposal by up to 90%.

Second, EFW technologies re-use waste products – garbage – for the efficient generation of electricity, heat, and steam. Furthermore, the final by-product of the process – ash – is often reused as road bed material, landfill cover, and/or a concrete substitute. Even fly ash can be chemically altered to serve the same function as road salt. When ash is re-used in this way the final amount of waste going to landfill is reduced by more than 95%.

Finally, EFW technologies recycle material more effectively. Of course, material separation is critically important at the front-end, yet studies in the US and Europe demonstrate that recycling rates increase between 5-13% in jurisdictions operating EFW plants. Furthermore, EFW recovers significant amounts of recyclable material at the back-end of the combustion/conversion process, thereby enhancing the results of front-end recycling programs. In fact, Metro Vancouver collects approximately \$1 million each year from ferrous and non-ferrous metals recovered after the EFW applications. These are resources/revenues that would otherwise be lost in every other stage of the waste management hierarchy, and ultimately would be buried forever in the massive Cache Creek landfill two hundreds miles away.

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After these secondary 3R processes within an EFW application, less than 5% of the waste stream remains for final disposal, as opposed to 30% after the primary 3R treatments.

In addition, whereas the first three stages on the waste hierarchy offer avoided costs, and final disposal represents real costs, the “fourth R” – recovery - represents a revenue source. For instance, Metro Vancouver generates approximately \$10 million in revenue from its EFW plant, while their landfill operations cost the municipality approximately \$30 million; this \$40 million delta is an amount that puts the municipality on much firmer financial footing.

As the Minister’s Report stands, if thermal treatment plants are only given credit for diversion for the portion of the waste that is recovered and reused after combustion, then the benefits of diversion are limited to metal and non-metal recovery, unless the operator is also able to divert the balance of the bottom ash.

Yet the logic behind this is difficult to follow since digesting garbage for methane production will likely count as diversion, as will making fuel pellets, yet both of these processes are just intermediate steps in another type of combustion system.

The logic is even more troublesome because failing to recognize the energy value in a highly regulated EFW plant while treating these other processes as diversion will surely lead to thousands of small combustion systems with limited emission controls.

For these reasons, EFW – whether it be combustion or conversion - is a diversion technology that utilizes renewable resources, and it should be recognized as such by the Ontario government – regardless what other policies are adopted vis-à-vis the Act and Review.

### **7 Supporting Producer Responsibility and Diversion**

CEFWC supports source separation as an essential precondition to use of EFW. CEFWC supports the use of diversion targets and landfill bans. Indeed, we would also welcome/support a ban on certain designated material for EFW plants, such as electronic waste.

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We recognize that the Minister's Report may recommend implementing a disposal levy to narrow the gap between the cost of diversion and disposal, which may shift behaviours toward greater diversion, while using the revenue to support the waste diversion efforts of businesses, consumers, and municipalities.

On the issue of disposal levies, we urge careful consideration before using this blunt economic instrument.

Of course, the EFW industry would prefer that there be no levy on EFW processes that meet state of the art environmental standards and achieve a reasonable standard of conversion of waste to energy

However, CEFWC recognizes that certain benefits could accrue from a properly designed system of levies. We recommend a graduated scale that reflects the relative benefits inherent in the IWMH.

This means that each level of the IWMH may be subject to a different, escalating levy based on environmental impacts. This is the approach adopted in Europe. The UK employs an escalating landfill surcharge while recognizing the environmental attributes of EFW by allowing these facilities to qualify for a significant Renewable Obligations Certificate, which provides significant revenues for each MWh of energy produced. France uses a levy of 15 Euro per ton for landfill that will go to 40 Euro per ton in 2015. The levy on EFW treated waste is 5 Euro now to go to 15 Euro in 2013. This recognizes the value of thermal treatment while still giving an incentive for reduction prior to EFW.

According to Columbia University's Professor Themelis, "It is pointless to put a levy on both landfill and EFW as if they are one and the same thing. Since it has been proven time and again that EFW is environmentally superior to landfill, the levy should be on landfilling so as to encourage the building of more EFW capacity."

If the Minister's Report is to recommend a levy as the preferred option, then it should also recognize the secondary 3R attributes inherent in EFW applications, thereby requiring such a levy to apply only to the bottom and fly ash portions that are sent to disposal.

After all, the utilization of EFW technologies eliminate all of the problems identified related to landfill (methane generation, potential for ground water contamination, need

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for long term monitoring, legacy costs, etc.), and should therefore be subject to a much lower levy.

The Minister's Report suggests that burning waste without material recovery for reuse is not diversion, yet both the energy ministry and the environment ministry promote the combustion of biomass as renewable energy.

Since the feedstock in an EFW plant is 55-65% biogenic, and therefore renewable, and is recognized as such in Europe and in 25 US states, therefore, at the very least, the biomass portion of the waste should be treated as a clean, renewable resource, and therefore not count toward the levy.

Again, there is a profound lack of logic in promoting the burning of clean or freshly harvested biomass for power generation, but not the biomass that has already been re-used and is now part of the waste stream. GOOD LINE AND COULD BE MOVED UP IN THE SUBMISSION, PERHAPS UNDER THE GHG SECTION?

Moreover, EFW facilities should be allowed to acquire and retain carbon credits for the displacement of fossil fuels.

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## **8 Conclusion and Recommendations**

The Minister's Report states that "municipalities have benefitted from increased recycling, including extending the life of landfills because less waste is sent for disposal, and reducing climate change impacts from collection and processing of organics." If such an argument explains the intuitive benefits of recycling, how can the same argument be ignored when EFW delivers the same benefits in a parallel and compatible process?

Having said this, the CEFWC is pleased to respond to the Minister's Report and would like to close with the following recommendations:

- ≈ That the MOE provide full-disclosure related to the selected case studies, acknowledging that EFW in the context of an Integrated Waste Management Hierarchy is a profoundly important part of waste planning in the world's "leading" and "progressive" jurisdictions; also that EFW is subject to high levels of public acceptance in these countries/states; and also that EFW is highly compatible with aggressive recycling programs.
- ≈ That the MOE recognize the energy value of residual waste, because by failing to do so the Minister's Report is turning Ontario away from international best practices adopted in the most progressive and sustainable jurisdictions.
- ≈ That the MOE clarify the concept of diversion to allow a wider range of processes and technologies to be used to meet diversion requirements and encourage innovations, maintaining a high priority on reduction, reuse, and recycling, but also recognizing the positive environmental attributes of EFW.
- ≈ That the MOE designate the combustion of municipal solid waste (MSW) for energy recovery in energy-from-waste (EFW) facilities - whether of a mass burn or refuse derived fuel (RDF) design - as a waste diversion system.
- ≈ That the MOE designate the combustion of municipal solid waste (MSW) for energy recovery in energy-from-waste (EFW) facilities - whether of a mass burn or refuse derived fuel (RDF) design - as a renewable energy source.

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- ≈ That the MOE adopt the Integrated Waste Management Hierarchy (IWMH) - not zero waste - as the most fundamental, internationally-recognized model related to long-term waste management planning.
  - ≈ That the MOE augment the Waste Diversion Act 2002 with a comprehensive solid waste management plan that recognizes environmentally preferable management practices such as EFW for the waste remaining after recycling.
  - ≈ That the MOE develop and implement a clear and concise diversion accounting methodology and specific municipal solid waste targets that focus on accurately and consistently tracking performance.
  - ≈ That the MOE consider impose no levy on EFW processes, that meet state of the art environmental standards and achieve a reasonable standard of conversion of waste to energy.
  - ≈ That in the alternative, the MOE, should impose levies on all waste management technologies/systems based on a graduated scale that reflects the relative benefits inherent in the IWMH, particularly on EFW by-products and management practices that beneficially reuse and/or divert residual waste material:
    - ≈ impose the levy is such as way that it recognizes the secondary 3R attributes inherent in EFW applications, thereby requiring such a levy to apply only to the bottom and fly ash portions that are sent to disposal.
    - ≈ impose the levy is such as way that it recognizes the feedstock in an EFW plant is 55-65% biogenic, and therefore renewable, so the biomass portion of the waste should be treated as a clean, renewable resource, and therefore not count toward the levy.
  - ≈ That the MOE support allowing EFW facilities to acquire and retain carbon credits for the displacement of fossil fuels.
  - ≈ That the MOE accept our request to meet in order to discuss the merits of this submission in further detail.

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The Minister's Report states, "We are looking to design a waste diversion framework whose benefits will be felt for years to come. It is an undertaking that must transcend short-term concerns. We know that if we are going to get it right, we have to reflect a wide range of views and concerns."

The CEFWC believes that the recommendations above will play an important role in satisfying these goals.

The Canadian Energy-From-Waste Coalition (CEFWC) represents industry, associations, and other stakeholders committed to sustainable environmental policies. We stand for the promotion, adoption, and implementation of energy-from-waste (EFW) technology for the management of residual materials within the context of an integrated solid waste management system. Recognizing that EFW solutions are compatible with proactive recycling and other diversion efforts, the coalition seeks to promote the merits of the thermal treatment of waste to recover energy and garner support for waste derived fuels.

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