



## Climate Change and Waste – The Missing Link

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Strategies being used to mitigate climate change in Canada are largely focused on curtailing emissions from energy production: energy efficiency improvements; developing renewable energy; carbon capture and storage; and regulating transportation emissions. Considering that 80% of Canada's total greenhouse gas (GHG) output is associated with the production and consumption of energy from fossil fuels<sup>1</sup>, these strategies target the largest source of GHG emissions and should continue to be implemented. However, measures targeting the systems that are responsible for using this energy, such as the provision of goods, have been largely neglected. Implementing programs that affect what is produced and with what kind of materials, such as waste management programs, can have significant impacts on GHG emissions and should be integrated into climate change policy.



### How does the provision of goods affect climate change?

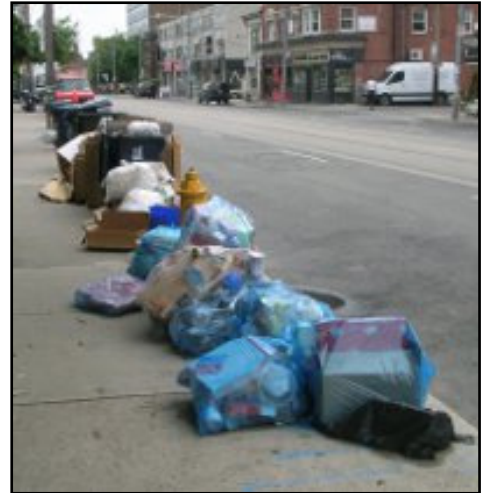
A recent report released by the United States Environmental Protection Agency, *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*, highlights the impacts of different systems on GHG emissions, instead of sources. It found that 29% of the total GHG output in the US was from the provision of goods.<sup>2</sup> A white paper released by the Product Policy Institute further amplified this figure to 37% by considering the impacts of products that are produced abroad and consumed in the US.<sup>3</sup> This link between climate change and materials management is blatantly absent from most of the climate change discourse at the political level. If over one third of our total GHG emissions come from providing goods to people, strategies should be aimed at affecting how this contributes to climate change. Even though Canada and the US have different economies and geographies, this report clearly points to the need for the integration of materials management policies and measures to mitigate climate change. More specifically, effective waste management practices have the potential to significantly reduce our GHG emissions.

### What does waste have to do with the release of greenhouse gasses?

The generation of waste impacts GHG emissions both directly and indirectly:

- Directly, much of the waste that is disposed of in landfills decomposes, resulting in the release of both methane and carbon dioxide. In 2008, 20 million tonnes of CO<sub>2</sub> equivalent (eq.) were released from the disposal of solid waste on land. This is 2.7% of Canada's total GHG output.<sup>4</sup>

- Indirectly, waste policies can impact decisions made all the way up the supply chain, where GHG emissions are generally more significant. For example, using recycled content in products instead of virgin materials usually results in less GHG emissions over a product's life cycle.



### Extended Producer Responsibility

Extended Producer Responsibility (EPR) is a waste management framework that seeks to shift the responsibility for managing the end-of-life of a product from the government and taxpayer to those in charge of designing and producing the product. The theory is that if a producer is burdened with the cost of disposing a product at the end of its life, it has an incentive to design the product for recyclability or reusability as well as to reflect the environmental cost of the product in its prices.

EPR has already gained widespread support in other jurisdictions, such as Europe, because of its ability to efficiently increase recycling rates while reducing waste management costs for governments. Few jurisdictions, however, currently employ EPR as a means to combat climate change. There are two ways EPR programs can reduce GHG emissions:

- Increasing recycling rates: Recycling more materials means less virgin resources are being used in manufacturing processes. All of the GHGs that would have been released from extracting and refining the resource are avoided. Although some GHGs are released by transporting and processing recycled materials, there is almost always a net benefit over the use of virgin resources. Also, more recycling means that less waste ends up in landfills, decreasing landfill emissions. The table on the right estimates the net benefit of recycling different types of products and materials as opposed to landfilling. It should be noted that recycling paper products both saves GHG emissions



that would have been generated from cutting and processing trees as well as allows trees to continue to act as carbon sinks.

Material	tonnes CO <sub>2</sub> eq. avoided per tonne material recycled
Newsprint	1.53
Fine Paper	4.38
Cardboard	3.55
Aluminum	6.50
Steel	1.19
Copper Wire	4.11
Glass	0.11
HDPE	2.28
PET	3.64
White Goods	1.47
Personal Computers	1.61
Televisions	0.24
Tires	3.30

Source: ICF Consulting (2005)  
*Determination of the Impact of Waste Management Activities on Greenhouse Gas Emissions, Contract No. K2216-04-0006, prepared for Environment Canada and Natural Resources Canada*

- Influencing upstream design: Making the producer responsible for the end-of-life of a product provides an incentive to design products that are easier to reuse or recycle. Also, recycling targets can be set and restrictions can be placed on the types of materials used in products. For example, there could be a requirement for a certain level of recycled content in each new product sold. All of these factors can work to reduce our GHG output.

### **Increasing Recycling Rates in Sweden and the EU27**

Sweden has implemented one of the most successful programs in the world for managing waste electrical and electronic equipment (WEEE). In 2009, Sweden achieved a WEEE recycling rate of 15.85 kg/capita.<sup>5</sup> This compares to 1.3 kg/capita for Ontario's WEEE program after its first year of operation. Since Sweden's WEEE program has been in operation for much longer than any Canadian program, it can provide insight into the kind of recycling rates that can be achieved for products not yet included in any Canadian programs, the largest group being white goods - mainly refrigerators, freezers, stoves, dishwashers and washing machines. In 2009, Sweden recycled 6.7 kg of white goods/capita.<sup>6</sup> In Canada this would translate into 0.22 million tonnes of white goods. Using the above table, this would deliver a savings of 0.33 million tonnes of CO<sub>2</sub> eq. White goods constitute a tiny segment of the overall waste stream.



Recycling rates in Europe are significantly higher than in Canada. In 2004, Canadians diverted just 24% of the country's waste stream,<sup>7</sup> compared to 37% in the 27 European Union countries (EU27)<sup>8</sup>. Although many factors can be attributed to this difference, the prevalence of EPR programs is definitely one of them. It is estimated that EU27's recycling rate is preventing 158 million tonnes of CO<sub>2</sub> from being emitted into the atmosphere.<sup>9</sup> This represents 3.0% of the total amount of CO<sub>2</sub> released in EU27 in 2006.<sup>10</sup> If the recycling rate in Europe were increased to 50%, this would eliminate an additional 89 million tonnes of CO<sub>2</sub>, or 1.8% of the total. If a similar correlation can be achieved in Canada, we have the potential to see significant reductions in GHG emissions by increasing our recycling rates.

### **Upstream Design Changes in Germany and the EU27**

In 1991, Germany became the first country in the world to introduce legislation making producers responsible for the recycling and recovery of sales packaging. Through effective pricing and operation, the German government has been able to influence the materials used in packaging to be more recyclable, decrease the total amount of packaging sold into the German market, and divert more packaging away from landfills. In 2009, Germans prevented 2.75 million tonnes of used packaging from going to landfills, avoiding 1.5 million tonnes of CO<sub>2</sub> eq. and 60 billion megajoules of energy.<sup>11</sup>

The success of the German program led to the establishment of an umbrella organization to assist all European Union countries in employing their own producer responsibility programs for packaging:



Packaging Recovery Organization Europe (PRO Europe). In 2008, members of PRO Europe recycled or recovered 32 million tonnes of packaging material resulting in the reduction of 25 million tonnes of CO<sub>2</sub> eq.<sup>12</sup> Note that this does not include the impact of reducing packaging and using more recyclable content.

***EPR programs have been proven to reduce GHG emissions through higher recycling rates and upstream design changes***

### **Policy Options for Canada**

There is a major divide between provinces and the federal government on what emission targets should be set and on how these targets should be reached. The Government of Canada has committed to reducing our GHG output by 17% from 2005 levels by 2020. This would mean our total GHG output would have to decrease from 734 million tonnes to 607 million tonnes of CO<sub>2</sub> eq. Most provinces have more ambitious targets, but to achieve even the Federal government's modest goal, all levels of the government need to work together to implement and harmonize climate change policies.

Canadian governments would benefit from using successful EPR programs as models for how effective waste management policies can impact GHG emissions. Some provinces already have EPR programs running and more are set to launch in the near future. Federally, the Canadian Council of Ministers of the Environment (CCME) has also taken steps to promote EPR, releasing a Canada-wide Action Plan for EPR and Strategy for Sustainable Packaging. These are steps in the right direction; however, governments have not yet integrated EPR programs into their climate change policies, nor targeted systems that release GHG emissions, such as the production of goods.

Although provincial and municipal governments are responsible for waste management, the Federal government can support EPR programs through a variety of tactics. It can assist provinces to develop EPR programs for specified products. It can set internal government procurement guidelines using certain criteria, such as a required amount of recycled content for government projects. It can provide incentives to stimulate the development of a recycling industry. It (or the Canadian Council of Ministers of the Environment) can establish not-for-profit organizations to help guide and harmonize the development of EPR programs across the country. Once EPR programs are running, the Federal government can use municipal or provincial recycling targets to incorporate expected GHG savings into the overall plan to reduce GHG emissions.

Targeting GHG emissions from the provision of goods should not be done solely through EPR programs, however. Rather, the overall life cycle of goods should be evaluated, so the best and easiest opportunities to reduce GHG emissions can be identified and exploited. In some cases, it might be more

effective to set energy efficiency standards, as has been done through the federal *Energy Efficiency Act* and recent vehicle emission standards.

For Canada to achieve its modest goal of only releasing 607 million tonnes of CO<sub>2</sub> eq. per year by 2020, it needs to use every policy tool at its disposal, including EPR.

### Areas of Further Research

- The link between EPR programs and their impact on GHG emissions needs to be better understood
- A general framework for prioritizing and qualifying products for EPR programs needs to be developed for Canada using life cycle analysis
- The cost of mitigating climate change through waste management strategies should be compared against other methods to evaluate its cost competitiveness
- Trade-offs between minimizing a product's impact at its end-of-life and minimizing impacts during other stages of its life cycle need to be better understood so that environmental impacts can be minimized

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<sup>1</sup> Government of Canada (2010). *Canada's Action on Climate Change, Greenhouse Gas Emissions*. Available from: <http://www.climatechange.gc.ca/default.asp?lang=En&n=21654B36-1>. [Accessed: 15 November 2010]

<sup>2</sup> U.S. Environmental Protection Agency (2009), *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. Available from: [http://www.epa.gov/oswer/docs/ghg\\_land\\_and\\_materials\\_management.pdf](http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf).

<sup>3</sup> Joshua Stolaroff, Product Policy Institute (2009). *Products, Packaging and US Greenhouse Gas Emissions*. Available from: [http://www.productpolicy.org/ppi/attachments/PPI\\_Climate\\_Change\\_and\\_Products\\_White\\_Paper\\_September\\_2009.pdf](http://www.productpolicy.org/ppi/attachments/PPI_Climate_Change_and_Products_White_Paper_September_2009.pdf)

<sup>4</sup> Environment Canada (2010). *A Summary of Trends: 1990-2008*. Available from: <http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=F1CA74A6-1>. [Accessed November 15, 2010]

<sup>5</sup> El-Kretsen, *Annual Report 2009*. Available from: [http://www.el-kretsen.se/sitespecific/elkretsen/files/dokument/el-kretsen\\_arsberattelse\\_2009\\_engelsk.pdf](http://www.el-kretsen.se/sitespecific/elkretsen/files/dokument/el-kretsen_arsberattelse_2009_engelsk.pdf).

<sup>6</sup> *Ibid.*

<sup>7</sup> Statistics Canada (2004). *Waste Management Industry Survey: Business and Government Sectors*. <http://www.statcan.gc.ca/pub/16f0023x/16f0023x2004001-eng.pdf>.

<sup>8</sup> European Environmental Bureau (2008). *How recycling can fight climate change – leaflet*. Available from: <http://www.eeb.org/EEB/?LinkServID=6EB76766-9070-0C83-F90D7931DAAB4D67>.

<sup>9</sup> *Ibid.*

<sup>10</sup> European Environment Agency (2010). *Annual European Union greenhouse gas inventory 1990 – 2008 and inventory report 2010*. Available from: <http://www.eea.europa.eu/publications/european-union-greenhouse-gas-inventory-2010>.

<sup>11</sup> Der Grüne Punkt – Duales System Deutschland (2010). *Facts & Figures*. Available from: <http://www.gruener-punkt.de/en/corporate/company/facts-figures.html>. [Accessed November 15, 2010]

<sup>12</sup> Packaging Recovery Organization Europe (2010). *Position Paper on Contribution of Packaging Recycling and Optimisation to reducing Climate Change*. Available from: [http://pro-e.org/files/10-02\\_Climate-Change.pdf](http://pro-e.org/files/10-02_Climate-Change.pdf).