

Sustainable Waste Management

By: City of Edmonton, Waste Management Branch

Background on Edmonton's Waste Management System

Sustainable waste management protects human health, property, and the environment, and conserves valuable natural resources. An environmentally sustainable waste management system will help protect future generations from environmental degradation and associated financial burdens.

Waste management is a critical issue for growing municipalities worldwide because:

- improper waste management can cause environmental and health problems,
- the decomposition of some wastes produces greenhouse gases, which contribute to climate change, and
- if not managed effectively, it can be costly to manage waste disposal sites for future generations.

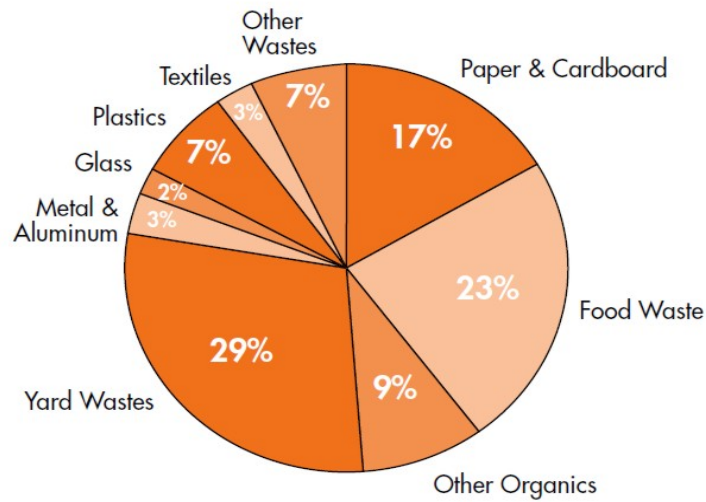
Edmonton was one of the first major cities in Canada to implement a sustainable, integrated waste management system. This system includes reduction of waste at source, several collection services, diversion of waste from landfill through reuse, recycling and composting, and recovery of products and energy from residual waste materials.

Edmontonians have played a key role in Edmonton's leadership in waste management. They provided extensive input into the development of the 30-year waste management strategy, focusing on waste minimization and diversion of residential waste from landfill. The residents of Edmonton have demonstrated a strong and consistent commitment to the plan through their exceptional participation rates in voluntary waste reduction practices. These practices include recycling, using Eco Stations to drop off household hazardous waste, backyard composting, grasscycling and reuse activities.

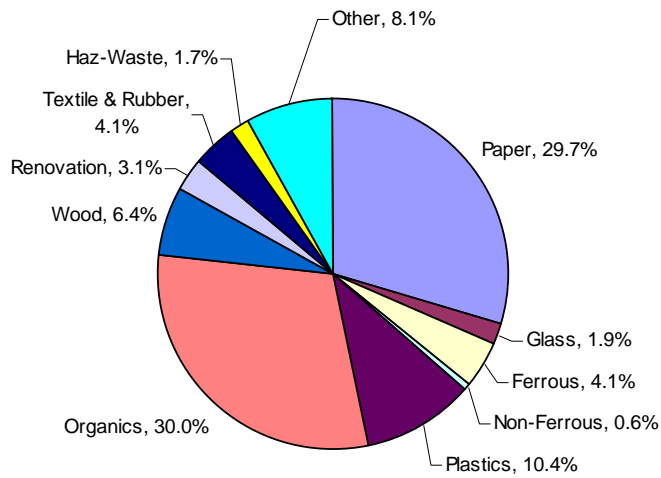
The City of Edmonton's waste system has focused primarily on the residential sector and is at the early stages of expanding its services to include the non-residential sector to influence diversion from landfill. An estimated 40% of all waste generated in Edmonton is from the residential sector and 60% is from the non-residential sector (industrial, commercial, institutional waste stream, and construction and demolition waste stream). Non-residential hazardous waste is

managed under Federal and Provincial legislation and regulation. The City has no active role in the collection or treatment of non-residential hazardous waste.

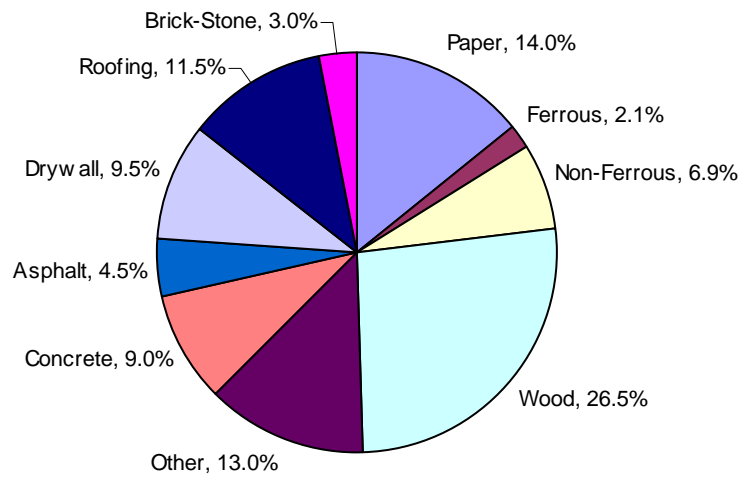
Composition of Edmonton's residential waste is shown below, as well as estimated waste composition for ICI and C&D streams for the Province of Alberta.



Waste Composition in Edmonton (after Recycling)



ICI Waste Composition in the Province of Alberta in 2002



C&D Waste Composition in the Province of Alberta in 2002

Diversion from Landfill

Edmonton's current commitment is 60% diversion of residential waste from landfill. This is accomplished through recycling (approximately 20%), municipal composting (approximately 35%) and an additional 5% waste reduction practiced by residents through composting, grasscycling and reuse. This is two times the Canadian average waste diversion rate of 29% based on 2006 data.

The City's target for landfill diversion by 2013 is 90%. This ambitious target is expected to be achieved in 2013 through the operation of a waste-to-biofuels facility. This facility will process non-recyclable and non-compostable waste and convert it to methanol and ethanol. This facility will be the first municipal waste-to-biofuels facility that accepts processed mixed residential waste. (Visit www.edmontonbiofuels.com)

While some ICI and C&D waste comes to the Edmonton Waste Management Centre (EWMC), the majority is hauled to privately owned landfills in the capital region, making it difficult to estimate the total volumes and diversion rates for Edmonton. It is estimated that approximately 10% to 15% of C&D waste is currently recycled in Alberta. The latest available national data from 2006 by Environment Canada show a waste diversion rate of MSW, including residential, ICI, and C&D waste streams of 22%.

Policies, Strategies and Actions

Edmonton's waste management system has evolved from one that was largely focused on burying waste in landfill, to today's highly integrated, sustainable system that can divert 60% of residential waste from landfill and is focused on resource recovery. Through extensive public input processes, residents articulated a desire for a more environmentally sound, yet convenient and affordable solution. These demands influenced the existing 30-year waste management strategic plan with a goal of environmental sustainability.

The Plan balances social, economic, political, governance, environmental and technical considerations. Because of its long-term outlook, it also provides a method of controlling inevitable future costs of managing waste from a growing city.

Edmonton's position as a leader in urban waste solutions is guided by:

- 1) The Waste Management Policy (approved by City Council in 2007)

- 2) The Waste Management Strategic Plan (approved by City Council in 1994 and updated in 2008)
- 3) Ongoing input from residents
- 4) City Council and Council committees
- 5) The Waste Management Bylaw 13777.

The policy, the strategic plan update and the Bylaw are available at www.edmonton.ca/waste.

Focused on reducing overall production of waste, the City of Edmonton has implemented the following activities into its Waste Management system:

- Reuse Centre and reuse education – The Reuse Centre received 119 tonnes of material in 2009; 95% of material is reused or recycled
- School tours, presentations and resources – provided to almost 17,000 students and teachers each year
- Volunteer programs - approximately 350 volunteers provide a minimum 5,000 volunteer hours to the Branch at the Reuse Centre and as Master Composter/Recycler volunteers each year.
- Compost demonstration site and workshops at the John Janzen Nature Centre open to all residents in both single family and multi-family sectors
- Various outreach and social marketing programs designed to increase participation in sustainable waste practices such as grasscycling and at home composting.

Key components of Edmonton's Waste Management system focusing on recycling and other resource conservation activities are:

- Convenient recycling programs (blue bag for single family households, blue bins for multi-family households, and recycling depots for all residents)
- Eco Stations – 3 existing Eco Stations and 1 in planning stage for drop-off of household hazardous waste, electronics, bulky waste and recyclables
- Big Bin Events – 12 community events for drop-off of large bulky items and e-waste
- Materials Recovery Facility – for sorting recyclables and preparing material for market
- Integrated Processing and Transfer Facility – where all residential waste and some commercial waste is sorted into 4 streams: composting, some recycling, transfer to landfill and future processing of waste for the biofuels facility

- Edmonton Composting Facility – where the composting (organic) stream sorted at the Integrated Processing Transfer Facility is converted to compost
- Electronics and Electrical Recycling – a partnership with Global Electric and Electronic Processing (GEEP), where all Edmonton's electronic and electrical waste consumer items can be recycled
- Research and Development – through continued support of the Edmonton Waste Management Centre of Excellence.

A 2009 survey of Edmonton residents found:

- 89% participation in Blue Bag recycling
- 80% awareness of Eco Stations to dispose of hazardous waste
- 29% of single family residents participate in backyard composting
- 36% of single family residents participate in grasscycling

Other Sustainability Initiatives

- Landfill gas recovery: Since 1992, enough landfill gas from the Clover Bar Landfill is captured each year to satisfy the electricity demands of approximately 4,600 homes. In 2009, 146,045 tonnes of CO2 equivalent emissions were captured - equivalent to removing approximately 36,000 cars from the road for one year. The Clover Bar Landfill is the only landfill site in Alberta that recovers gas and converts it to electricity.
- The City monitors the groundwater and landfill gas emissions at the Clover Bar Landfill and 2 former landfills, Millwoods Golf Course and Rundle Golf Course. Edmonton was one of the early municipalities in Canada to start environmental monitoring of landfills.
- Leachate Treatment: Treating leachate, the contaminated water that settles to the bottom of a landfill, is an important part of an environmentally sound municipal waste management system. The Clover Bar Landfill was built with a compacted clay liner to contain leachate and collection pipes to draw it out. The leachate is pumped to the Leachate Treatment Plant where it is processed for disposal in the City's municipal sewage system.
- Environmental Management System: In 2006, the Waste Management Branch of the City of Edmonton received ISO 14001:2004 Certification for its Environmental Management System, called Enviso. The ISO 14001 framework provides a tool to systematically manage the environmental impacts of its operations. Enviso helps the City to recognize and control environmental risks, conserve materials, energy and other resources even more; and foster a greater awareness of environmental issues among employees and stakeholders.

Future Sustainability Initiatives

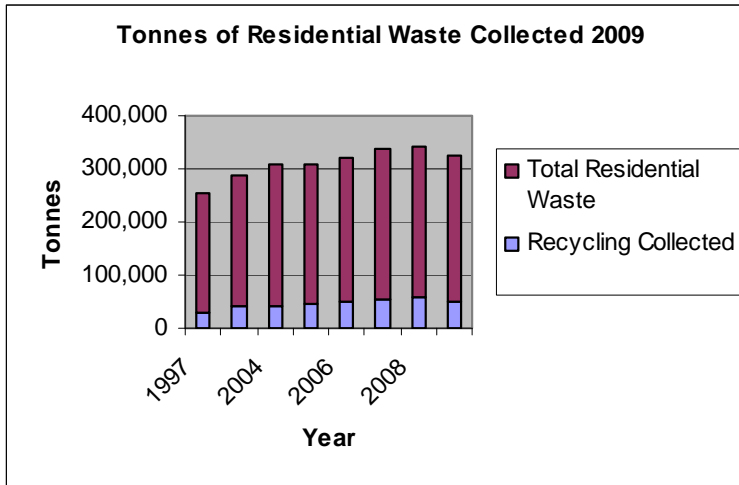
- Closed loop recycling: a partnership with Greys Paper Recycling Industries to build paper production and recycled glass/aggregate brick manufacturing facilities at the EWMC
- Enhanced construction and demolition waste recycling at the Edmonton Waste Management Centre: development of a commingled construction and demolition waste recycling operation to handle up to 50% of material generated in Edmonton
- Recycling collection service for commercial sector: establish a presence in commercial collection for collection and processing of refuse and recyclables
- Alternate fuel sources from waste products: use ethanol produced at the Edmonton Biofuels Facility to fuel waste collection vehicles.

Trends in Waste Generation

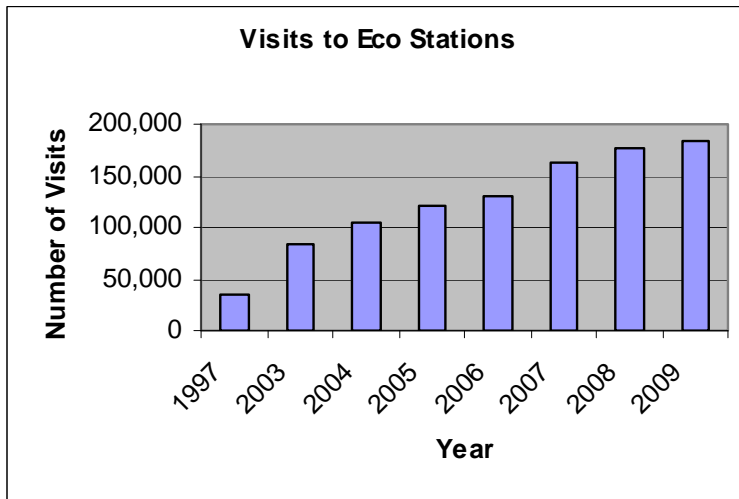
Edmonton's per capita residential waste production decreased from 363 kg per person per year in 1997, to 350 kg per person per year in 2009. This includes both recyclable materials (collected in blue bags, bins and depots) and garbage (destined for the city's compost facility or landfill).

There are many contributing factors for the recent decreases in waste collected in 2008 and 2009. For example, 2009 saw an increase in citizen visits to the Eco Stations. The three Eco Stations received 183,359 visits in 2009, a 4 % increase over 2008. The reduction in economic activity in the Edmonton region has likely resulted in lower levels of consumption. Also, public education efforts are aimed at encouraging residents to reduce waste, such as the Master Composter Recycler Program which has trained over 645 volunteers since 1991.

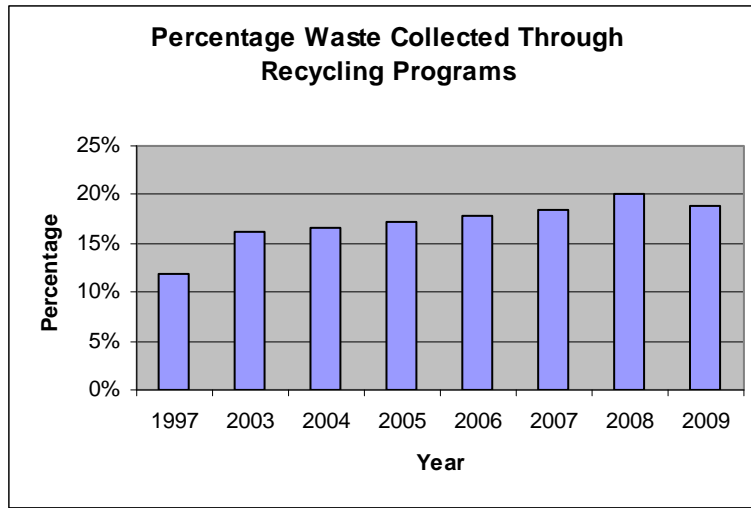
Another positive trend over the past decade has been the increase in recycling as a proportion of the total residential waste stream, as shown in the chart below. In 1997, 11.9% of residential waste collected was recyclable material. In 2009, 19% of the residential waste stream was recycled through the use of blue bags, blue bins, and recycling depots.



Tonnes of Residential Waste Collected



Eco Station Visits in Edmonton



Waste Collected through Recycling Programs

Regional/Provincial Context

The Provincial Government's waste strategy, *Too Good to Waste*, identifies a goal of recycling and recovering 80% of Alberta's waste and disposing 20%, as opposed to the current 20% recycling and recovery and 80% disposal. Based on 2004 data, Albertans produce more waste per capita than any other province in Canada. However, Alberta has achieved significant results in waste management. For example, Alberta was one of the first provinces to implement a number of province-wide stewardship programs to increase recovery and recycling rates for beverage containers, used oil, scrap tires, electronics and paint.

The province is currently developing a leaf & yard waste strategy and is working towards 2 new stewardship programs:

- a construction and demolition stewardship program
- a packaging and printed material stewardship program.

Construction and demolition waste makes up close to one quarter of waste sent to landfill in Alberta. It is estimated that no more than 10 to 15 per cent of all C&D waste materials are currently being recycled. A provincial construction and demolition waste reduction program will help provide incentives to reduce, reuse, and recycle more of this waste stream. This program is expected to be implemented by the province in late 2011 or 2012. One of its key recommendations is a deposit-refund program whereby builders apply for a

refund of their pre-development deposit by submitting documentation of material diverted for recycling and waste sent for disposal.

The City of Edmonton is well positioned to participate in the C&D program. In 2008, the City started to accept segregated C&D waste at reduced landfill rates, at the EWMC. Starting in 2011, mixed loads of construction and demolition waste will be accepted for processing. In 2009, 36,376 tonnes of C&D waste was accepted for recycling. The City also recycles over 100,000 tonnes of asphalt and concrete into aggregate and recycles over 80 percent of its road sand annually.

The City of Edmonton has representation on the Capital Region Waste Minimization Advisory Committee. This committee was established in 1992 and has representation from 20 municipalities in the Capital Region. The mission of the committee is to provide a forum for information sharing and to bring together stakeholders in cooperative, collaborative efforts to facilitate joint waste minimization solutions.

Solid Waste Issues and Opportunities

1) Waste processing for non-residential sector

An estimated 60% of all waste generated in Edmonton is from the non-residential sector. This sector participates in limited recycling and waste reduction activities, generally using private service providers. The waste streams from this sector arriving at the Edmonton Waste Management Centre (EWMC) and at the other disposal sites in the area contain a range of materials that could be recycled - including organics, paper, cardboard and plastics.

The new Integrated Pre-processing and Transfer Facility at the EWMC provides, for the first time, the opportunity to extract recyclables from non-residential loads arriving at the EWMC.

In 2010, the City of Edmonton is establishing a commercial collection service to influence recycling in the commercial sector. The City will offer commingled (mixed waste and recyclables) collection services to businesses, in response to a demand from businesses who want to practice more sustainable waste management and recycle more than paper and cardboard. This service is made possible by development of the City's Integrated Processing and Transfer Facility, which is also available for use by private haulers.

2) Operating a waste management system without landfill

Edmonton landfill diversion rates are the highest in the country and a wide array of technologies and processes have been and will be applied in the coming years to achieve a 90% residential waste diversion rate. Edmonton's focus on a sustainable system that will not burden future generations provides ongoing opportunities and also challenges in further optimizing existing waste management programs and developing new initiatives with improved triple bottom line benefits. For the City of Edmonton, the commitment to enhanced citizen engagement and investment and support of research & development represents two of the most important tools to achieve its goals.

Conditions required over the long term for Edmonton to be sustainable.

Commitment to research and innovation: Edmonton has developed a waste system that is becoming less dependent on landfill and is focused on recovering value from waste. Our long term leadership and sustainability requires a continued commitment to research and innovation in areas such as creating alternate fuel from waste and closed loop recycling.

The City of Edmonton is a founding member of the Edmonton Waste Management Centre of Excellence (www.ewmce.com), designed to advance research, technology demonstration, and practitioner training in waste management. The Centre of Excellence is a non-profit corporation that offers services and expertise in sustainable management of municipal, industrial and agricultural solid waste and wastewater. The City will continue to collaborate with the Centre of Excellence and private sector companies in various research activities to develop new technologies that can be applied in a practical manner to Edmonton's operations. One example of this is the road sand recycling project which now enables the City to recover and reuse 80% of its road sand.

Citizen engagement: Edmonton's successful waste management system is the result of a strong collaboration between the City and its residents. The residents of Edmonton have consistently voiced and demonstrated their desire for a sustainable system that will not burden future generations. They recognize that Edmonton's system is comprehensive and environmentally sound. The City has a responsibility to continue to respond to the needs and requests of the community it serves.

Federal and provincial leadership: Other orders of government, in particular the Province of Alberta, provide the context in which Edmonton manages its operations. Federal and/or provincial government leadership and support is needed for initiatives such as research and development, alternative fuel development, extended producer responsibility, and environmental protection. An example of this leadership is the support of the province, through Alberta Innovates – Energy and Environment, to the development of research and production facilities to produce biofuels from municipal solid waste. Programs and legislation that provide incentives for people to reduce, reuse and recycle, enhance the City’s ability to influence its residents. For example, the proposed provincial construction and demolition waste program will significantly boost the City’s ability to grow its construction and demolition waste recycling initiative.

Edmonton’s system for residential waste is sustainable in terms of landfill diversion and minimizing its impact on the environment. Increased opportunities are needed for recycling and recovery of value from waste generated by the institutional, commercial and industrial sectors. The City’s initiative in providing collection services and processing to the commercial sector is already influencing the private sector to be more proactive in this area.

More details about Edmonton’s waste system are available in the Waste Management Annual Review, at www.edmonton.ca/waste, under publications.