Recover

Definition

Recovery involves utilizing the embodied energy in waste materials to produce needed heat or electricity.

Why recover?

Recovery, also known as "waste-to-energy" (WTE), is a residuals disposal option, not an alternative to waste prevention, reuse or recycling. Instead recovery is an interim measure to deal with material left over after the other Rs are implemented. The long-term goal of zero-waste is to eliminate residuals from the waste stream through better product design and improved markets for recycled materials as well as reuse and reduction.

WTE facilities are common in Europe where space for landfills is at a premium. There, WTE goes hand in hand with strong recycling programs and targets. Two of the biggest users of WTE, the Netherlands and Germany have diversion to recycling rates of approximately 50% and 87% respectively.

According to the Recycling Council of Alberta (RCA), the benefits of WTE include the potential to:

- Reduce waste material 90% by volume and 70-75% by weight;
- Produce 450-500 KWH of electricity per tonne of waste process;
- Reduce greenhouse gas emissions compared to landfills depending on the technologies involved and the waste composition; and
- Generate less water contaminants than landfills.

However RCA also points out that WTE facilities are associated potential drawbacks:

- They generally cost more than landfills or recycling programs;
- Generate more air contaminants compared to landfills. Though through utilization of state of art technology these emissions are far lower than they were historically;
- Landfills are still required to deal with residual ash;
- New and emerging technologies such as plasma gasification are generally not yet commercially available or proven on a full scale.

Municipalities interested in pursuing WTE options need to consider a number of factors:

- Generally, larger facilities are less costly on a per tonne basis. Any municipalities considering thermal treatment should consider partnering with neighbouring municipalities in order to build a large facility and obtain cost savings through economies of scale.
- There are many companies aggressively marketing new technologies. Municipalities should directly contact communities that have used the technologies to determine the real costs and benefits.
- Many WTE companies require guaranteed feedstock volumes. As recycling and composting systems advance and additional product stewardship programs are implemented volumes of waste may go down. Municipalities need to be cautious to avoid becoming contractually obligated to provide a minimum volume of waste that exceeds overall waste generation after the other Rs are implemented.

Municipal Examples

Municipality	Example
Provincial	
City of Edmonton	**Waste to Bio-Fuel Facility** Edmonton's Waste to Biofuels and Chemicals Facility is the first industrial scale waste to biofuels facility of its kind to turn household garbage into biofuels and biochemicals. The facility was built and is owned and operated by Enerkem Alberta Biofuels, and will convert 140,000 tonnes of municipal solid waste into 38 million litres of biofuels and chemical annually – reducing greenhouse gas (GHG) emissions. The City of Edmonton is currently diverting over 50% of residential waste from landfill primarily through recycling and composting. The Waste to Biofuels and Chemicals Facility will help the City to increase that diversion rate to 90%. Initially the facility will produce methanol, followed by ethanol. The goal of producing methanol and subsequently ethanol has both environmental and economic benefits since it supports the increasing demand for biofuels. Click here for more information.
City of Lethbridge	**Lethbridge BioGas** Lethbridge Biogas processes organic residues such as agricultural manures and food processing byproducts. The biogas generated is used to produce green and renewable electricity. The plant uses an anaerobic digestion process to capture and use methane, an environmentally destructive greenhouse gas. The remaining by-product of the digestion process is digestate which is used as a high quality fertilizer for land application. In December of 2013 Lethbridge Biogas officially opened as the largest anaerobic digester/co-generation facility in Canada. The $30 million facility currently has a generating capacity of 2.8 MW – enough to power 2,800 homes. It has the capacity to produce as much as 4.2 MW in the future with the addition of new generating units. The facility has received funding from the Alberta Government, Department of Energy and from the Climate Change and Emissions Management (CCEMC) Corporation. Click here for more information.
Regional Municipality of Wood Buffalo, Fort McMurray	**SWAP** The region's Solid Waste Alternative Process (SWAP) under their Zero Waste Initiative creates unique environmental, social and economic opportunities to utilize waste, currently landfilled, as energy and zero waste products. The SWAP process converts typical household waste into energy and recyclables.

	The energy from the SWAP process will be used to heat greenhouses year round. These sustainable greenhouses create a balanced ecosystem where fish and vegetables grow and support each other using fish waste to replace fertilizer that is harmful to watersheds, and plants to clean the water. Click here for more information.
National	
Metro Vancouver, British Columbia	**Waste-to-Energy Facility** Metro Vancouver's waste-to-energy facility is a mass-burn facility that handles about a quarter of the region's garbage, generates enough electricity to power 16,000 homes, and recovers about 8,000 tonnes of metals annually. Metro Vancouver annually earns about $6 million from the sale of electricity and $500,000 from the sale of recycled metal to a company that produces reinforcing steel. Throughout its 25 years in service, the facility has performed considerably better than the required regulatory emissions standards. Its performance has improved over time due to continuous operational improvements, and frequent upgrades of emission control systems. This commitment to environmental safety means that today emissions are extremely low. Click here for more information.

Additional Resources

Other Organizations	**Resources**
Provincial	
Alberta Energy	**Bio Energy Success Stories** Alberta Energy showcases bioenergy success stories from around the province. The stories provide good examples as to how waste products can be used to produce energy. Click here for more information.
Alberta Finance and Enterprise	**Assessment Toolkit** To assist communities in assessing possible projects, Alberta Finance and Enterprise has developed the *Renewable Energy Toolkit for Economic Development*. Although not directly geared to WTE, it contains relevant information as it is designed to facilitate a better understanding of the basics of energy, to assist communities in beginning due diligence processes, and to provide basic guidance for screening various projects. Click here for more information.

Recycling Council of Alberta (RCA)	**Expertise for Councillors** The Recycling Council of Alberta has developed a presentation on the role and impact of waste-to-energy options in municipal waste management systems. This presentation is particularly suited to politicians (i.e., municipal councils) who may be interested in waste-to-energy alternatives, but have little technical background on the implications of this technology. The RCA is offering this presentation to municipalities in the interests of education and open dialogue about the future of waste management in Alberta. The presentation is anticipated to take about one hour, depending on questions and discussion. Those interested in hosting a presentation should contact the RCA at 403.843.6563 or info@recycle.ab.ca. Click here for more information.
Southern Alberta Energy from Waste Association (SEAWA)	**Energy Recovery Research** The Southern Alberta Energy from Waste Association (SAEWA) is a non-profit coalition of municipal entities and waste management jurisdictions in southern Alberta committed to the research and implementation of energy recovery from non-recyclable waste materials that will reduce long term reliance on landfills. SAEWA is in the final planning stages to develop an Energy-from-Waste Facility that will handle the conversion of municipal and other sources of solid waste into energy. SAEWA's energy from waste project was a 2017 recipient of FCM's Green Municipal Fund. Click here for more information.
University of Alberta	**Biorefining Research Network** Based out of the University of Alberta, the Biorefining Conversions Network (BCN) is an initiative working to support provincial research communities in the areas of biorefining and biomass conversion technologies. By striving to form strong partnerships between academia and industry, the BCN promotes research programs that are structured towards achieving commercializable outcomes. Click here for more information.
National	
Federation of Canadian Municipalities (FCM)	**Funding Opportunities** FCM's Green Municipal Fund accepts applications for the capital costs of thermal treatment processes where the municipality has achieved a waste diversion rate of at least 60% prior to undertaking the thermal treatment project. Click here for more information. Funding is also available for energy recovery projects including biogas systems. Click here for more information.

Confederation of European Waste To Energy Plants (CEWEP)	**European Leaders** CEWEP represents about approximately 80% or 400 Waste-to-Energy Plants from 22 European countries and the USA. The plants represented by CEWEP are operated both by municipalities and private companies. CEWEP emphasizes that its members annually treat the roughly 59 million tonnes of household and similar waste that remains *after* waste prevention, reuse and recycling. Click here for more information
Energy Recovery Council	**US Council** The ERC is a US trade organization representing the waste-to-energy industry and communities that own waste-to-energy facilities. Current ERC members own and operate the majority of waste-to-energy facilities in the US, safely disposing of municipal solid waste, while at the same time generating renewable electricity. Click here for more information
Solid Waste Association of North America (SWANA)	**Waste-to-Energy (WTE) Division** SWANA's WTE Division provides industry professionals with the information and professional contacts they need to improve their plant operations while encouraging innovation to enhance waste-to-energy's role as a viable option for solid waste management and an expanded source for clean, reliable and renewable power. Click here for more information.