

POWERING A CIRCULAR ECONOMY

A Case Study

COVANTA

Powering Today. Protecting Tomorrow.



AT THE CENTER OF THE CIRCLE

Today, much of the world economy operates in a linear fashion: we extract resources from the earth, manufacture and produce materials, distribute them to customers who use them, and then discard the materials. Different economies have, to varying degrees, been able to return some materials back to the economy through recycling. For example, countries like Germany, Austria and the Netherlands are successfully recycling **60 percent** of municipal solid waste (MSW). However, countries like the United States and Canada do far worse. Even when companies in the United States and Canada are successful at recycling, the result is products made out of the recycled materials that are of lower quality, a result called “downcycling.”

In contrast, a circular economy aims to always keep products, components and materials at their highest utility and value, returning them back into the market at the end of their first lifecycle at the **highest level possible**. Nearly every step of a circular economy requires an energy input and leftover waste can help meet this need.

LINEAR ECONOMY



EXTRACTION



PRODUCTION



DISTRIBUTION



CONSUMPTION



WASTE

CIRCULAR ECONOMY



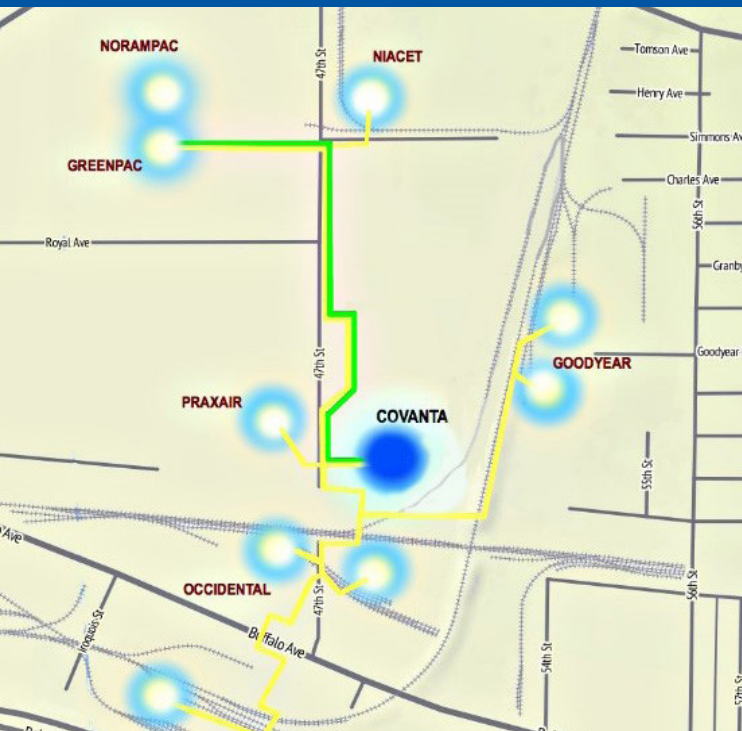
- 01 PRODUCTION
- 02 DISTRIBUTION
- 03 CONSUMPTION
- 04 REUSE & RECYCLING
- 05 RECOVERY

A significant example of a circular economy in practice today can be found in Niagara Falls, New York and is the direct result of companies colocating with a Waste-to-Energy (WTE) facility.

Here, six different companies from a variety of industries are connected to Covanta Niagara, a pioneer in the modern WTE industry that began converting refuse into clean, renewable energy in the 1980s. Through these colocation partnerships, Covanta supplies steam generated through processing up to **2,250 tons of waste per day** to the neighboring businesses and takes in nonrecyclable waste in return to add to its feedstock. In many ways, it can be said that several of these businesses benefit from other's inputs and outputs.

"The reason colocation works for us is that we're able to secure a predictable price [for exporting steam] that is potentially **higher than what we would get for a wholesale energy price** on the electrical grid. That is attractive to our investors," said Dave Burke, manager of export steam sales at Covanta.

"From the customer's perspective, they're likely going to get a reduced price on their energy and there are the ancillary benefits of being able to send their waste to us and avoid landfills. Also, by providing turnkey steam for our clients, it eliminates the need for them to own and operate a fossil-fueled boiler house, creating a competitive advantage by allowing these organizations to focus on their core business."



MAP OF COVANTA NIAGARA'S INDUSTRIAL CUSTOMERS



WASTE PAPER COLLECTED FROM HOMES AND BUSINESSES



If you have customers nearby that are in complementary value chains, you can pass products back and forth without having to put them on a trailer or train. It's a benefit of colocation.

Dave Burke,
Manager of Export
Steam Sales,
Covanta



FOLLOWING THE INPUTS AND OUTPUTS

An example of the colocation and circular process begins in Niagara when bales of waste paper collected from homes and businesses are delivered to Greenpac Mill. Considered the most advanced and largest facility of its kind in North America, Greenpac Mill manufactures a lightweight linerboard made with **100 percent recycled fibers** and has an annual production capacity of **540,000 tons**. The linerboard is produced with significantly less water and less fiber than similar strength paper, making Greenpac's product the strongest fully-recycled linerboard in North America. But not every bit of paper sent to Greenpac Mill can be used.

Nearly all recycling processes generate waste. Paper recycling is no exception. In addition to the short fibers, clays and other fillers in most recovered papers that cannot be recycled, bales of recovered paper will always have some amount of contamination. This contamination includes plastics, metal, glass and other non-paper materials. The amount of contamination depends on the source of the recovered material and its grade. Some bales from single stream curbside recycling programs can have up to **40 percent** non-paper contamination. At any paper recycling operation, the residues and wastes resulting from the recycling operation need to be managed. So, what happens to the paper that *can't* be used to create the linerboard? It gets sent to Covanta Niagara where the output of unusable paper becomes the input for energy recovery!



OVERHEAD PIPES RETURN STEAM TO INDUSTRIAL CUSTOMERS

When the unrecyclable waste from Greenpac Mill arrives at Covanta, it is mixed with other waste and metered onto the state-of-the-art grate system where the combustion process occurs. During the combustion process, water in steel boiler tubes is heated up and converted into high temperature steam (energy recovery) and is sent back into the community as electricity to supply **over 15,000 homes a year**. Steam generated in the process is sent to the mill via a dedicated line built just for Greenpac Mill, where it is used for drying paper in the manufacturing process.



Additionally, the steam is distributed to other companies along the steam loop including Praxair, Goodyear, Niacet and Norampac, for use in their production processes. In this way, unusable paper and other non-paper contamination become the input for energy recovery in the form of steam, which is then used as an input for other processes at the companies in this circular system.

And don't forget the linerboard that Greenpac Mill makes. Local companies such as Diamond Packaging of Rochester, New York use boxes made from the Greenpac linerboard. Diamond Packaging is the only American-owned folding carton manufacturer to achieve zero manufacturing waste-to-landfill status. Some waste materials from Diamond Packaging becomes part of the bales of waste paper sent to Greenpac Mill to begin the process again, and any non-recyclable wastes are sent to Covanta for energy recovery.

By moving products via pipe-bridge and short transportation, there is a great improvement in the carbon footprint for these colocated businesses. In fact, by opting for WTE conversion rather than the landfill for its residuals, Greenpac Mill avoids the emission of close to **12,000 tons of CO₂e** (carbon dioxide equivalent) just by itself. That's comparable to removing **2,500 cars** from the roads for a year.

“We’re a sort of “green anchor” here, helping businesses reduce their environmental impact, stay in operation and continue to provide the area with **more than 600 well-paying jobs.**”

Dave Burke, Manager of Export Steam Sales, Covanta



At Covanta, our mission is to ensure no waste is ever wasted.

It's our business, our purpose and our passion to recover, recycle and reimagine waste to better serve both people and planet. We make this possible through our dedicated staff and vast network of facilities, which safely convert trash into clean electricity, pollution into environmental solutions and scarcity into sustainability.

At Covanta, we power today and protect tomorrow.

However complex your waste challenge is, we've got a solution. Email us at:

info@covanta.com

Explore more content on making a difference in sustainability. Visit our site at:

covanta.com

