



Fuelling a circular economy

Enerkem's waste-to-biofuel technology chemically recycles carbon molecules in waste into added-value products

Imagine giving your living room a makeover using a bright new coat of paint – made from rubbish. Fiction? Not anymore. As countries around the world look for ways to transition from a linear economy – in which we take, make, use and dispose – to a circular economy – where we reduce, reuse and recycle – one innovative Canadian start-up has come up with a revolutionary idea: to develop and commercialise a disruptive technology that uses an abundant resource available everywhere – non-recyclable waste – as a resource to manufacture renewable chemicals.

Communities all over the world are struggling with the often huge challenge of waste management, and they are often desperate to find new ways to reduce waste sent to landfills and incinerators.

More than 2 billion metric tonnes of waste is generated around the world every year. Despite the efforts and programmes introduced to recuperate materials that can be recycled or composted, more than 50% of this volume is still landfilled, creating environmental problems and generating methane emissions, which are 25 times more harmful than carbon dioxide (CO₂).

While governments are developing policies to address the need for more sustainable energy, including low-carbon transportation fuels, global consumer goods manufacturers are also putting pressure on leading chemical manufacturers to replace hydrocarbon-based products with renewable chemical alternatives to meet the demand of their own customers. However, the

challenge to reduce waste remains. Enerkem's disruptive technology can help address these pressing environmental issues and fulfil the growing demand for greener products,

or a 'cradle to cradle' solution in consumer products.

The technology is an advanced thermochemical process that chemically recycles carbon molecules



An Enerkem employee performing a series of tests at the Enerkem Innovation Center in Westbury, Québec

contained in waste into added-value products, such as renewable methanol and ethanol. It takes waste in less than five minutes to produce a synthetic gas, and convert it into advanced low-carbon transportation biofuel – enough to fuel over 400,000 cars on a 5% ethanol blend. In turn, biofuels also help reduce greenhouse gas emissions by approximately 60% when compared to fossil fuel production and landfilling. Today, this technology is helping the City of Edmonton in Alberta, Canada increase its household waste diversion rate from about 50% to 90%.

In Europe, driven by the demands of the circular economy, Enerkem is developing its first European project in the Netherlands, with a consortium led by AkzoNobel, Air Liquid, the Port of Rotterdam and Shell. The consortium, which has set up a dedicated joint venture company, has already undertaken extensive preparatory work, covering detailed engineering and the

permitting process. It aims to take a final investment decision later in 2019 as it pursues development work and finalises the selection of an engineering and procurement contractor.

The planned facility will convert up to 360,000 tonnes of waste into 220,000 tonnes (270 million litres) of bio-methanol – a chemical building block that is used to manufacture a broad range of everyday products, as well as being a renewable fuel. This represents the total annual waste of more than 700,000 households and represents estimated CO₂ emission savings of around 300,000 tonnes, when compared to the production of methanol from fossil fuels.

The facility will be built within the Botlek area of the Port of Rotterdam using Enerkem's proprietary technology, and will convert non-recyclable mixed waste, including plastics, into syngas and then into clean methanol for use in the



Figure 1: A circular economy uses waste as a resource

chemical industry and the transportation sector. This is a departure from today's processes, in which methanol is generally produced from natural gas or coal.

Innovative clean technologies can help communities create value and meet local waste diversion objectives. While reducing pollution and greenhouse gas emissions, Enerkem's technology can help the world shift from a linear economy to a circular economy that

uses waste as a resource to produce sustainable products (Figure 1).

Since 2000, Enerkem has tested and validated several different feedstocks – from solid waste coming from several municipalities to dozens of other types of residues. Its exclusive process is environmentally sound and requires relatively low temperatures and pressures, which reduces energy requirements and costs. The technology was rigorously scaled up from pilot to demonstration to commercial stage over a 10-year period. Following the successful launch of its first facility, the company is now seeking to leverage its carbon recycling technology expertise to help solve the ever-growing issues related to ocean plastics waste.

Last year, Enerkem engaged in discussions with the Ocean Legacy Foundation, a Canadian non-profit organisation that carries out coastal clean-up expeditions, to explore ways in which soiled plastics can be recuperated from oceans to produce low carbon transportation fuels and chemicals, using the company's technology. ●



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For more information:

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