

# From food waste to bus fuel and biofertilizer

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In autumn 2009, Oslo residents began sorting their food waste into green recycling bags like this one. Now the city itself is exploiting this resource, says acting manager of the new biogas plant Anna-Karin Eriksson of the Oslo Municipality Waste-to-Energy Agency (EGE).

Banana peel, coffee grounds and other food waste will be transformed into green fuel for Oslo's city buses starting next year. The Norwegian capital's new biogas plant will also supply nutrient-rich biofertilizer for agriculture.

The plant will be able to process 50 000 tons of [food waste](#) annually, converting it to environment-friendly fuel for 135 municipal buses as well as enough biofertilizer for roughly 100 medium-sized local farms. The biogas production processes were developed through long-term

Norwegian research with funding from the Research Council of Norway.

## Biogas reduces emissions

Biogas is a CO<sub>2</sub>-neutral fuel produced from biological material such as food waste, sewage sludge and manure.

Already, 65 [Oslo](#) buses are powered by biogas produced from sludge from the city's sewage treatment plant. When the new biogas plant reaches its full capacity in 2013, the local bus company will have enough biogas for at least 200 buses.

“Running on biogas will reduce emissions from public transport, which means less airborne particulate matter and thus improved air quality in Oslo. What's more, the biogas buses run quietly,” explains acting plant manager Anna-Karin Eriksson of the Oslo Municipality Waste-to-Energy Agency (EGE).

Biogas not only helps to improve air quality, it is meant to be good business as well. The new plant is slated to produce the energy equivalent of 4 million litres of diesel fuel – valued at the very least at NOK 30–40 million annually given current diesel prices.



Oslo's new biogas plant is being constructed by the Norwegian company Cambi

AS.

## **Extensively researched**

The new plant is being constructed by the Norwegian company Cambi AS, which won the contract after intense competition with foreign companies.

For over 20 years, Cambi has been developing technology for converting biodegradable material into renewable energy. The company has carried out a number of research projects that have received public funding from the Research Council and the former Norwegian Industrial and Regional Development Fund (now part of Innovation Norway).

Cambi's Research Council funding was provided under the Large-scale Research Programme on Clean Energy for the Future (RENERGI). The company is also an industry partner in the Bioenergy Innovation Centre (CenBio), one of Norway's 11 Centres for Environment-friendly Energy Research.

## **Internationally successful**

The new plant will produce biogas using a method known as thermal hydrolysis, whereby raw materials such as waste or sewage sludge are boiled under both high temperatures and pressure. Cambi has worked out a hydrolysis process that yields substantially more biogas compared to conventional facilities.

So far the company has designed and delivered 28 plants for converting biodegradable material into renewable energy. Their plants are processing waste and sludge from a total of 23 million people in the US,

Australia, Chile, Japan, Dubai and many European countries.

## **Valuable fertiliser from biowaste**

The effluent (residue) from the biogas production process may be used as liquid fertilizer with roughly the same nutrient content as compound fertiliser. The new plant, located north of Oslo, will supply both liquid and solid biofertiliser in addition to a liquid concentrate.

“We’ve shown that biowaste has substantial value in itself and is well worth utilizing,” asserts Per Lillebø, chair of Cambi ASA. “The fertilizer produced is a vital part of the biological cycle.”

Biofertilizer also has two main advantages that farmers’ neighbours will no doubt appreciate: it is sterilized and odor-free.

Provided by The Research Council of Norway

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