

Though it seems much of the discussion these days on next generation biofuels has to do with breaking the cellulosic wall in plants, and thus creating “cellulosic biofuel” from crop waste, there’s a whole lot more waste that could become biofuel too. And that’s exactly what Finland’s st1 Biofuels is doing.

The company, which is best known in Finland as a chain of petrol forecourts, is all about finding innovative ways to process ethanol from waste. Up until now, much of that ethanol comes from waste dough and water from bakeries, waste from candy facilities, yeast from breweries and the like. Using its Etanolix® technology, three plants are up and running producing a total of 4.2 million litres of ethanol a year from 30,000 tonnes a year of waste. This year it will open its fourth plant producing another 1.2 million litres.

This technology produces a product that’s about 85% ethanol and 15% water. Ethanol from sugarcane, as an example, produces about 95% ethanol with 5% water. To use it as a fuel, both kinds of ethanol must go through a dehydration process to get it to about 99.8% ethanol. st1 has put in a dehydration facility that began operating last year for both its own ethanol and to dehydrate imports. At 44 million litres of annual capacity, it expects to double its capacity later this year.

But if the company is only producing about 5 million litres of ethanol, why invest the capital to double capacity? Surely the country’s imports aren’t so large, at least as yet. The answer, however, comes not with Etanolix® or imports, but with Bionolix™.

Bionolix™ is a new process st1 has developed using many of its own, proven technologies but in a “new way.” Basically the idea to create ethanol, along with heat and electricity, using household waste and eventually municipal solid waste. Not sewage, but landfill.

The first plant using Bionolix™, which should be online by the end of 2009, will have an initial capacity of about one million litres per year of ethanol, electricity of 8,000 MWh and heat of 17,600 MWh using 20,000 tonnes per year of feedstock.

Much of the talk on renewable energy in Europe has been about biofuels, and the pumped up controversies linked to biofuels. But in fact, the EU’s Renewable Energy Directive that was approved last December has a much larger focus on renewable energy in general—more for electricity and heating than for road transport.

But this Finnish concept has done both in what is now commonly called a biorefinery. That idea is getting a lot of press in the US, though far less in Europe. The idea is the creation of several renewable energy products from single or multiple feedstocks under one roof. So with Bionolix™, the idea is that one facility generates enough heat and electricity to run its own operations (read: co-generation, like with sugarcane bagasse) plus through the idea that district heating could provide heat and electricity for local neighbourhoods. That’s on top of the ethanol it will produce for its own fleet of forecourts, reducing the country’s need for ethanol imports.

Until the new plant is up and running, a lot of the company’s claims are likely just conjecture. But the blended technology approach is an interesting one that could have extensive applications. In Finland alone, st1 figures there’s the opportunity to install between 10 and 15 plants. They’ve been too focused on getting their own production up and running to look much beyond their domestic market but the opportunity extends well into Western Europe and beyond.

It’s the idea of producing biofuels and bioenergy from waste streams that’s beginning to really buzz in the biofuels industry. st1 figures there’s about 20% to 30% of biowaste within ordinary household waste that could be easily converted to ethanol and energy if the proper sorting was done at household level. In terms of reducing landfills, using Bionolix™ could bring down municipal solid waste to 10% to 25% of the original volume, the company says.

Urbanisation around the world has created a massive waste problem that could be more efficiently tackled with this kind of technology if it could be economically transferred outside of Finland. And it's not just in Europe, but in places like Africa and India where urbanisation continues to increase at a steady pace and where cities are over-run not just with people but with their waste too. Instead there could be job development through waste collection and sorting as well as additional access to heating and electricity for slums and lower income areas that may not have access now. That's on top of the ethanol that could be added to the local, regional or international fuel markets.

Using waste as a feedstock for biofuel also has the double benefit of not competing with food sources and starting out with zero greenhouse gas emissions. As CO₂ emissions are calculated based on the product, with a few directed towards byproducts, waste is just waste and therefore CO₂ emissions-free. Waste left in landfills can create methane, often seen as a more dangerous greenhouse gas emission than CO₂, so using the waste for energy generation causes further emissions reductions as well.

st1's new biorefinery concept is definitely one to watch, but as the concept gains popularity and technological refinement, it may one day find a way to compete with other cheap forms of biofuel, like Brazilian cane ethanol.