## MAKING BIODIESEL FROM GREEN WASTE

# ‘That is why you do it’

Kirsten Steinbusch with her testing apparatus in the lab.

**During her doctoral research Kirsten Steinbusch stumbled upon a new method of making biodiesel and other useful chemicals from green waste. She set up a company to develop the process further, with support from Wageningen UR.**

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'It was with a little bottle like this that I discovered my method of making biofuel from green waste', says environmental technology researcher Kirsten Steinbusch, holding up a simple glass bottle with a tube in it. She routinely checks the connections in some complex-looking experimental apparatus, a maze of tubes, humming pumps and glass test tubes. 'Look, in these little yellow sponges are the bacteria that cause the chemical conversions', she explains enthusiastically.

Nowadays, the lab work is just one of Steinbusch's activities. She spends two days a week networking and talking to potential investors in her company Waste2Chemical, a business that focuses on further developing the production method for biodiesel that she invented. So far this is unpaid work. She also works as a postdoc researcher in the Environmental Technology department at Wageningen University, part of Wageningen UR.

## FERMENTING SLUSH

Steinbusch laid the foundation for the new enterprise during her doctoral research at Environmental Technology. After getting her PhD she bought back the patent for the production of useful chemicals from organic waste from the university and brought it under her own company. Now she and her business partner Niels van Stralen are working on developing the discovery.

Steinbusch discovered the new production method by chance. She was working with micro-organisms which convert sugars, proteins and fats in green waste into smaller molecules. Under the right conditions – without oxygen – you end up with mainly volatile fatty acids, hydrogen and $CO_2$. Steinbusch initially concentrated on the conversion of the volatile fatty acids into alcohol, but that did not get her very far. 'We found less alcohol than there is in a malt beer', she says. Steinbusch had a hunch that the alcohol that was formed was immediately reconverted by other micro-organisms. So a student was put to work to investigate that further. 'He took rather a long time over his report and the little bottle of fermenting slush just stood there. When we came to take measurements some months later, we suddenly found relatively large quantities of the larger fatty acids such as caproate and caprylate.' This was a great discovery, because these substances can serve as the basis for polymers, paint, solvents and biofuels. 'I went crazy. That is what you do it all for.'

The formation of these valuable fatty acids has massive advantages. The raw material, green waste, is relatively cheap and the end product is easier to harvest than bio-alcohol. What is more, Steinbusch's method does not make any demands on agricultural land, so there is no competition with food production or rainforest.

## TECHNIQUE WAS NEGLECTED

The company that funded her research did not see much future in the new production method, but Steinbusch was sufficiently motivated to do something with her discovery anyway. 'You have a valuable technology here, and a big company says 'We are not going to do anything with it.' I thought that was a pity. And anyway, I was very curious to find out whether the method also works on a large scale. And it is very nice to watch your own child grow up.' Her first step was to follow a few courses on entrepreneurship in the Netherlands and the US. After launching Waste2Chemical, Steinbusch was coached by StartLife, a Wageningen UR foundation that supports young entrepreneurs with loans, networking and advice. Step by step, Steinbusch worked together with Wageningen UR on improving the new procedure. She studied how to optimize several aspects of the process, such as the conversion speed. 'At the moment we are also doing tests for potential clients. In one of these, we are looking at whether potato peelings are a suitable raw material for making caproate', she explains. One of the company's targets is to set up a larger trial plant in 2011. 'We are looking for extra funding for that. Still a long way to go? Well, I like a challenge. I am enormously driven to make a success of this.' ■

### KIRSTEN STEINBUSCH (1980)

- Graduated in Environmental Hygiene from Wageningen University, part of Wageningen UR, 2004
- Patented her process for converting organic waste into valuable chemicals, 2007
- Entrepreneurial boot camp: University of Wisconsin, 2008 and Wageningen University, 2009
- PhD in Environmental Technology from Wageningen University, 2010
- Launch of Waste2Chemical company, 2010