

## ASB Farmsmarts: The Power of Poo



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Experience, says John Scandrett with dry humour, is what you get just after you really need it. He's talking about the two years he, Fortuna Group and others have spent developing a system that generates electricity and hot water from cow poo in New Zealand conditions.

An environmental game-changer, the system's development at Glenarlea Farm, one of Fortuna Group's farms in Southland, is significant for two main reasons: 1) If it works in Southland's cooler climate, it can work anywhere in New Zealand and 2) it potentially enables New Zealand to lose its unwanted crown as one of the world's worst (or the worst) emitters of methane on a per capita, per year basis.

Each cow produces about the same amount of greenhouse gases as a car and the concept, from NIWA (implemented along with EECA and Dairy Green Ltd) channels cowshed effluent into a big pond where methane is encouraged to develop.

Scandrett, an agriculture and engineering consultant for Dairy Green, says biogas has been around for centuries. The ability to make gases from organic matter in the absence of oxygen has been harnessed in Europe, particularly Germany, where thousands of biogas farms produce an estimated 2.5 per cent of that country's electricity.

The reason it hasn't caught on in New Zealand previously is because, until recently, New Zealand has had comparatively cheap electricity, the cost of overseas-manufactured biogas systems is expensive and the sheer scale of New Zealand's cow poo supplies (we produce about 600kg of methane emissions per capita per year; the global average is about 100kg) meant a different approach was required.

Scandrett's answer was to meet scale with scale. The Glenarlea Farm (about 900 cows on 300 hectares) system has a much-bigger-than-usual digester, a specialised effluent pond where the waste from the

cowshed is channelled. The pond is then covered, the gas develops underneath in such profusion it easily supports the weight of an adult male walking on the soft covering.

The biogas from the effluent pond on the 900-cow Glenarlea property at Fairfax, near Otautau, is then piped about 100m to a conversion generator which helps power the milking shed (Scandrett says it provides most but not all the power the shed needs) and heats hot water – a staple of cowsheds up and down the country.

### **So what does all this mean for farmers?**

The Fortuna Group system is still a work in progress but Scandrett says it should produce enough power for about six households every year.

“So far, we have used the gas to make about \$2700 of electricity since October,” he says. “That’s money you don’t have to pay for electricity and, on top of that, there are more power savings to be made because you are making your own hot water.

“In fact, we think we would have made about 50 per cent more than that [so about \$4000 worth of electricity in total] because we had a bit of a glitch. One of the farmers decided to clean the compound and spruce up the shed and used a cleaning agent that really clobbered the bugs in the pond.”

That’s what Scandrett means when he says experience is one of those things you get just after you really need it: “There’s no instruction manual for all this; it’s been a case of seeking information and finding out things all the way.”

He estimates the cost of establishing the system will wind up at about \$200,000 and says it will likely take about 10 years to pay for itself.

“That probably means it may not be a go for small farms on an economy of scale basis,” he says, though there are ways of speeding up biogas development for smaller outfits.

One of the problems faced was the efficiency of the cows themselves – “cows are very good at extracting energy from grass” – so a bigger pond was required and more time to ripen the gas. Smell is another environmental problem associated with biogas but Scandrett and his team fixed that with the covering.

Even if farmers do not convert the gas into electricity, there is still a win-win inherent in the new biogas processes developed, he says: “First option – do nothing and just let the gas escape. Second option, do what we have done and turn it into biogas and electricity. Third option, burn it.

“Even if you just burn it off, you are doing a lot better environmentally. Methane is 21 times worse than carbon dioxide as a greenhouse gas; when you burn it, it turns into carbon dioxide so you are 21 times better off right there...

“What’s happening now is the farm manager starts the motor about 4.30am for milking and runs it for up to 16 hours, during which time it generates 30KW of power. The shed needs about 25-55KW to run during milking, so we are producing a reasonable chunk of power during peak times, as well as saving on water heating costs.”

The exciting bit is extrapolating that out to include a large number of dairy farms across New Zealand – meaning savings for farmers. And for the environment.