

Berrybank Farm, Windermere – Victoria



Thanks to its installed biogas module from MTU Onsite Energy, Berrybank Farm, the slick family operation run by Charles Integrated Farming Enterprises Pty Ltd (Charles I.F.E Pty Ltd) at Windermere, Victoria, is finding that the old farming philosophy of ‘waste nothing’ makes perfect business sense.

Berrybank Farm can now generate electricity and heat from biogas simply, yet sophisticatedly, utilising a state-of-the-art combined heat and power (CHP) unit that has been fully customised, commissioned and installed by MTU Detroit Diesel Australia’s expert engineering team and electrical specialists.

The install is a country-first for MTU Detroit Diesel Australia’s biogas sector and engineering team, and highlights the business’s strategic push into biogas technologies, which is in keeping with the growth of renewable resources within Australia.

CUSTOMER

Charles I.F.E Pty Ltd for
Berrybank Farm

LOCATION

Windermere, Victoria

DESCRIPTION

MTU Detroit Diesel Australia installs its first MTU Onsite Energy biogas system at Berrybank Farm; providing all system design, electrical and mechanical assistance, commissioning and aftersales support

OPERATIONAL DATE

October 2012

MTU Detroit Diesel Australia's marketing team travelled to Berrybank, to view the install and meet with Jock Charles at his sprawling 2,500 acre proper in early May 2014. We wanted to find out first hand, how Jock's installed MTU Onsite Energy biogas generator module is helping to enhance efficiency and day-to-day operation of his Aussie farming success story.

BERRYBANK – A THOROUGHLY MULTI-FACETED FAMILY FARMING BUSINESS

Jock Charles is a check-shirt-clad, Blundstone-wearing kind of guy. An accountant by degree, Jock is somewhat of a farming entrepreneur and innovator, who has employed MTU Onsite Energy's leading biogas technology to turn his humble family farming business, into a first-rate and eco-friendly operation, and a model in total waste management.

Berrybank, the farm that he runs with his brother and father, is a 20,000 head piggery that operates

on a birth to bacon cycle; with an offshoot breeding program that supplies 40,000 pigs to market annually. Berrybank sells its livestock domestically, at 22 weeks, to two local buyers, to ensure that the best market value for their product is secured. "We've chosen to keep our operation localised and to have a couple of key Victorian buyers, which is ideal for getting the right price. We don't export," Jock explains.

While this works well for Berrybank, the livestock business represents merely one aspect of this multi-faceted operation, with Berrybank Farm also cropping approximately 2,500 acres of wheat and canola to feed its pig population. A positive by-product of all this is a burgeoning fertiliser business, in which Berrybank produces, packages and distributes domestic fertiliser to nurseries and garden centres.

How does Berrybank do all of this, you ask? Simply: by utilising waste.

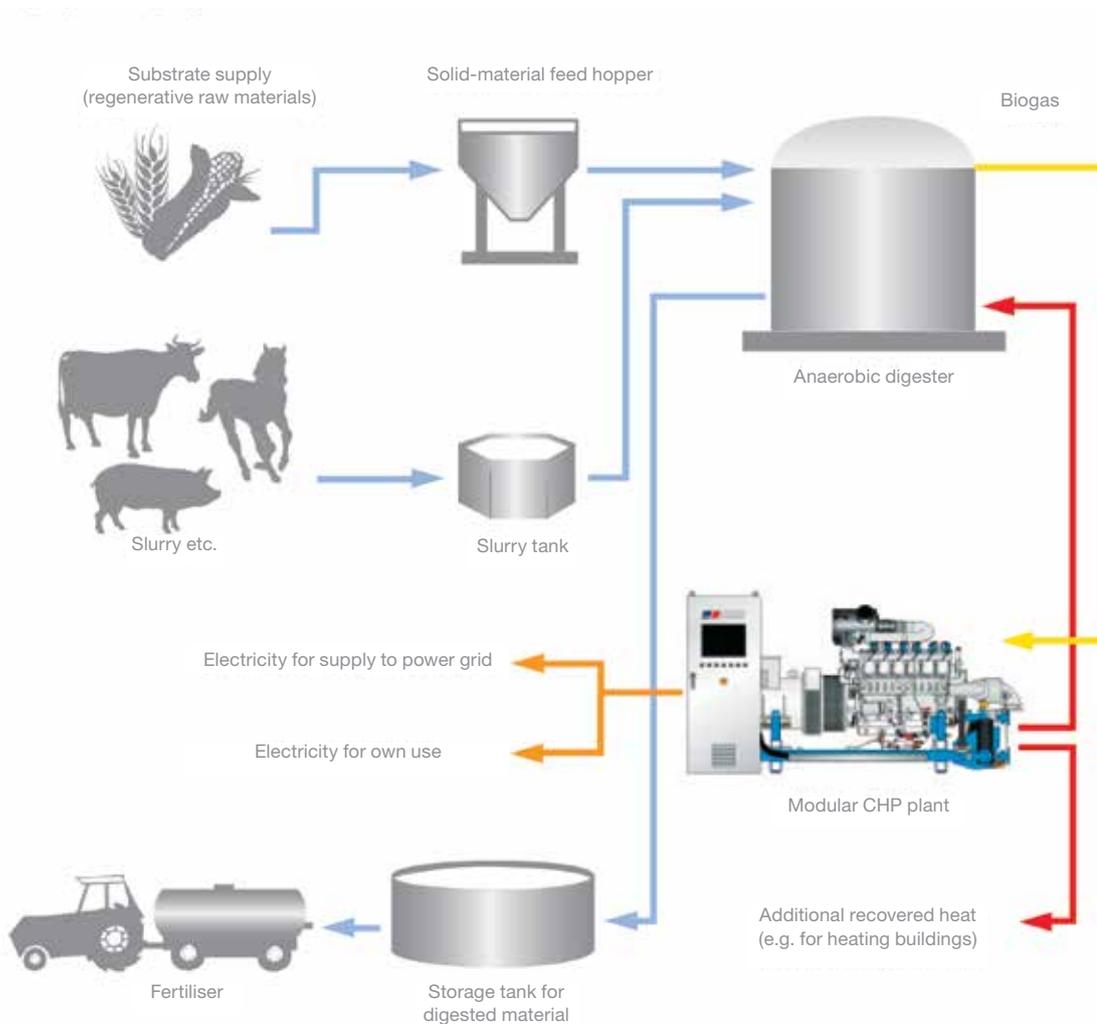
Half of what Berrybank's pigs consume is returned as waste, which is more than 275,000 litres of sewerage effluent per day (effluent has an organic solids content of approximately two per cent, making it great for biogas operations). That is equivalent to the sewerage output of a town of 50,000 people.

To make use of this massive amount of waste, Berrybank looked into employing biogas to generate electricity, recycle and conserve water, and export power back to the grid; so as to improve its efficiency and achieve a better return on investment.

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Right: Farming innovator Jock Charles has turned his humble family business into a first-rate and eco-friendly operation, thanks to an MTU Onsite Energy biogas module.





Left: Berrybank Farm employs a simple yet effective biogas conversion system to generate thermic heat and electricity.

Berrybank now uses a simple and straightforward method that involves the following stages:

1. Automatic and continuous waste collection – The existing drainage around and under the piggery recovers the waste, with automatic flushing valves linked to a main pumping station.
2. Grit removal – The grit from undigested matter in the pig slurry is removed by sedimentation to prevent damage to the internal pump mechanisms.
3. Slurry thickening – The thickening plant system is made up of a screen and floatation system, which allows the smaller particles suspended in the slurry to separate from the water.
4. Primary and secondary digestion – Using anaerobic digestion, via two large tanks, to breakdown the wastes. While this process occurs naturally in swamps, where bacteria break down rotten vegetation to produce smelly biogas, the digester provides the right environment for faster and controlled digestion by removing oxygen, mixing the materials and providing optimum temperatures for the bacteria to flourish.
5. Biogas purification – The potentially damaging sulphur is removed from the biogas with scrubbers, traps and dehumidifiers.
6. Cogeneration thermiplant – The biogas is converted into thermic heat and electricity.



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ABOUT MTU DETROIT DIESEL AUSTRALIA'S HEATING AND COOLING SYSTEM

After a three month scoping and design process, MTU Detroit Diesel Australia supplied Berrybank with a customised Series 400 GC192B5 biogas unit from MTU Onsite Energy, to generate its electricity and thermal power requirements.

As part of the cooperative, MTU Detroit Diesel Australia installed its first ever biogas module in-country, assisting in Berrybank's total waste management system. MTU Detroit Diesel Australia provided all system design, and assisted in all the electrical and mechanical installation, commissioning and aftersales support.

The unit generates 192 kWe of electricity to run the farm, in parallel mode with the grid, while the 214 kWth of thermal power is harnessed for heating within the pig sheds and for the heating of the digester tanks themselves.

"The plant can generate a total of 1,300 MWh of electricity a year that we feed into the state power grid," Jock says. The thermal energy recovered

from the engine coolant and the exhaust is used to heat the pig pens in winter. "The electricity we produce from the plant is enough to supply around 200 homes in the area," Jock states.

Today the farm saves \$180,000 per annum in electrical costs, as compared with \$120,000 savings achieved with their previously installed gensets.

Clockwise (from right):

Berrybank Farm's MTU Onsite Energy genset enclosure and (below) the Series 400, is helping Berrybank generate its electrical and thermal power requirements through biogas utilisation.



'This thing is awesome'

Enter Tony Vassallo, key team member for the project and a Commissioning and Technical Specialist at MTU Detroit Diesel Australia, who was responsible for the onsite mechanical and electrical installation. Having worked closely with the customer throughout the project, Tony took time out of his schedule to discuss the unique job with MTU Detroit Diesel Australia's marketing team.

Upfront Tony says, "this is a pretty steep learning curve, for us, this biogas business". But when discussing the intrinsics of the biogas module, he adds in a genuine and no fuss manner that "it's a very, very good engine – and a brilliant product".

Explaining the ground work that was required before and during the installation, Tony tells how he would, "consult with Jock and advise on the best possible way to install the engine" – offering insight and specification into what the mechanical and electrical installation needed to resemble.

"While Berrybank did the physical installation, we supervised the process and made sure it was done to our specification; and we also provided advice on lubricants, gas quality, compliance issues, and other matters that Jock needed to be aware of," Tony said.

From there, the team was tasked with the commissioning of the unit, to test the way the MTU Onsite Energy module integrated into all of Berrybank's systems, including their hot water and power systems. All this was coordinated with Berrybank's electricians.

"At this point, our team executed any software upgrades that needed to be made to the MTU Module Control (MMC), because we tailor the software specific to site," Tony explains. To do so, the commissioning team worked around the clock, liaising with its German counterparts at MTU Onsite Energy from 5pm to 1am AEST, to get the job done.



Above: Jock Charles (left), Director of Berrybank Farm is shown through the MMC's functionalities by Mohsen Elnashar (right), Controls Engineer at MTU Detroit Diesel Australia.



Left: The MMC is vital for the plant's around-the-clock requirements, allowing the farm's operators the peace of mind they need to 'turn the key and walk away'.



It's a very, very good engine – and a brilliant product



This thing is awesome, you just turn the key and walk away

“Once we’d installed it all and Jock got to see how the module actually performed, and the way that it tied into his plant, I think that he was satisfied beyond his expectations. I would have to say – he is a happy customer,” Tony informs.

Tony goes on to add: “When I get a customer phoning me, to say that ‘this thing is awesome, you just turn the key and walk away,’ that is a great thing. It’s rare that a customer will call you just to say, ‘hey man, this thing is running awesome.’”

“I think that Jock has been surprised with the engine; I think that he knew that he was buying a good product but he looked at it purely based on numbers. He said ‘yep, the numbers look good on this,’ but what he has got with our module is more than just great financial rewards.”

Regarding his early research into biogas generator options, Jock Charles says in a matter of fact manner: “I just knocked up a spread sheet with the likely payback of all the units and it (the MTU Onsite Energy unit) came out on top”. The financial

gains were grounds alone for Jock to opt for the MTU Onsite Energy product, although Jock, as well as MTU Detroit Diesel Australia’s engineering team, has since learned that the biogas module delivers a lot more than just cost saving benefits.

SO WHAT MAKES THE MTU ONSITE ENERGY UNIT SO GOOD?

MTU Onsite Energy’s CHP module at Berrybank Farm features electrical and thermal controls, engine and system protection via the MMC, and a heat recovery unit.

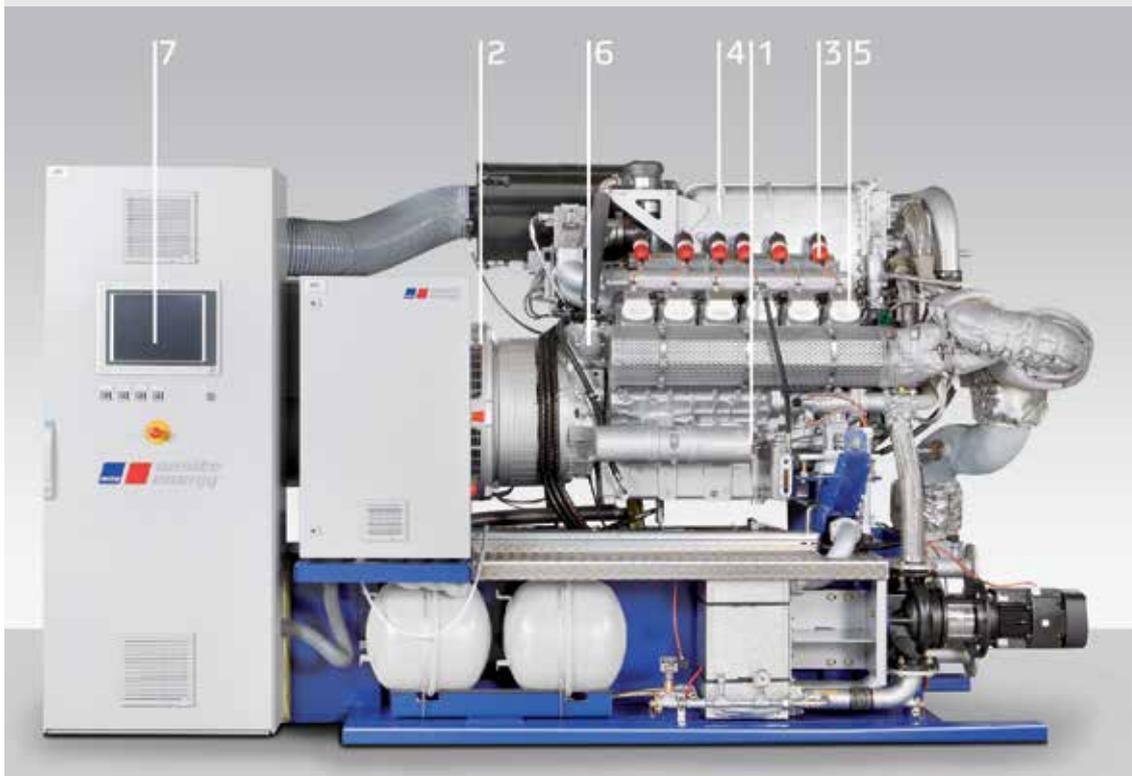
Working continuously, the biogas module is fuelled by 1,700 cubic metres of methane to provide 3,650 kW of cogeneration power daily, and delivering significant savings to the farm’s power and gas bills; with 50 per cent greater electrical saving achieved by the MTU Onsite Energy unit, (as compared with the savings achieved by the previous unit).

Below: The vast grounds at Berrybank Farm, a model in total waste management for Victoria and a pig farm success story.



SERIES 400 – INDIVIDUAL COMPONENTS

1. Gas engine – Advanced and proven gas engine from the Series 400, optimised for biogas use. Combustion chambers ensure the highest level of efficiency in this performance category.
2. Generator – Optimally tailored to the engine and made by renowned manufacturers, the generator ensures a high level of reliability and the perfect degree of efficiency.
3. Ignition system – Ignition systems for individual cylinders allow for the most efficient level of operation for all cylinders, even with variable methane content. The ignition voltage display gives customers information about the state of the spark plugs.
4. Mixture cooler – The two-stage mixture cooler with large surface area improves engine performance and heat utilisation.
5. Knock detection – Cylinder specific knock detection and regulation protects the engine from abnormal operating conditions and guarantees safe operation even with biogas, which contains high levels of methane.
6. Crank case ventilation – Improved crank-case ventilation minimises deposits within intake tract and combustion chamber and guarantees a continuously high level of performance.
7. MTU Module Control (MMC) – The MMC contains all the important functions necessary for controlling the plant. All the auxiliary drives required for the CHP plant can be operated from here. The integrated power circuitry minimises the need for cabling onsite. The MMC is housed separately in the control cabinet and is therefore hidden from sight.



Boasting ingenious technology, the Series 400 engine automatically adjusts its load by monitoring gas levels throughout the fermentation process; for greater efficiency. The module is renowned for its sophisticated yet compact design, reliability, with the highest available efficiency within its power range.

MTU Onsite Energy's compact module technology is based on the economical principle of optimising both output and benefit, and the Series 400 not

only offers high levels of electrical and thermal efficiency, with a fuel-efficiency level of up to 90 per cent and beyond, but many other benefits as well.

Advantages of MTU Onsite Energy's compact modules include:

- Space saving
- Supplied ready to connect
- Factory tested
- Available as uncovered or enclosed units
- Easy to maintain.

Contact our Power Generation team
via 1300 688 338 or penskeps.com

