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ENERGY CRISIS

Shedding light on new solutions



A hub of activity in bioenergy

In the face of Australia's energy crisis, a young bioenergy company has developed a novel solution that will allow manufacturers to use waste to generate energy. **Michael Hughson** reports.

AUSTRALIA is facing an energy trilemma, as government and industry struggle to chart a course for our future electricity grid while also balancing three competing priorities: keeping a lid on prices; reducing carbon emissions; and maintaining a reliable network.

The simple solution is to pick two and let the third (be it prices, reliability or emissions) fall by the wayside. At least as far as currently installed generation technology and energy market functionality goes, this would have to be the case.

Meanwhile, as politicians and regulators try to get a handle on the situation, Australian industry is feeling the pain of dramatically higher energy costs.

But innovative new businesses are filtering into the energy game, demonstrating to industry and consumers that, to paraphrase an old idiom, they can generate their electricity and use it too.

One such firm is Utilitas Group, a Brisbane-based

bioenergy specialist. A recent visit to its head office shed some light on the exciting ways it is looking at tackling the energy problem.

THE UTILITAS STORY

Utilitas is a youthful company, founded seven years ago with a mission to create energy, jobs and value from agricultural and

While Utilitas is a business and a profit-seeking enterprise, the firm is also passionate about creating shared value for the communities it will operate in. For group CEO Fiona Waterhouse, a big part of the inspiration for the business was her own recognition of an economic decline in regional Australia, and a desire to bring back regular and high-skilled jobs to regional communities.

"Over the past few decades, regional communities have been losing important services such as banking, medical care, and education. As we move to a circular economy and as resource recovery evolves to the next level, regional communities will be the big winners, as we've seen in other countries," she says.

"That's why I will not stop until we've built 100 bioHubs across regional Australia, and that's what gets me up in the morning – the idea of creating a network of regional bioHubs stimulating jobs and economies and positive creating social and environmental outcomes."

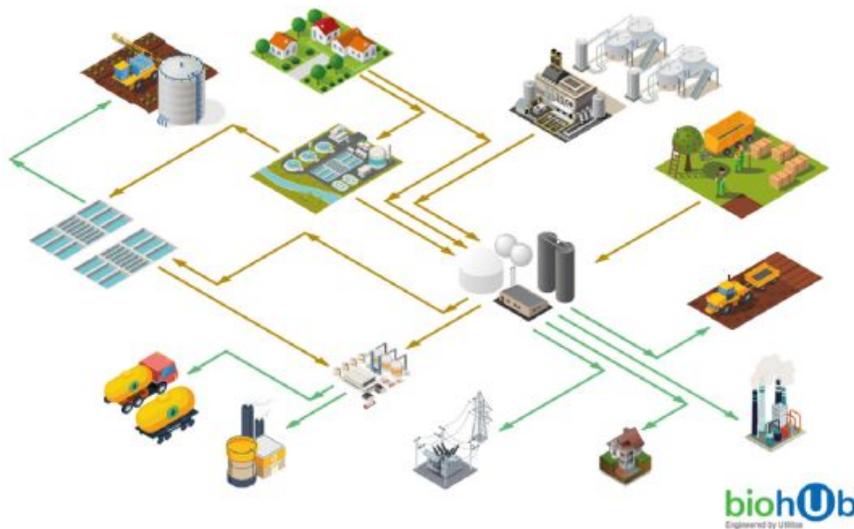
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BIOGAS PLANTS SUPPLY BIOMETHANE INTO GERMANY'S NATIONAL GAS GRID

industrial waste streams. The firm specialises in bioenergy (specifically biogas), and its frontline offering is the bioHub system. The bioHub processes organic waste streams, converting them into gas and fuel from which electricity (or natural gas) can be produced.



LEFT: The anaerobic digester used in the bioHub bioenergy system is effectively a large storage tank.

BELOW: A flowchart illustrating the regional bioHub model, and how it converts local waste into energy and other outputs for use in the community.



THE BUSINESS MODEL

Utilitas envisages itself as a service and infrastructure provider for industry and regional communities, bundling waste processing and electricity services together.

The bioHub systems are to be operated and maintained by Utilitas, with the firm offering long-term service contracts for waste processing and energy provision.

Utilitas' customers will be able to lock in a reliable power supply and price over the long-term. This is in sharp contrast to the current retail electricity market, where prices are projected to rise rapidly and with contracts only being offered on a short-term, one or two-year basis.

"Food and beverage producers are, of all the industry groups, the most exposed to the increase in energy prices, and the difficulty in securing long term gas contracts. They also have the greatest advantage in a bioHub model, as they have their own sources of organic waste," Waterhouse says.

"So instead, we are offering them a way to secure their energy future with their available waste supply, and they don't have to pay for it with our business model. A bit of feasibility work is needed from them, but there is no capital requirement beyond that. We provide the infrastructure as a service, and we charge a utility fee, meaning they can lock in long term pricing with just CPI increases."

"I will not stop until we've built 100 bioHubs across regional Australia, and that's what gets me up in the morning."

So, what do you need to get a bioHub going in your local area or at your site? The system requires an anchor tenant, which can provide a consistent flow of organic waste and waste water (required for the anaerobic digestion system) to make the facility economically viable. Examples of anchor tenants from planned bioHub

sites include a sewage treatment plant in Casino, NSW and the Bundaberg Rum Distillery in Queensland. With an anchor tenant secured, the bioHub can still process additional waste from, and supply energy to, the surrounding local area.

The system is designed to be flexible in its electricity output (depending on the needs of the anchor tenant) and can be designed to supply anywhere up to 1 MW of

electricity on a continuous, dispatchable basis if sufficient waste streams are available.

At present the bioHub will be a 'behind-the-meter' offering, with customers maintaining their existing electricity grid connections for added reliability. However, the intention is to load-follow the anchor tenant's needs, such

GLOBAL VIEW

PROVEN TECHNOLOGY

Waste to biogas systems are in fact a well-established technology. In other parts of the world they are a proven and reliable solution for waste processing and providing energy to local communities. Leading the way in this pursuit is Germany, with 10,000 biogas plants supplying 28,000 GWh/yr. This is 4.7 per cent of total Germany electricity production. There are also 178 biogas plants supplying biomethane into Germany's national gas grid.

The German model has served as an inspiration for Utilitas' bioHub system.





ABOVE: The Utilitas team from left: Environmental engineer Kate Mirskaya; former environmental engineer Nick Christy; CEO Fiona Waterhouse; chairman Bernie Ripoll; operations director Matthew Richards; and plant design and IT systems manager James Hurren.

that the grid connection will only need to be called on under exceptional circumstances. Coming changes to the operation of the national grid may even allow customers or Utilitas to trade electricity on a peer-to-peer basis in the local area, when demand for electricity from the anchor tenant is low

Of course, no start-up firm gets seven years into its life without facing some challenges. One of the biggest hurdles to overcome, notes Waterhouse, has been socialising the bioHub technology with businesses, engineers and operators.

The challenge, she says, stems from an underlying apprehensiveness in the Australian mindset when it comes to adopting new technologies that lack a long track record in this country.

“Food and beverage producers have enough on their plates. They don’t have time to work out how to integrate these kinds of technologies into their businesses.” Waterhouse concedes. “And what we are proposing isn’t just a case of adding new technology, it’s also a new business model.”

TECH OUTLINE

The bioHub system is relatively straightforward, however, from an engineering perspective. The equipment required is all off-the-shelf – pumps, piping, an anaerobic digester (effectively a large storage tank) and a reciprocating engine – which makes rollout of new facilities easier and simplifies its ongoing maintenance.

As Waterhouse points out, none of the equipment will be foreign to operators and technicians who currently work in regional Australia.

The system is also robust. The anaerobic digester (where waste material is converted into gaseous, liquid and solid fuels) is relatively large, and as such has a long residence time. This allows the system to handle upsets or deliberate variations in its feed materials, while

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THE MW OF GENERATION UTILITAS HOPES TO HAVE UP AND RUNNING BY 2025

maintaining a consistent fuel output for downstream energy generation. The upshot is an ability to flexibly absorb additional feed materials when they become available, such as when a crop is irreparably damaged by a hailstorm or cyclone.

Further down the track, the plan is to introduce more complex thermo-chemical processing units into the system. This will allow higher-value added products such as bioplastics and biocrude to be manufactured, bringing in additional revenue.

“Anything that you can refine out of fossil coal, oil, and gas, you can make out of modern organics like sewage and food,

beverage and abattoir waste. That’s a big aha moment that isn’t yet fully understood, and that’s what we are doing with the bioHub,” Waterhouse says.

“Anaerobic digestion, a mature technology, is at its heart. The next layer of development is in the upstream and downstream processing technology to create a platform for other refining opportunities such as chemicals and nutrient sources. That’s where the future of these projects lies.”

On this front, Utilitas is fortunate to have access to, and partnerships with, several leading Australian universities – Queensland University of Technology, Griffith University and University of Sydney.

WHERE TO NEXT?

With three projects under its belt, Utilitas is looking to extend its network of bioHubs around Australia. The next phase of development will see the rollout of a ‘Rapid 10’ for the next set of bioHub projects, and the opening of a satellite office in La Trobe, Victoria.

In the medium term, Utilitas hopes to have 100 MW of generation up and running by 2025. This is based on the extensive research it has carried out over the past seven years, during which the company has developed a rapid assessment tool for potential sites. Initial economic assessments can be completed within three hours of a client getting in touch. The company is encouraging firms and local councils to reach out, with a few spots remaining in its ‘Rapid 10’ rollout. *

RUM HUB

BUNDY’S BIOHUB

Utilitas has been tasked with repurposing the soon-to-be-retired Bundaberg East Wastewater Treatment Plant to convert organic waste from the Bundaberg Rum Distillery and other local agro-industrial counterparties into green electricity, for return to the distillery, and biocrude for the local marine industry.

The project will also involve the creation of a world-leading biotechnology and education hub for the future.

The project will be supported by the Queensland Government’s Biofutures program, and is expected to create more than 30 local jobs.

