gTET Hot Wire

The Heat Transformers

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News & Updates from green Thermal Energy Technologies

gTET remains open for business during COVID19

IN THIS ISSUE...

Turn-key solutions to transform waste into useful energy, delivering economic and climate change benefits

gTET

gTET specialises in innovative solutions at industrial scale for thermal energy management, in particular redeploying waste or renewable streams to reduce opex and carbon footprint.

gTET's revolutionary ORC generators enable thermal energy to be effectively converted into electrical power where this is the most efficient and effective use of the energy.

As we like to say here "*WASTE* is the new *OIL*"

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1. Projects:

Timber Industry Waste to Energy

gTET has designed and installed two ORC generator waste recovery systems for the timber industry.

In 2011 gTET installed its 60kW development prototype system at Reid Bros Sawmill in Yarra Junction Victoria. This installation successfully produced power for the site utilizing excess steam from the biomass boiler fueled from sawdust and shavings produced by the hardwood processing facility. The power station used a cooling tower for condensing and varied its output capacity according to biomass boiler pressure. This system deployed a screw expander and synchronous generator, prior to commercialization of gTET's leading turbo-alternator and, as such, had difficulty to provide sufficient modulation to match the small boiler load fluctuations typical of a synchronous system.

The project achieved awards for assistance to the timber industry

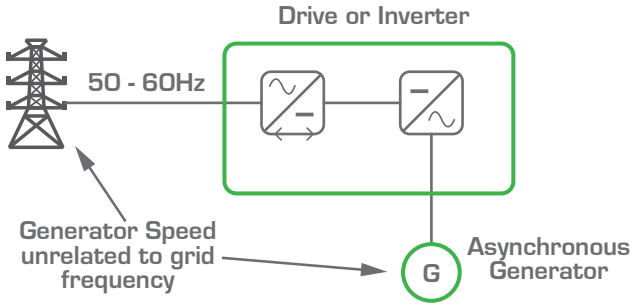
In 2014 gTET installed a 170kW system at Auswest Timber in Manjimup Western Australia. This system successfully produced power for the site, also from a biomass boiler fueled by the mills processing waste producing 8bar steam. The power station condensing was achieved using air condensers since the scarcity of water at the site meant that a cooling tower couldn't be used. The ORC generator deployed gTET's industry leading twin turbo-alternator and power converter which proved very successful in modulating its output to match the highly variable steam pressure impacted by regular cycling in the sites kiln and reconditioners.

gTET's experience in the timber processing industry has provided it good insight into the optimal waste to energy solution that compliments existing processes and enables biomass boilers to operate continuous levelised loads thereby maximizing life and minimizing maintenance.

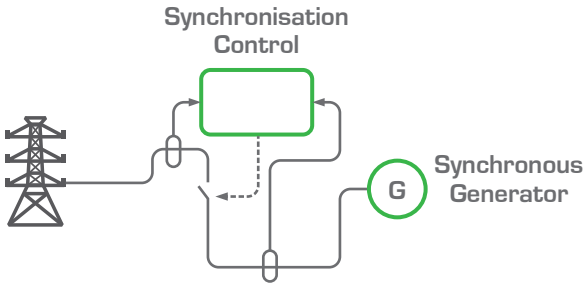
2. Technical Brief:

Benefits of Asynchronous Generation

Conventional power generation has applied inductive generators that are rotated at a constant speed (synchronous speed) necessary to produce 50 or 60Hz electrical output required to synchronise with the grid or if off-grid, the 50 or 60Hz AC expected by the loads. More recent developments in power electronic technologies have meant that the 50 or 60Hz electrical output necessary to synchronise with the grid can be emulated electronically so that the energy source to the power electronic system (drive or inverter) can be completely asynchronous to the output frequency.



Asynchronous Embedded Generation



Synchronous Embedded Generation

The asynchronous technology offers many advantages over synchronous power generation:

1. Upon starting, synchronous generators are disconnected from grid and must initially accelerate to synchronous speed upon which the speed must stabilise for a set time and with the alternating voltage phases between the grid and generating matching before an external controller electrically connects the generator to the grid. Energy consumed by the generator during the starting phase is wasted.

   By contrast an asynchronous system can be continuously connected to grid, even with the energy source idle, with any energy produced being transferred onto the grid. This issue is particularly relevant in installations where the generator may cycle a number of times each day so that the wasted energy in starting accumulates.

2. The synchronous generator must maintain a continuous speed typically within +/-5% of synchronous speed in order to remain connected to the grid. This means that if the energy source falls below a level sufficient to maintain synchronous speed the generator will trip.

   By contrast, since an asynchronous system remains connected to grid regardless of the energy source then the source can turn down to zero. This condition is particularly beneficial in highly fluctuating sources typical of many variable waste or renewable streams as well as those energy streams where the generation is supplementing other uses e.g where the generator is being used to levelise the load such as a biomass boiler. In fact, with gTET's asynchronous ORC generator the system can be operated with negative energy source or in other words the turbo-alternator acts as a motor.

3. Since the alternating voltage and current is created by the power electronic control system associated with an asynchronous generator it can adjust the phase angle between the output voltage and current thereby impacting the power factor. In doing this the embedded asynchronous generator can improve a sites power factor by applying an opposite power factor to that normally exhibited. This was the subject of gTET's Hot Wire newsletter issue 1 in Jan 2020 illustrating the commercial efficiency benefits of power factor improvement.

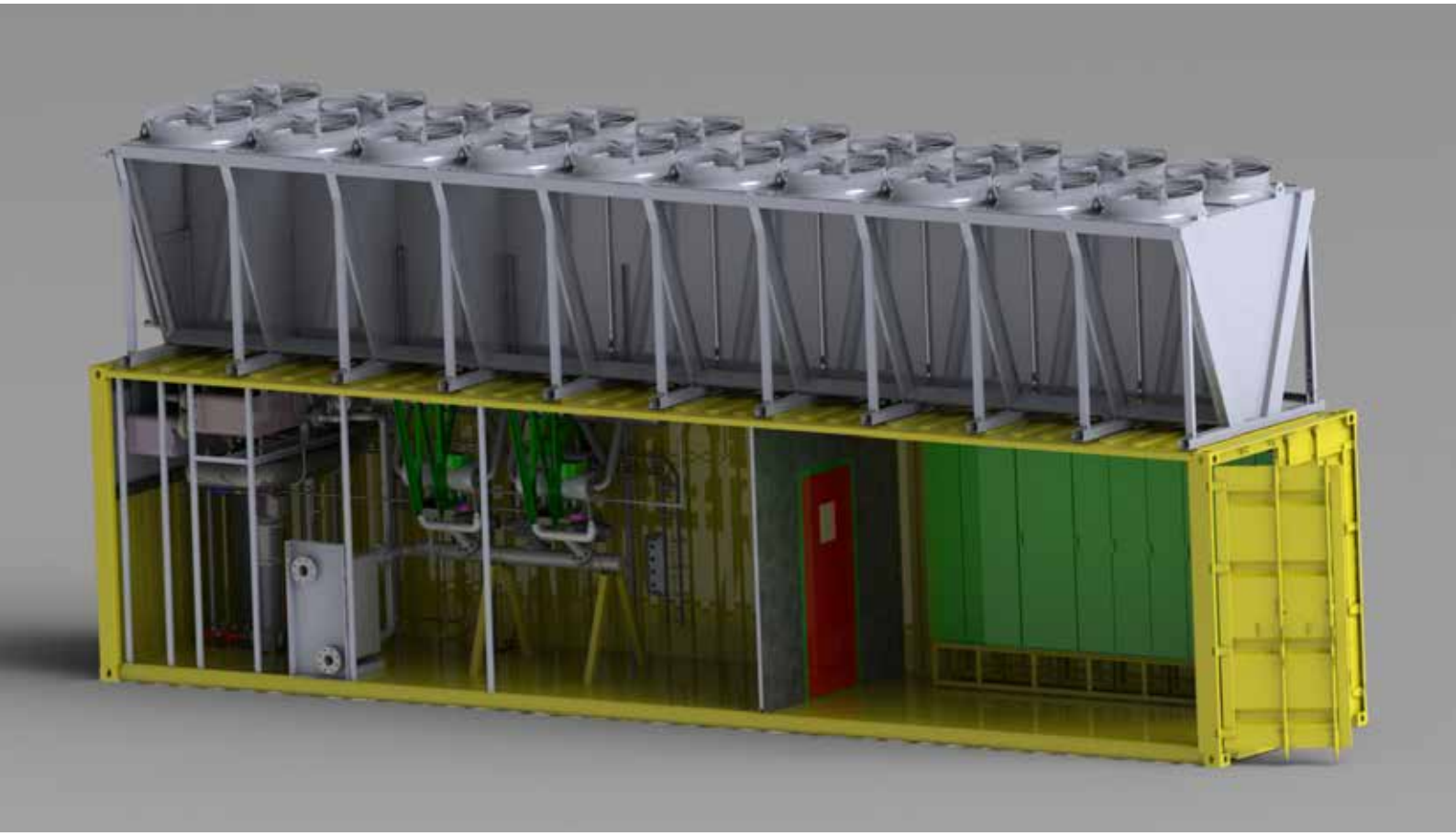
4. As asynchronous generators don't need to operate at grid frequency they often operate at much higher speeds thereby reducing the physical size. For example gTET's turbo-alternators operate at 45,000rpm and are physically in the order of 7-10 times smaller than equivalent synchronous generators. This reduces floor space requirements and often cost.

5. The inverter based asynchronous rotating generators often use Permanent Magnet alternators (which themselves are synchronous with the inverter) which can deliver overall system efficiencies in excess of 95%, superior to induction synchronous generators with a maximum efficiency of 90% resulting from slip and coupling losses.

In summary, the advent of very efficient power electronics provides the market significant operational and commercial benefits in asynchronous embedded generation systems.

gTET's fully contained outdoor ORC generator

Just connect the heat source (water, steam, exhaust gas, oil etc) and 3ph power start generating!



Contact gTET today to find out how our fully contained outdoor ORC generator could benefit your operation.

Be sure to follow gTET on

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