Far and wide: Efficient, flexible biomass for the next generation

Biomass to power

It is not just people who sometimes struggle to combine intensive and extensive behaviours. Biomass generators have often failed to address both of these challenges simultaneously. Boasting the capability to process a wide range of feedstocks whilst also operating on high efficiency levels is the ideal scenario for biomass generators — but it remains an aspiration for many in the industry.

HRS Energy, however, is taking major strides to make this a reality.

The challenge

The experience of most of those seeking to generate renewable energy from biomass is that the feedstock that arrives at the warehouse door comes in many shapes and sizes. This is especially true of generators running sustainably on waste wood and forestry trimmings, rather than standardised (and frequently imported) pellets. Whilst shape and size is itself rarely a problem, with ever more shredding and processing tools available, what is more challenging is when materials arrive with varying levels of moisture content.

High moisture content in feedstock can inhibit combustion in biomass boilers and cause the furnace temperature to decrease. This lower temperature, in turn, slows combustion, further decreasing the furnace temperature and causing yet more delay. This downward spiral can eventually lead to a boiler ceasing to function - unless the biomass moisture content is reduced or the auxiliary fuel flow rate in the boiler is increased to keep the furnace temperature high.

As such, running plants that can process a wide range of feedstock, including those with high moisture content, often comes at the cost of efficiency — and therefore environmental performance and profitability. Many generators will therefore simply avoid high-moisture, hard to process feedstocks entirely — consigning them to landfill or leaving them to rot in the open air.

Combining technologies to drive flexibility through efficiency

HRS Energy's Advanced Biomass Power Generator (ABPG) tackles this challenge head on. The ABPG is a full-service power plant, combining several HRS patented world-leading designs to create the most efficient biomass generation available on the market — with the lowest cost per megawatt of any comparable facility. This efficiency performance is so profound that it effectively tackles the downward spiral described above, and means that the ABPG can handle feedstocks with a moisture content of up to 65%.

HRS uses a 'STABB' fluid bed in its combustion system - a simple, low cost design, offering multi-fuel capability with unbeatable reliability, efficiency and clean combustion. The fluid bed is comprised of finely sieved sand, limestone or ash, which is fluidised by a stream of high pressure air. The behaviour of the bed is similar to that of a boiling liquid, with vigorous movement and mixing. Air, fuel and hot bed material mix, intimately creating rapid heat transfer and efficient combustion, and therefore high levels of efficiency and low emissions.

With this technology the ABPG can convert a wide range of biomass products and waste into useful heat and power. Doing so with high economy is the next challenge.

HRS stands for Heat Recovery Solutions, and this is where the company originally made its name. Though the fluidised bed generators are already some of the best in the industry, what makes the technology go further still — and provides truly revolutionary potential for the energy sector — is the size, weight, flexibility, and efficiency performance of the bespoke waste heat modules which capture and reuse the energy created in the combustion process.

The circular steam generators and waste heat recovery units use less steel than competitors and are highly engineered and configured to be lighter, cheaper, quieter, and more efficient than any comparable technology.

Moreover, both the fluid bed generator and heat recovery boiler incorporate a "bi-efficiency" radiant furnace that is unique within the industry — with an advanced condensing economiser further improving overall efficiency by around 6%.

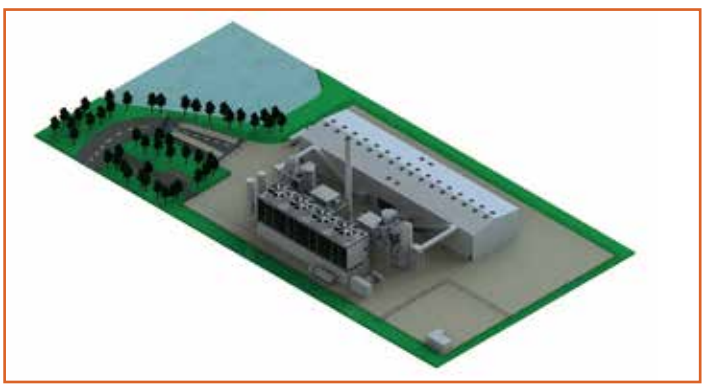
Overall, the APBG runs at a cycle efficiency of between 30-90% (depending on the heat to power ratio).This efficiency, brought about by the combination of these proven technologies working in tandem, means that ever more feedstock becomes 'fair game' for the ABPG - opening up new markets where generating renewable energy using biomass has not previously been possible. This includes some of the wetter parts of the UK (and beyond), where forestry and waste wood residues had previously been considered too damp — effectively wasting this resource.

The Advanced Biomass Power Generator in action

The first operational Advanced Biomass Power Generator can be found near Tansterne in East Yorkshire, UK, having been constructed in just more than 15 months. This is in itself remarkable for a plant of its size (21MW) — and owes to the modular design of the facility.

With significant orders being negotiated in countries such as the US and Mexico, and other sites being planned elsewhere in the UK, Tansterne will be a vanguard for a new generation of hyper-efficient biomass plants globally.

In so doing, HRS is answering a question posed by many bioenergy executives. It is through pursuing greater efficiency that the capacity for flexibility is created. ●



Computer generated image of the advanced biomass power generator at Tansterne

For more information:
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