



## Wood gasification projects may be hard work but worth the effort

Energy generation through wood gasification potentially offers a profitable investment for those with the skill and desire to take on this complex technology.

**Paul Spackman**  
reports

**G**asification technology has had a chequered past in the UK, but improved system designs and better understanding of the processes could open it up to more rural businesses in future.

Nick Helme at Wharton Farms near Leominster, Herefordshire, supports the technology. He installed two gasifier units in January 2015 and plans four more engines later this year.

"There have been a lot of problems in the history of gasification. Most are associated with old systems not cleaning gas properly, which means they need constant attention and tweaking of controls."

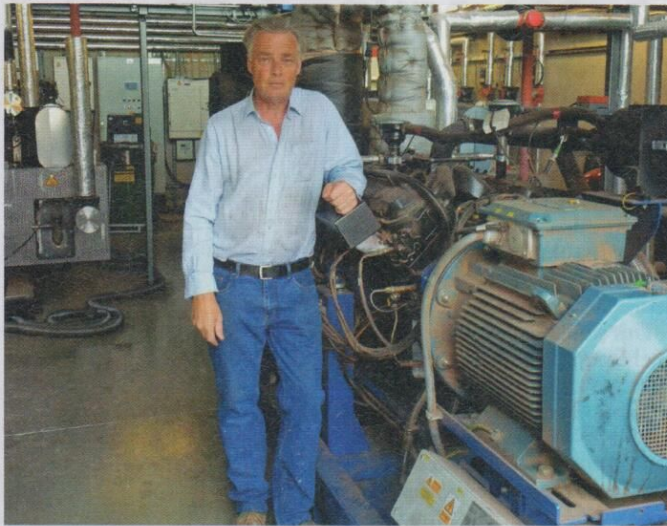
Automated computer controls mean modern systems are more reliable, he continues. "It's still not for the faint-hearted. Complexity is almost halfway between a biomass boiler and an AD plant."

### KEEP IT SIMPLE

Mr Helme, who has worked as a consultant engineer on waste-to-energy projects for 20 years, believes gasifier systems must be kept relatively small to be successful.

At Wharton Farms, two German-built Spanner Wood Cogeneration Systems were installed in an existing 50x20ft shed. They have capacity to produce 45kW of electricity and 108kW of heat each.

"Spanner has built over 400 gasifier systems and the oldest is seven years old and still running. Ours was a UK first so a huge leap of faith."



**Nick Helme: Gasification brings challenges but has cut electricity bill by 80%.**

Planning regulations are similar to those for biomass boilers, so if the unit is within an existing building planning permission may not be required. However Ofgem requires confirmation from the planning officer, he says.

Although equipment used to gasify woodchip is far more complex than a biomass boiler, the engine used to generate electricity at Wharton Farms is a basic V8 Chrysler adapted to improve its running on gas. "It's simple to repair and maintain and cheap to replace, at around £7,000."

Heat is recovered via a water jacket around the engine and exhaust, with warm water piped to where it is needed. "It's expensive to pipe heat, so the unit has to be close to a potential demand."

Likewise, each gasifier and engine

### What is gasification?

\* Gasification involves heating carbon-based feedstocks (such as woodchip) at high temperatures (800-1,200C) with a restricted air supply. This produces combustible gases, including carbon monoxide, hydrogen and methane, for use in engines or generators to produce electricity and heat.

must be located close together as piping gas long distances can cause problems with tar and condensation, he adds.

Feedstock is dried woodchip (<10% moisture) from logs cut and chipped on the farm and from fresh chip bought-in and dried on-site. About 1kg of dry chip is used per kWh of electricity produced per engine, he notes.

"Dry woodchip is crucial. Anything wetter than 10% causes immediate problems, such as tar and residue build-up on pipes or sensors and can coke-up engines."

### ENSURING SMOOTH RUNNING

Gasifiers share many features with conventional biomass boilers, but are far more complex and require a lot more attention, says Mr Helme.

"They need checking at least twice daily, morning and night, and you have to be prepared to spend time fixing any issues, which can be simple things like dust or soot on a sensor, to bigger issues such as a coked-up engine."

"Gasifiers are very fickle. Sometimes they run perfectly for five days, or they can stop five times in an hour."

Despite this, engine downtime for servicing and stoppages has been lower than expected, with units typically running 20 hours a

day. This results in an annualised running time of just over 7,000 hours. The budget is for each engine to be replaced after 15,000 hours, but experience so far shows this is probably pessimistic.

### PAYBACK

Wharton Farms' system cost about £500,000 to install, with each gasifier and engine accounting for £125,000. Building works, wiring, heating pipes and other infrastructure make up the remainder.

Gasifiers are relatively unknown to banks, so finance can be an issue, notes Mr Helme. "We had to fund it through a combination of sources, including a German finance company."

Wharton Farms uses most energy on-site, with electricity supplying cold stores and rented-out workshops. Heat is used in workshops and for drying woodchip and other materials on a commercial basis for a third party.

"We've reduced our electricity bill from £5,000/month to £1,000, which is very useful, but is not the main benefit."

The biggest income is from the double ROCs (Renewable Obligation Certificates) received on all electricity generated, worth 8.4p/kWh. The Renewable Heat Incentive (RHI) of 7.6p/kWh is also paid on all heat from the CHP engines.

That equates to a payback of just under three years. "Cost is considerably more than a biomass boiler, but the return on capital is much better."

The additional four engines will turn the farm into a net energy producer and, with much of the preparatory work already done as part of the first system, Mr Helme expects the extra units to pay back in just two years.

"With this kind of return, we can look at employing a fitter to maintain the systems full time."

"However, for anyone building a system next year I'm not sure how returns will look under Contracts for Difference (which replaces the RO) and if RHI tariffs change following the spending review."