

“ If the world is to achieve net zero carbon by 2050, then farming will have to play its part. ”



Machinery Masterclass

The future is now

In a world first, New Holland aims to have its T6.180 Methane Power tractor available commercially by 2022. *CPM* delves into the technical details, as well as talking to one Essex farmer who has been testing the pre-production model.

By Charlotte Cunningham

When you hear the word ‘methane’, what do you think of? Ruminant flatulence and climate change? Both perhaps rather negative connotations...

But what happens when we start to think about ‘methane’ being a help, rather than a hindrance?

And it’s exactly this notion that has led New Holland to develop its T6.180 Methane Power tractor — powered by biomethane — an eco-friendly alternative to conventional fossil-fuel natural gas.

Unlike the methane that comes out of the backend of a cow, biomethane is a naturally occurring biogas, which is also a

by-product of anaerobic digestion. From a chemistry perspective, it looks pretty similar to natural gas, but there are a few key differences, explains David Redman, tractor specialist at New Holland. “With biomethane, farmers can make use of agricultural or animal waste — as well as specifically-grown energy crops — to generate the gas, which powers the tractor, which, in turn, helps to grow those very crops.

Imminent availability

With an aim of full commercial availability anticipated by next year, it may not be long before we see these eco-friendly workhorses whizzing around fields, but getting to this stage has been the product of 15 years of research, development and investment by New Holland, says David. “In 2006, the firm declared its ambition to be the ‘Clean Energy Leader’ in the tractor sector — but what did that really mean?

“The long and short of it is that we wanted to be the first — and the best — manufacturer to provide a feasible alternative fuel option. We know that the T6 Methane won’t suit everyone, and in the short term, we completely acknowledge that it can’t fully replace diesel. But for us, it has been about creating a viable solution — which we believe we have done.”

In 2009, New Holland debuted the Energy Independent Farm concept, which was linked to the goal of being a Clean Energy Leader, based on the idea of being able to fuel vehicles from the land, to work on the land — meaning a farm would potentially be able to produce its own fuel to power its own kit, he adds.

And just four years on from that, in 2013 New Holland was able to showcase its first methane-powered prototype — an impressive feat in such a short space of



David Redman says it was New Holland’s ambition to be the first – and best – provider of an alternative fuel solution for growers.

time, some may say. "A second-generation prototype was developed a couple of years later and by 2017 we'd really been able to refine and perfect the design, allowing us to manufacture the first pre-production model — the T6.180 Methane Power."

The T6.180 showed itself to the world officially at Agritechnica in 2019, where it scooped top prize in the sustainable class of the Tractor of the Year awards.

Looking at the nuts and bolts, today the Methane Power T6.180 comprises a repurposed six-cylinder NEF engine, with performance matching its diesel-powered equivalent by delivering a pony count of 179hp, and David says there are actually many similarities between the two. "If you compared the two tractors, from the front of the cab to the back, it's exactly the same as the diesel T6.180 — exactly the same transmission and layout, even the fuel gauge is in the same place. We were adamant when creating the Methane Power that it wouldn't compromise on performance.

"The key visible differences are the fuel tanks and, under the bonnet, the top half of the engine. This is a gas-only rather than a dual-fuel machine — although it can also run on liquid natural or compressed natural gas should biologically-produced

methane be unavailable."

The front-mounted 'range extender' unit — which also acts as ballast, weighing in at 850kg — can be replaced with a front linkage and PTO if required, or removed for loader work.

Similarly to the diesel-powered model, engine service intervals remain at 600 hours, adds David.

"The engine has been specifically developed by FPT Industrial — which has over 20 years' experience producing natural gas engines. So users can be confident in its performance."

With a maximum 453 litres of gas capacity, the tractor holds sufficient fuel for around eight hours of road haulage or PTO work using maximum boosted power, rising to 14 hours for operating something like a cattle feeder.

"As a rule we don't see the T6.180 Methane Power being used as a heavy tillage machine — for now this is where diesel retains a place," says David.

"It's ideally suited, though, to road and field work on a farm with its own AD plant/biodigester that can be used as a fuel source, providing the opportunity to refill as required at very low fuel costs."

Compared with its counterpart, David



With biomethane, farmers can make use of agricultural or animal waste — as well as specifically-grown energy crops — to generate the gas.

says users can expect to see both financial and environmental benefits. "We're estimating about 30% lower running costs," he explains. "As well as this, by producing 99% less particulate matter and reducing CO₂ emissions by 10% — and overall emissions by 80% — biomethane makes near zero CO₂ emissions achievable." ▶

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Ben Sell has been testing a pre-production model of the T6.180 at his farm in Essex.

▶ With the initiative behind the development of the T6 Methane Power aimed at farmers generating their own fuel from their own land, Essex farmer, Ben Sells' 0.5MW anaerobic digestion plant made him the perfect candidate to test the pre-development version of the tractor.

Based near New Holland's factory in Basildon, Ben and his family run a farming and contracting business with a wide range of enterprises, including beef, sheep, arable crops, contracting, and of course, the AD plant.

With blue and yellow being the livery of choice for some time on the farm, Ben was asked if he'd be interested in testing new tractor developments. "We didn't expect our first machine to be methane-powered, but I was really intrigued to see if/what the differences were between this and the standard diesel tractor."

After arriving on the farm in February this year, Ben says his initial thoughts were that it looked pretty similar to the diesel version. "The only real difference we could spot at first was the additional front fuel tank, but everything else looked much the same."

Breaking it in gently, Ben's first job for the

Opportunities ahead

With an identical make up to natural gas, biomethane can be used as a renewable source for some applications natural gas would, including water heating, and in this instance, fuelling vehicles.

"Biomethane is most commonly produced from energy crops and waste to power a static gas engine that then produces electricity," explains David. "With biomethane plants sometimes not at full capacity and excess gas having to be flared off, there is potential here for this to be tapped and stored for vehicle fuel."

"We see the farmer of the future as being not only a food producer, but a producer of energy — of gas, electricity and fuel. There are farmers currently who have anaerobic digesters in good locations potentially suited to supplying road vehicles. And of course there are municipal users already operating gas-powered vehicles."

"But there are other biomethane access options. These include a virtual pipeline — an

HGV lorry trailer containing gas-filled pipes delivered to your location. Here you connect the hose and the pressure difference fills the tractor, and because it's a wheeled unit there are no installation issues. There is also potential for co-operatives to do this, or perhaps for a digester on one farm serving others."

As an alternative, across the UK there is a massive gas grid network, maintained and run by four key companies. Each can tap into the gas grid to allow creation of individual filling stations, he adds.

"While the UK is a little way behind some other countries in Europe in adoption of gas vehicle power, it is undoubtedly growing here, and while our role is as tractor designers and manufacturers, we have developed strong relationships across the gas industry, and can point potential methane tractor purchasers to the right people to talk to for infrastructure support."

Methane Power was haulage. "We also used it for PTO jobs, including chopping straw for cattle.

"We've worked with engineers to develop software to help fine-tune the torque curve but apart from that, it has been problem-free and we're impressed with the performance."

Since its arrival, the tractor has performed an array of tasks including topping grassland, applying digestate with a 16,000 litre slurry tanker and rolling spring cereals.

"We've also done some maize drilling, and some subsoiling with a twin-leg Keeble subsoiler, plus a lot of trailer work and operating a 9m rake for silage.

"After removal of the front supplementary methane tank we were also able to fit a loader, using it to help clamp silage, and to load the feedstock into the AD plant, completing the circle in terms of farming for fuel."

Ben adds that it's notably quieter than a diesel equivalent. "We also paired it with a 3m Lemken Zirkon power harrow, and at

Methane power – how does it work?

During a global webinar earlier in the year, New Holland's Europe vice president Sean Lennon explained that by producing their own sustainable fuel, farmers would be protected from fluctuating oil prices. "They could also create an additional revenue stream by feeding surplus energy back into the grid, or save up to 30% in fuel costs by using the biomethane they generate to fuel their farming equipment."

But how exactly does methane-powered equipment work?

David says that the cylinder head is where the real point of difference is. "Whereas conventional models work by using a diesel injection, the Methane Power comprises gas injectors and spark plugs, with the gas injected into each cylinder to produce constant, clean combustion."

Instead of diesel tanks, the T6.180 is instead

laden with 10 gas tanks which all vary in size, he adds. "The reason there are some smaller and some large tanks is to keep the pressure even. As the gas is used by the engine, if they were all the same size, the pressure would drop easily and rapidly — this way, we're able to maintain the pressure equilibrium as the gas is consumed."

In the absence of a traditional diesel engine, David notes that a much simpler after-treatment system is able to be used. "We've done away with the selective catalytic reduction system, instead replacing it with a simple three-way catalyst. Similarly to a petrol engine, this uses precious metals to clean up the gases."

For those interested in knowing how their conventional tractor stacks up against the T6.180, New Holland's website features a handy calculator which illustrates how much growers could save —



New Holland's online calculator illustrates how much growers could save by using the methane-powered T6.180

in terms of both pounds and pennies and CO₂ — if they were to optimise methane power. "These figures are based on red diesel values," explains David. "So for those thinking about using the T6.180 for hedge cutting or municipality, for example, there are even greater savings to be made."

2000 engine rpm there was considerably less in-cab noise.”

The on-farm AD plant is gas-to-electricity, as opposed to gas-to-grid and, at present, produces just 70-75% methane, meaning a virtual pipeline system from a lorry trailer is used to fill the tractor.

However, Ben says that going forward it may be possible to produce gas to the quality required by the T6.180.

Thinking about how to get the best from the tractor, he says fuel efficiency is at its optimum when carrying out low-torque, non-draft work, or on tasks requiring 1500 rpm or less. “This includes jobs like loader work, operating the feed wagon and fertiliser spreading. With these kinds of jobs, a full tank of fuel will last you about eight hours.

“We’ve done some draft work with it, however, I’d say that those jobs don’t make up much of many mid-range tractors’ workload anyway.

“In my opinion, the biggest benefits come from top and road work — with the fuel efficiency and lower noise levels being a really big plus point.”

But above all, Ben says that having machinery that they are able to supply their own fuel for is a hugely attractive prospect — not just from a financial point of view. “If

Being able to produce their own fuel is a hugely attractive prospect, says Ben Sell.

the world is to achieve net zero carbon by 2050, then farming will have to play its part. We’re already producing natural fuel for our digester — maize, wholecrop silages and grass silage — and adding waste manure from our own livestock and local dairy and chicken farms. While that’s currently used to power a gas engine and generate electricity, I’m really excited by the prospect of potentially using gas from it to power our own machines.” ■



Machinery Masterclass

Technology is advancing fast, and the capabilities of equipment found on farm far outstrips what was available just five years ago. For growers who embrace the change, the potential to cut cost, refine production systems and boost output is immense. But how can you make an informed choice about whether an innovation will deliver the refinements you seek if you’ve not operated it before? This is where Machinery Masterclass comes in. In this article, sponsored by New Holland, CPM has worked

with the manufacturer to get a true user experience and an insight into the technology advances it has introduced. We hope this will bring you a ‘try before you buy’ feel for specific features found on this item of machinery and help you remain at the forefront of progression in crop production.



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