PRESS RELEASE

New Holland Agriculture unveils methane powered concept tractor and its vision for the sustainable future of farming

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Can you imagine a farm of the future which is completely energy independent, satisfying all of its own fuel and energy requirements, as well as those of the local community? Now try imagining that same farm achieving this using waste products. That's what the engineers and designers at New Holland did. And they've done more than just imagine it. They've delivered it.

Farmers could spearhead the move away from fossil fuel powered vehicles towards renewable sources, by using a 'closed-loop' virtuous cycle that powers tractors using energy produced from their own land and waste products. That's the thinking behind the new methane powered concept tractor from New Holland Agriculture, a global agricultural brand of CNH Industrial N.V. (NYSE: CNHI / MI: CNHI).

This concept features a reimagined tractor design, which is a clear departure from anything seen to date in agriculture. The New Holland methane powered concept tractor reflects the increasing importance and viability of alternative fuels in farming, and of creating fuel from crops, agricultural waste and waste from the wider food industry. New Holland has proactively combined alternative fuels and advanced agricultural technology to create a modern, sustainable solution to the need for 'future-proof' power, with readily available and proven powertrain technology.

Proven expertise in natural gas powertrain technologies

CNH Industrial's brands have a long history in developing and commercializing natural gas-powered vehicles, and they are the market leaders in this area. Since pioneering natural gas technology 20 years ago, FPT Industrial, the powertrain brand of CNH Industrial, has produced more than 30,000 natural gas engines, running on both compressed natural gas (CNG) and liquefied natural gas (LNG). There are some 22,000 natural gas powered vehicles from CNH Industrial's truck and bus brands IVECO and IVECO BUS on the road today, making them the absolute European leaders in this segment. Capital cities as diverse as Astana, Baku, Madrid and Paris have chosen natural gas-powered IVECO BUS fleets to transport their citizens.

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Today, there are some 5,750 gas-powered IVECO BUS products on the world's roads. CNH Industrial and IVECO are also working with world governments, such as that of Israel, with whom they have established a cooperation to develop alternative fuel and natural gas-based technologies. In addition, FPT Industrial is working on a range of hybrid and electric propulsion solutions, with some 1,200 IVECO and IVECO BUS vehicles powered by this technology produced to date.

A complete range of alternative fuel solutions

This broad experience in alternative fuels has brought considerable benefits to the development of New Holland's methane powered concept tractor in terms of viability, reliability and proven technology.

New Holland itself has a rich history in this area, and a key pillar of its Clean Energy Leader Strategy, which encompasses all areas impacting sustainable agriculture, is to develop products that can help produce and use alternative fuels. Having led the way in 2006, as the first manufacturer to offer 100% biodiesel compatible products, enabling farmers to grow their own fuel, New Holland went on to create the world's first hydrogen tractor concept: the NH^2™, and has proven the feasibility of this in agriculture. In 2009, New Holland launched the concept of the Energy Independent Farm™ system to accelerate the adoption of alternative fuels, and since then, has been actively pursuing solutions to make it a reality. In 2012 this lead to an initial propane powered tractor prototype, which demonstrated New Holland's commitment to finding alternative fuels which deliver reduced emissions and lower running costs. This work culminated in the development of the first methane tractor prototype in 2013, and two further iterations were subsequently released and field tested in farms in agricultural realities as diverse as Brazil, the Czech Republic, France, Italy, and the UK.

Powerful methane engine technology from FPT Industrial

The new methane powered tractor concept represents a significant technological advance, building on the foundations of previous prototypes. It uses an FPT Industrial engine which has been specifically developed for agricultural applications and delivers maximum power of 180hp and maximum torque of 740Nm – identical to the equivalent diesel powerplant. The engine features stoichiometric combustion technology, which has been developed by FPT Industrial, and was first introduced in 1995; it is applied across the entire natural gas engine portfolio as it

enables comparative performance to diesel engines, whilst delivering ultra-low emissions and high efficiency.

The methane powered concept tractor features advanced fuel tank design that enables day-long autonomy. In addition to farm-grown energy crops, crop residue and other waste products are used to produce biomethane, the resulting fuel has a virtually zero CO_2 profile – and delivers an 80% reduction in overall emissions.

The concept's powertrain develops the same power and torque as its standard diesel counterpart, meaning identical infield performance. And this is achieved with a 50% reduction in drive-by noise levels, which makes it ideal when working in the yard, especially around livestock and in municipal operations.

The virtuous cycle: the benefits of biomethane

Biomethane is produced using a cyclical system that delivers CO_2 neutral production. It particularly suits on-farm use by agricultural vehicles as farmers already possess the raw materials and the space to produce the gas. This enables agribusinesses not only to be fuel sufficient, but also energy sufficient, as biomethane can also be burned to generate electricity to power farm buildings as well as to satisfy any heating requirements. In addition, it can be fed into the gas grid for domestic requirements, and can be used to create electricity to be fed into the national grid to power communities, creating a truly virtuous cycle.

Biomethane can be produced from a mixture of specifically-grown energy crops and waste plant or food material, the latter in both liquid and solid forms. This material is either harvested from the fields or gathered at the farm from sources such as food factories, supermarkets and restaurants and canteens, and is fed into a biodigester. Here, in the absence of air, it is heated and begins to break down biologically as it is digested by bacteria, much like any compost heap. As it does so, it gives off biogas – including biomethane – in a two-stage fermentation process lasting around 60 days. This is eventually refined to produce fuel-grade biomethane, a product which can then be used to power the tractor.

Known as digestate, the liquid and solid waste plant materials collected from the digester after gas production has ceased, have a high nutritional profile, and are used as fertilizer, on the fields that are then sown with next season's crops.

In this way, farmers can produce their own CO_2-neutral fuel, while also protecting themselves from fluctuating oil prices, as well as benefiting from significant running cost savings of between 10 and 30 percent over buying-in diesel. In addition, they can turn waste products such as animal manures, crop straw and waste food into energy, and can benefit from an additional revenue stream by selling biomethane to third parties to fuel their vehicles. And even for farmers who do not have the resources to produce their own biomethane, the New Holland methane powered concept tractor can be powered by 'conventional' network methane.

A full day's autonomy

To make optimal use of space, the tractor's fuel is stored within tanks produced using a composite layered tubular structure within a sleek and integrated storage structure fitted at the front of the tractor, together with two tanks on the left and right of the machine. This new layout enables a full day of farm-work autonomy. The tractor is as easy to refuel as one powered conventionally with diesel, using a single nozzle, and with comparable filling time.

Due to the reduction in polluting emissions arising from methane combustion, a simplified after treatment system is used, which features a maintenance-free single standard catalytic converter.

All-round farming versatility

New Holland's concept methane powered tractor is able to complete all of the tasks that a standard diesel powered equivalent would undertake. From yard work to transport, high speed field work, cultivation and heavy draft activities such as ploughing through to loader work feeding animals and loading grain, the concept methane powered tractor delivers outstanding agricultural versatility in a productive and sustainable package.

Futuristic unique agronomic design

CNH Industrial's international design team have reimagined tractor styling, and created a vision for the future of tractor design. Key New Holland styling cues have been accentuated, such as the aggressive hood air intake gills and combined with futuristic elements including the wrap-around hood, which extends into the 'collar' of the cab, integrated front fenders to create a flowing design and a custom metallic blue livery. A complete LED lighting package features New Holland

signature lighting, with lights integrated into the front tank, front fenders, hood and roof mounted work lights, roof mounted stop lights and aggressive rear fender lights to offer unsurpassed levels of in-field visibility.

A range of technologically advanced materials have been used to enhance the operating environment, to increase comfort and reduce fatigue. The new seat, which evokes the form of a stylized New Holland leaf, has been produced in a wick-away fabric with a honeycomb structure. This fabric facilitates air circulation and keeps the operator cool in hot weather and insulates them in cooler periods. The layout of the cushions further enhances air circulation.

Ultimate visibility from the fully glazed cab

The methane powered concept tractor's cab features a design that is radically different from the operator's usual workplace, aiding safety, productivity and comfort. Advanced features include:

- Wrap-around glazing provides 360-degree visibility, with a 20% increase in the glazed area compared to a standard tractor.
- The floating domed roof creates a completely panoramic design – an agricultural first – and will enable operators to view a front loader throughout the entire operational arc, aiding tasks from loading digestate to feeding cattle.
- The use of 360-degree viewing cameras eliminates the need for wing mirrors, with the surrounding view displayed on the fixed hub steering wheel display. Wireless cameras can also be attached to implements operated by the tractor, for close-up viewing of performance.

Ergonomic, intuitive and connected operation

A smartly-designed integral right-hand armrest is an exercise in minimalism, resulting in a clutter-free tractor cab operating environment. All essential controls are instantly accessible, and additional parameters are controlled through the interactive headliner display. The integrated controls feature:

- Ergonomic joystick to control the front loader;
- Gear and range shift buttons;
- Hydraulic paddles to manage rear mounted implements;
- Throttle control;
- PTO engagement and control.

The entire armrest is attached to the seat, so it swivels in conjunction with the seat itself, enhancing ergonomic operation when working with rear mounted implements such as mowers and ploughs.

The fixed hub steering wheel mounted display cluster remains in a fixed, upright position, independent of the position of the steering wheel. This display provides immediate access to the most frequently consulted operating parameters including:

- Forward speed, engine temperature, engine speed, direction of travel, fuel gauge and gear selected;
- When driving on the road a navigation map and in the field guidance path information;
- When conducting road transport, the view from the rear facing cameras replacing the wing mirrors, and when in the field a 360° bird's eye view. When reversing, a camera system provides assistance with maneuvering.

The headliner display is located to the top right hand side of the cab, and has been positioned so that the operator can view it at a glance. This panoramic display consists of three distinct sections:

- The first screen, on the left, is dedicated to the feed from the viewing cameras which replace the conventional wing mirrors, together with feeds from implement-mounted wireless cameras.
- The second central screen contains less frequently consulted tractor parameters such as PTO speed, linkage height, hydraulic flow and the lighting package.
- The right hand third screen is dedicated to information feeds. This includes radar weather data and a standard news feed – designed to assist in making timely business decisions – together with climate control information and the media package.

It is possible to swipe between the central headliner display and the fix-hub steering wheel cluster screen, to manage and select key operating parameters, such as lighting requirements or PTO speed. Once the modification has been made, the operator swipes the screen back up to the central headliner display panel.

Voice control of key functions enables the operator to keep their hands on the steering wheel at all times, for maximum safety during operation. These functions include features key to modern-day operator productivity, such as climate control, the tractor's media system, and mobile phone operation.

The specific software on a smartphone makes it the link between the farm office and the tractor. The tractor can be located and unlocked using a fingerprint identification process, which is replicated in the cab as an additional security measure. Only once this has been completed will the tractor 'start' sequence be initiated. The smartphone can also be used to control the rear linkage, making hitching implements easier, as the operator can stay next to the implement during the entire hitching sequence.

The methane powered concept tractor also incorporates a full suite of 'precision farming' technologies, with a sleekly integrated roof antenna, enabling it to steer itself along rows in the field, for example. It also possesses elements of autonomous technology, such as automatic detection of obstacles.

Combining an advanced operator environment, connected farming, with sustainable and reliable powertrain technology, which is readily available, for efficient and productive farming, the New Holland methane powered concept tractor represents a viable future for agricultural technology.

For further information on the methane powered concept tractor, including images, video and technical information, please visit: bit.ly/methane-powered-concept

CNH Industrial N.V. *(NYSE: CNHI /MI: CNHI) is a global leader in the capital goods sector with established industrial experience, a wide range of products and a worldwide presence. Each of the individual brands belonging to the Company is a major international force in its specific industrial sector: Case IH, New Holland Agriculture and Steyr for tractors and agricultural machinery; Case and New Holland Construction for earth moving equipment; Iveco for commercial vehicles; Iveco Bus and Heuliez Bus for buses and coaches; Iveco Astra for quarry and construction vehicles; Magirus for firefighting vehicles; Iveco Defence Vehicles for defence and civil protection; and FPT Industrial for engines and transmissions. More information can be found on the corporate website: www.cnhindustrial.com*

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