



A SELECTION OF RECENT ARTICLES ON RENOVARE FUELS.

DIESEL MANIFESTOS ARE “SHORT SIGHTED”, SAYS SCIENTIST

Sources: www.recyclingwasteworld.co.uk | Published: 01 June 2017



The head of a team of renewable fuel scientists says he is concerned that “current party manifestos clearly demonstrate politicians’ lack of understanding of true fuel emissions and engine efficiency”.

Devin Walker, chief technical officer of London-based Renovare Fuels, says that the information being provided to UK policymakers is often limited in scope. Walker is a developer in new technology used to convert biogas from organic waste into petrol, diesel and even jet fuel, tested

and approved to ASTM standards.

“Natural gas and petrol do produce less nitrogen oxide (NOx) but relying on these forms of fuel would be at the expense of vehicle engine power and fuel efficiencies,” argues Walker.

“In comparison to petrol engines, diesel vehicles can operate up to 30% more efficiently. Petrol engines produce less NOx, but because around 30% more fuel is needed to generate the same amount of energy, this ultimately leads to a higher accumulation of carbon in the atmosphere

“For accuracy, we should not be simply measuring emissions from vehicles but also emissions from processing and distribution of fuel

"New NG fuelling stations would cost around £1.4m each to construct, while new diesel stations would cost around £116,000 each. Upgrading a bus fleet to NG would cost between £23,000 and £77,000 more per bus, compared to diesel fleets.

"Recent research has shown that in trials, well-to-wheel annual GHG emissions increased up to 13.3 tons of CO2 equivalents per NG bus, compared to a diesel bus

"We should not focus on scrapping diesel vehicles but continue to develop exhaust treatment systems which break down nitrogen and oxygen into their individual components; allowing the retrofit of current diesel engines at a fraction of the proposed scrappage cost

"Continued development of clean diesel technologies which convert biomass and waste to diesel fuel would also offer zero net carbon emission, in line with the government's plan for all vehicles to be zero emission by 2050

"The two strategies together would offer billions of pounds in fuel infrastructure savings, continued efficiency gains and reductions of not just NOx emissions but total GHG life-cycle emissions from well-to-wheel."

Renovare Fuels has developed and trialled the world's first technological process which enables biogas produced from organic waste in UK anaerobic digestion facilities, UK landfills and industry to be processed directly into liquid fuel in the form of petrol and diesel through a carbon neutral process. According to Renovare Fuels, the technology, which is scheduled to become commercially available later this year, produces fuel in a ready-to-use form without the need for any engine modifications.

www.renovare-fuels.co.uk

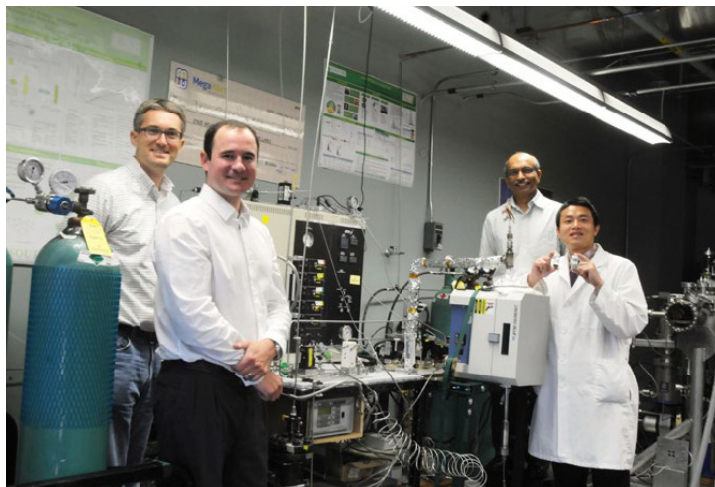


UK COMPANY CREATES FIRST DIESEL FUEL FROM LANDFILL GAS



Post Date: 20 January 2017

Author: WWW.EAEM.CO.UK



A UK sustainable energy company, Renovare Fuels, has successfully converted landfill gas into usable diesel fuel with no fossil fuel additives in recent US trials - a world first.

The renewable diesel fuel produced by the new process resembled commercial diesel both physically and chemically, and could therefore be used as a drop-in fuel in diesel engines without the need for engine modification.

The company's patented technology has been developed from NASA-funded research for Fischer Tropsch synthesis and a patented 'Egg-Shell Catalyst' developed by chemical engineers at the University of

South Florida. Renovare uses these new catalyst technologies to first convert the landfill gas to syngas using a tri-reforming catalyst and then produce liquid hydrocarbon fuels using a Fischer- Tropsch Synthesis catalyst, specifically tailored to produce large fractions of middle distillate fuel. By integrating this technology into gas capturing systems at landfills, municipal solid waste facilities are able to convert naturally produced landfill gases into liquid transportation fuel (diesel).

During the trials, landfill gas from Sarasota County Municipal Solid Waste Facility in Florida was converted into diesel which met the specifications of all American Society for Testing and Materials (ASTM International) standards testing.

Renovare Fuels say the bi-products of flue gas and water not used to produce steam for the reforming process could also be used to cool water or satisfy the water requirements of the anaerobic digester onsite. By powering entire plant operations in this way, it would make such facilities entirely self-sufficient; an important development as government subsidies continue to be slashed.

Led by young entrepreneur, Devin Walker, Renovare Fuels includes a team of technical consultants who work closely with American space agency NASA. The company is currently in negotiations with leading waste operators and utility companies in the UK, with a view to beginning production of fuels for sale later this year.



UK BREAKTHROUGH IN SUSTAINABLE DIESEL PRODUCTION, CLAIMS RENOVARE FUELS



Published: 27 January 2017

Author: Editorial Staff of Recycling and Waste World

Following recent trials, a UK sustainable energy company is reported to be the first to have successfully converted landfill gas into usable diesel fuel with no fossil fuel additives.

Renovare Fuels, which has its headquarters in London, claims to have developed technology to produce middle distillate hydrocarbons with a selectivity of 55%.

According to Forbes' "30 Under 30" entrepreneur Devin Walker at Renovare Fuels, the bi-products of flue gas and water not used to produce steam for the reforming process could also be used to cool water or satisfy the water requirements of the anaerobic digester onsite. "By powering entire plant operations in this way, it would make such facilities entirely self-sufficient; an important development as government subsidies continue to be slashed," explained Walker (pictured above).

During the trials, landfill gas from Sarasota County Municipal Solid Waste Facility in Florida was converted into diesel which is reported to have met the specifications of all ASTM standards tested.

Additionally, a carbon number distribution and hydrocarbon family analysis were performed and compared to commercial diesel. "The renewable diesel fuel produced by the new process resembled commercial diesel both physically and chemically, and could therefore be used as a drop-in fuel in diesel engines without the need for engine modification," added Walker.

Renovare Fuels said it is currently in negotiations with UK waste operators and utility companies, with a view to begin production of fuels for sale later this year.



UK COMPANY MAKES BREAKTHROUGH WITH SUSTAINABLE DIESEL FUEL PRODUCTION



Published: 23 January 2017

Author: Liz Gyekye, editor of Biofuels International and Bioenergy Insight.

A UK sustainable energy company is the first ever to have successfully converted actual landfill gas into usable diesel fuel with no fossil fuel additives, during recent trials.

Renovare Fuels, which has its headquarters in London, claims to have developed technology to produce middle distillate hydrocarbons with a selectivity of 55%.

The bi-products of flue gas and water not used to produce steam for the reforming process could also be used to cool water or satisfy the water requirements of the anaerobic digester onsite. By powering entire plant operations in this way, it would make such facilities entirely self-sufficient; an important development as government subsidies continue to be slashed.



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Renovare Fuels is led by Forbes' noted "30 Under 30" entrepreneur, Devin Walker and includes a team of technical consultants who work closely with NASA.

The company is currently in negotiations with the UK's leading waste operators and utility companies, with a view to begin production of fuels for sale later this year.



LANDFILL TO ENGINE FUEL

Published: 20 January 2017

Author: WWW.EDIE.NET



When history is made in the sustainability sphere, it is usually something to do with global temperatures. But for UK-based Renovare Fuels, making history is simple as becoming the first company to convert landfill gas into usable diesel fuel with no fossil fuel additives or traces. All in a day's work.

Renovare Fuels ran trials on a technology that is claimed to produce middle distillate hydrocarbons with a selectivity of 55%; essentially creating renewable diesel fuel that resembles traditional diesel both chemically and physically.

The trials, based in Florida, could act as a replacement for fossil fuels in diesel engines, without the need for any infrastructure modifications in the vehicle. The bi-products – flue gas and water - could also be used in anaerobic digestion (AD) plants, according to the company, making the facility self-sufficient. A welcome breakthrough for AD plants, which are set to have subsidies slashed.

FEATURES



Process invention: Walker (*above*) and his team uses sustainable waste as the feedstock. (*Right*) testing the technology at a landfill in Florida



PROFILE

In 2014, Devin Walker was named as one of Forbes' '30 under 30' top entrepreneurs after he set up US-based company T2C-Energy, which owns the catalyst process Renovare is putting to the market.

After graduating from the University of Florida in 2007 with a bachelor's in biochemistry, he landed a job at engineering firm Applied Research Associates, where he became a biofuels scientist, making jet fuel from plant and algae oils.

In 2012 he obtained a masters in chemical engineering.

“I like the idea of scaling technologies and renewable energy sources on a level that can sustain our way of life without negatively impacting on the environment.”
– Walker

Utilise biofuel without having to convert a fleet's engines

The Government has fired the starting gun on a race to develop transport fuel from waste. **CORIN WILLIAMS** speaks to a company that wants to lead from the front

Game-changing products usually get going only with the twin backing of the right market conditions and favourable Government policies. Renovare Fuels is hoping that its innovation – which is being billed as a cost-effective way of producing liquid diesel from landfill or anaerobic digestion (AD) gas – will hit the mark on both counts.

Simply put, the company is developing a catalyst device that can be bolted on to existing biogas facilities to produce diesel that can be poured straight into vehicle tanks. The potential benefits are enormous: any company, farm or waste management firm with an AD or landfill gas site would be able to fuel their fleets without having to convert engines to run on compressed natural gas.

Renovare, which has its headquarters in London, is implementing a highly ambitious business plan that could see the technology up and running around the world within a few years. The company has won investment and backing from the Government to press ahead,

with advanced approval from the taxman for £1.6m under the Enterprise Investment Scheme. It is also speaking to the UK's leading waste operators and utility companies.

Devin Walker is Renovare's chief technical officer and one of the inventors of the catalytic process. He is also chief executive of the US company that holds the master rights for the technology. He says it is a scientist's 'duty' to figure out what to do with waste streams.

"What makes a sustainable fuel is one that is competitive with petroleum," he says. "Let's face it – as much as we love the environment and as much as we can say we're environmentally friendly, it's the money that runs the show."

"The question is, how do you do that – and it comes down to feedstock. If your feedstock is negatively valued, you are not starting in the red and you've got some wriggle room to work with as far as operating expenses go. And that's where waste comes into play."

"It is expensive to extract oil or process corn into ethanol. What else is more sustainable



China unsheaths National Sword

Markets, page 55

FEATURES

than waste? As long as there are human beings, there is always going to be waste generation.”

The business case for waste is clear, says Walker. He points to the US agricultural and waste industries which consume around 4.2 billion gallons of diesel fuel or about 7% of total national diesel consumption. “Theoretically, if you put this technology in all of the landfills and all the AD sites in the US, you’re now displacing that amount.”

Walker’s catalysts have been proven to work at a landfill gas site in Florida, and the resulting biodiesel was used directly in existing vehicles. Landfill gas, says Walker, is harder than AD gas to convert because it is usually around 50% methane and 50% carbon dioxide; AD is typically 60% methane.

A pilot facility is now being constructed in the US. When it is up and running in July, it is expected to be able to take 1cu m a minute of biogas and produce 500 litres a day of diesel.

“This will produce enough per day to do all the engine testing needed,” says Walker. “You want the engine manufacturer warranties to be honoured and for the fuel to pass all the specs.

“We are also trying to prove the robustness of the process. It’s a transportable pilot, so we are going to go to multiple facilities – landfills, wastewater treatment facilities, AD facilities – and in doing so you take the risk away.



A lot of people have been burned on ethanol and solar, a lot of promises were made and a lot were broken. But when you see liquid diesel come out, it’s a revelation”

“In the biofuel world, seeing is believing. A lot of people have been burned on ethanol and solar, a lot of promises were made and a lot were broken. But when you see the liquid diesel come out, it’s a revelation.”

Renovare is aiming to construct its first commercial plant in 2018. In order to be profitable, it will need to process at least 400cu m of gas per hour. This would allow “fairly small” AD sites to benefit.

“Being able to take the technology into a modular farm-scale type of application, it opens up a lot of doors,” says Walker. “Small-scale biogas to fuels has been a challenge in the industry for many years. And that’s what we’re overcoming – it’s a huge breakthrough.”

Matthew Stone is chairman of the UK company and an ‘early stage’ investor in the US. He

is on board to get things going in Europe and beyond as soon as the pilot scheme proves the technology’s worth.

He says there were a number of benefits to setting up in the UK, including its mature energy-from-waste market and the ongoing reduction AD feed-in tariffs. Conditions are ripe for an innovation that does not require subsidies. But perhaps the main driver has been the Government’s change in attitude to renewable transport fuel (*see page 27*), which is now seen as key in reducing the UK’s carbon emissions.

Converting AD gas into biodiesel is currently not as efficient as using it directly as compressed natural gas, and this means vehicles need to be converted if they are to use waste-derived transport fuel.

“The Government has a renewable fuel target but doesn’t know how to achieve it,” says Stone. “What they have said, quite categorically, is they need technology to take up the slack and fill the void between policy and budget. The industry must be self-sustaining, and all other solutions will have to be subsidised if they are to be scaled up.

“This technology bridges that gap immediately. You can be independently fiscally viable and use all your upstream apparatus, all the same AD processes. You simply bolt on to the end of it and, by changing the output, you

CATALYST FOR SUCCESS

DIESEL-TO-GAS EXPLAINED

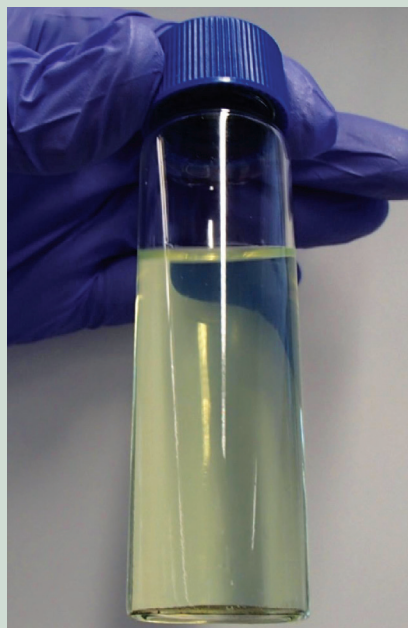
Making diesel from gas is possible using what is known as the Fischer-Tropsch catalyst. Velocys is using Fischer-Tropsch technology for commercial production in the US. It also has a research base in Oxford.

But the idea has not yet caught on in the UK. One problem cited by experts is that, under currently available methods, the process produces a wide range of liquid hydrocarbons which then have to be further separated by a refinery process in order to isolate the usable diesel fraction.

This reduces the efficiency of the process, meaning that using the gas directly in adapted vehicles is preferable.

What Devin Walker and his colleagues at the University of South Florida did was to devise a way to produce a greater proportion of the usable fraction. This cuts down on the post-processing treatment required or can even bypass it altogether.

The group patented an 'egg-shell catalyst', which is used along with the Fischer-Tropsch and other catalysts, to first produce syngas from landfill gas then transform that into



liquid transport fuel. Unlike other methods, it also utilises CO₂, which makes up a large proportion of biogas.

into today's vehicles, which is exciting."

Stone is quick to play up the advantages for companies with integrated fleets that can refuel at their own facilities, and cites a "good payback period" and "massive savings per litre". Some supermarket chains, for instance, deal with food waste and have their own transport fleets and fuelling stations. The appeal of Renovare's technology is obvious.

The confidence Stone has is reflected in the company's global strategy, and to open up new markets even while the pilot phase is ongoing.

"Concurrently, we have people who want to start building in Q4 this year," he says. "As soon as the technology is ready, we can move forward fairly aggressively. We have exclusive rights to develop in south-east Asia – there are huge gas reserves in landfill just sitting there. We have people working in Singapore, Jakarta and Kuala Lumpur on the equity side.

"Within five years I expect we will have dozens of sites constructed or under planning in and around the UK. We will expect to be partnering with some large utility companies and have our cornerstone commercial partners.

"We will certainly expect to be expanding into Europe – I had discussions with people from Sweden and Germany the other day. We are also perhaps looking at South Africa." 