

## News Review



**Issue Seventy-Five**

**June 2018**

Each month we review the latest news and select key announcements and commentary from across the bioenergy sector.

# Contents

Policy.....	4
Markets .....	6
Biomass Heat and Power .....	9
Biogas.....	11
Energy from Waste.....	14
Events.....	15
Prices.....	17

# Foreword

Welcome, subscribers, to June's Bioenergy News Review.

Here in the UK, it would appear (touch wood) that summer has finally arrived, bringing with it the usual two weeks of sun, too late for the bank holidays and too early for the time we have booked off work. It has also brought about a calmness in the weather, which is not good news for wind power. With no generation from wind over the first week of June, biomass power has been brought to the fore of renewables generation. Renewables such as wind and solar are clearly reliant on certain weather conditions, which means they are responsible for most of the fluctuations in renewables generation in the UK. Biomass, however, can generate around the clock, providing the solid foundation upon which the UK's renewable energy generation can be built.

Biomass has also been in the spotlight from a bioenergy policy perspective, as the UK government have announced the first wave of reforms to the Contract for Difference (CfD) scheme. This scheme is one of the principal ways of financing renewable energy in the UK, taking the form of an auction, where generators will bid for the lowest price they are willing to accept to generate a given capacity, in theory ensuring customers do not end up with inflated prices due to higher renewables generation. Concerns had been raised by the government as to the efficiency of some bioenergy plants that were making use of the scheme, and so in the first wave of reforms, new requirements will be introduced in terms of overall efficiency, heat efficiency, and primary energy saving. This will ensure that bioenergy installations are not actually costing the customer, by producing less heat than they are actually slated to generate. However, this can be a difficult figure to calculate, which may add undue costs (both in terms of time and money) to smaller scale generators, who have in the past struggled to make waves in the CfD system.

Finally, there is news regarding unforeseen environmental effects of bioenergy. Anaerobic Digestion, as a way of producing biogas for heat and power, is an ever-growing sector here in the UK, and one particularly championed by us here at NNFCC. One of the by-products of this process is digestate, which is most often used as a fertiliser. However, researchers in Germany have made a discovery that while digestate may be an excellent fertiliser, it may well have the unwanted side-effect of introducing microplastics back into the environment. This was particularly significant when organic waste was utilised as the feedstock for the digestion process, most likely caused by contamination from packaging that has slipped through the organic waste sorting process. This serves as a reminder to bioenergy generators that due diligence must always be taken that their feedstocks are fit for purpose, equipment is maintained and closely observed at all times, and all possible ramifications of using a particular feedstock are considered.

Read on for the latest news.

# Policy

## Tariff guarantees launched for Renewable Heat Incentive



*Pixabay*

A tariff guarantee allows applicants to the Non-Domestic Renewable Heat Incentive (RHI) to secure a tariff rate before their installation is commissioned and fully accredited on the RHI. The regulations for tariff guarantees were introduced on 22 May 2018.

Tariff guarantees are available for solid biomass CHP, geothermal and biomethane applications of all sizes, as well as for biomass over 1MWth, biogas over 600kWth and ground source heat pumps and water source heat pumps over 100kWth.

In order to ensure the RHI scheme stays within budget there are budget controls for tariff guarantees.

Ofgem publishes information on a weekly basis on the following: number of tariff guarantee applications made, the number of provisional tariff guarantee notices issued, the number of tariff guarantee applications granted, the sources of energy and technology and capacity of the plants in respect of which tariff guarantees have been granted, estimated total tariff guarantee

commitment for each of the relevant financial years (note: the total tariff guarantee commitments are estimates and subject to change), the latest weekly report was released by Ofgem on 12th June 2018 confirming 58 tariff guarantee applications had been made, with no provisional notices or guarantees yet issued; the allocated budget has not yet been reached.

Click [here](#) for more information.

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## UK Government's first response to CfD consultation

BEIS has responded to the first part of the December 2017 Contracts for Difference (CfD) consultation.

The December consultation noted concerns that the standards being applied meant schemes could qualify for CfD support whilst producing a low level of useful heat, and achieving low levels of overall efficiency. The government therefore proposed to increase the minimum efficiency requirements that would be applied to new schemes seeking CfD support.

The government intends to require all new dedicated biomass with CHP and energy from waste with CHP schemes (at all scales) applying for new CfD contracts to have a minimum 70% overall efficiency (net calorific value), primary energy saving of 10% (gross calorific value), and 10% heat efficiency (gross calorific value).

There is also to be an amended Definition of Waste. BEIS will, "subject to parliamentary approval, amend the current definition of "waste" in The Contracts for Difference (Definition of Eligible Generator) Regulations 2014 to make it clear that the term 'waste' excludes any substance that has been intentionally modified or contaminated to fall within the definition of waste

in Article 3(1) of the Directive 2008/98/EC (the Waste Framework Directive)."

The secondary legislation implementing all of these changes will be laid before parliament 'shortly', but there is no precise timeline provided for this process.

Click [here](#) for more information.

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## UK government publishes air quality consultation



*Pexels*

The UK Government released its Clean Air Strategy consultation in May. This Strategy shows how the Government aims to tackle all sources of air pollution, protect nature and boost the economy. It sets out a wide range of actions on which the UK government is consulting and also shows how devolved administrations intend to make their share of emissions reductions. The consultation will inform the final Clean Air Strategy and detailed National Air Pollution Control Programme, to be published by March 2019.

There are specific issues around use of biomass highlighted in the draft strategy which could impact on future support for biomass heat and power technologies. The draft strategy highlights that the government will: "conduct a cross-departmental review into the role of biomass in future policy for low carbon electricity and heat, focusing on the air quality impacts", "consult on

excluding biomass from the RHI if installed in urban areas which are on the gas grid", and "consult on making coal to biomass conversions ineligible for future allocation rounds of the contracts for difference scheme", though none have been eligible to date.

Click [here](#) for more information.

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## UK government announces inquiry into Carbon Capture

The Business, Energy and Industrial Strategy Committee has launched an inquiry on carbon capture, usage and storage (CCUS) and efforts to kickstart this technology in the UK.

The inquiry will examine the Government's commitment to deploying CCUS technology and whether it has a "Plan B" to meet the UK's climate change targets should desired cost reductions not materialise.

Carbon capture, usage and storage (CCUS) is expected to play an essential part in meeting the UK's carbon budgets. Yet the Government's budget to kick-start CCUS has been cut from £1bn to £100m. In the inquiry, BEIS want to test the Government's ambitions in this area and to examine what policy levers need to be pulled to make large-scale CCUS a reality in the future. Clearer policy signals are needed if the UK is to create a market and commercialise this technology into the 2030s. If the Government judge the costs are such that CCUS is not a viable option, then they must spell out an alternative if the UK is to meet its carbon emission reduction targets.

Click [here](#) for more information.

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## UK seeks to lead Carbon Capture development

UK Energy Minister Claire Perry has announced that the UK is to lead an international challenge with Saudi Arabia and Mexico to remove carbon from emissions. This builds on a COP21 'mission challenge' on carbon capture, to which the UK has committed £21.5 million. The aim of the funding is to invest in innovation that could reduce the cost of the technology.

A call for CCUS innovation will offer £15 million of grant funding for projects up to 28 months and will be available to 31 March 2021. BEIS will consider grants of up to £5 million for a single project. Projects that are UK-led or that involve collaboration with an international partner will be considered.

In addition, BEIS and UKRI has committed £6.5 million to the 2nd call of the 'Accelerating CCS Technologies' (ACT) Research Programme (just published) which involves several countries partnering in the ACT consortium to address CCS issues.

Click [here](#) for more information.

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# Markets

## How to make AD market competitive



*Geograph*

In 2012, solar modules sold for about \$1/Watt; in 2018 they are selling for \$0.37/Watt ex-factory in China, and Bloomberg New Energy Finance projects that this will drop further to \$0.24/Watt in 2019. Recent solar power tenders in Mexico and Texas have come in at around \$20/MWh, while at the same time wind has dropped from somewhere around \$270/MWh to currently around \$70/MWh, with these prices set to fall further. The falling cost of batteries looks set to make 24/7 solar and wind economic in the very near future.

Against this background, anaerobic digestion (AD) looks like a serious laggard; it is currently expensive and subsidy-driven, and the costs of AD have barely moved over time. To be competitive in the modern world, AD has to make some substantial changes.

There are three ways AD can become more competitive: it can secure higher prices; it can find lower-cost feedstocks; and it can become cheaper to build. The first two of these can be achieved by AD becoming viable at farm scale. With animal and crop wastes to hand, perhaps supplemented by a little energy crop, average feedstock costs on farms are bound to be cheaper than bought-in crops. Small-scale AD can also secure higher prices for its output by using most of it on the farm where the value of heat and electricity are much higher than if sold to the grid.

To find its way onto the farm, AD has to become economic at small scale, perhaps 50-150 kW, and to do this, AD has to move from farm-specific project to mass-market product. It will never benefit from economies of scale in production if every AD plant is unique and involves designers, construction teams, financiers, grid negotiations and the like.

By making small-scale AD into a product that can fit into perhaps one or two shipping containers and a bag-type externally heated digester that would need little more than an excavator, an adjustable spanner and a screwdriver to install it, it becomes possible to design a plant just once but build many of them in a factory. By doing this using the techniques and buying power of other mass-manufacture approaches, it would be possible to bring the cost of a plant down to levels close to \$3 per installed Watt or lower. This would make owning an AD plant the norm for farmers with livestock or crop waste.

Another of the advantages of small, containerised AD is the ability to fund it at lower cost than a fixed, purpose-designed plant. From the funder's perspective, a small, containerised plant is a movable asset and can be repossessed and relocated if the project fails to pay. This makes it much lower-risk and therefore a much easier funding prospect than a conventional AD plant.

Ultimately, though, even \$3/Watt isn't cheap enough. This is the point where a new approach becomes necessary – using biomimicry of cows and other ruminants to find a way to make AD plants even smaller still without reducing power outputs. A cow can sustain an organic loading rate of around 180 kg volatile solids (VS)/m<sup>3</sup>/day, compared to 4-7 kg VS/m<sup>3</sup>/day for an AD plant. Hydrolysis at that rate would allow a 100 kW-equivalent AD plant, including the reactor, to fit into a 40 ft container. At that point AD plants could become as common as tractors!

For this to happen we need serious targeted investment in R&D from both industry and academia coupled with a clear vision of what AD could do for society that other energy and waste-processing technologies cannot deliver. We also need policy clarity – so that food and other 'wastes' have to be recycled or used as part of a fully integrated circular economy.

Click [here](#) for more information.

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### **New competitive funding available for UK energy developments**

The Energy Entrepreneurs Fund (EEF) is a competitive funding scheme to support the development and demonstration of state of the art technologies, products and processes in the areas of energy efficiency, power generation and heat and electricity storage. Since 2012 there have been 6 phases of the EEF.

The EEF seeks the best ideas, irrespective of source, across these energy technology areas from the public and private sector. The scheme particularly aims to assist small- and medium-sized enterprises, including start-ups, and those companies that are selected will receive additional funding for incubation support.

The EEF Phase 7 applications will open on 4 July at the EEF Launch Event. The full documentation relating to EEF Phase 7 will be published once the competition is launched.

Click [here](#) for more information.

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## US funding for bioenergy research



*Wikimedia Commons*

The U.S. Department of Energy has announced the award of \$40 million in funding for 31 projects to advance research in the development of microbes as practical platforms for the production of biofuels and other bioproducts from renewable resources.

The projects will further the ongoing revolution in biology and biotechnology, and will increase our understanding of how nature's sophisticated production capabilities at the cellular level can be harnessed to produce sustainable, clean, and efficient fuel as well as drive other industrial production processes.

Over the past decade, DOE-supported scientists have identified and modified a wide range of microbial organisms to be production workhorses, transforming microbes into effective platforms for the generation of fuels and other useful precursor chemicals from renewable plant feedstocks.

Using today's most advanced techniques of genomics-based systems biology, these projects seek both to improve the production capabilities of already identified organisms and to identify new organisms as potential production platforms. They will modify the organisms to maximize their effectiveness as producers.

Organisms under study range from yeast and fungi to cyanobacteria and rare thermophilic microbes that thrive at extremely high temperatures. Products to be produced range

from biofuels to alcohols to other valuable precursor chemicals with multiple possible downstream applications.

In addition to the projects focused on specific microorganisms, approximately one third of the projects are focused on developing and improving the essential imaging tools for this work of characterizing and modifying organisms on a microscopic scale. Several of the projects also seek to enhance capabilities for real-time "in situ" imaging. This means observing in real-time how nature's microscopic processes unfold in detail at the cellular level.

Projects were chosen by competitive peer review under two separate DOE Funding Opportunity Announcements, one for Systems Biology of Bioenergy-Relevant Microbes and another for Bioimaging Research for Bioenergy, both sponsored by the Office of Biological and Environmental Research within the Department's Office of Science.

Total funding is \$40 million for projects lasting three years in duration.

Click [here](#) for more information.

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# Biomass Heat and Power

## Calm conditions see biomass at forefront of UK renewables generation

The first 7 days of June has seen almost zero power output from wind across the UK, and with practically zero coal generation the UK is relying on European interconnectors to France and the Netherlands running at full pelt, with gas peaking plants drafted in to smooth supply.

These calm conditions are expected to last at least until mid-June, though at least solar generation is up during the day delivering around 6GW of capacity while wind struggled to deliver 1GW.

This has pushed up power prices and increased carbon emissions as gas takes up the slack. Wholesale prices rose to just over £60/MWh a 2-month high.

This situation contrasts to mid-March where wind at one point delivered almost half of UK electricity generation, and as a whole in the first part of the year delivered 15.6TWh of power (30GWh more than nuclear).

While there is now a rush to battery and other power storage options, and find solutions to control and moderate demand, biomass continues to provide reliable low carbon baseload power, yet still faces difficulties in political circles in gaining support for further development.

Click [here](#) for more information.

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## 4th Drax unit begins biomass conversion



*Geograph*

In a press release Drax has announced that it has taken its fourth currently coal-fired power generating unit offline as part of a planned outage programme as it prepares to convert it to run on sustainable biomass.

Once the upgrade is complete, two-thirds of the power station's capacity will produce renewable power.

Drax has already invested around £700 million in upgrading half the power station and associated supply chain infrastructure to use sustainable biomass instead of coal – transforming the business to become Europe's largest decarbonisation project.

The conversion of the fourth unit is expected to be complete over the summer, returning to service in the second half of 2018. The cost of conversion is significantly below the level of previous conversions, at around £30 million.

Drax's engineers will upgrade the unit by re-using some redundant infrastructure left from when the company was first co-firing biomass with coal on a large scale, around eight years ago.

A trial last year confirmed that by modifying the old co-firing delivery system, compressed wood

pellets can be delivered in the quantities required to fully convert the fourth generating unit.

Once it comes back online, the fourth unit will help the power station, at Selby in North Yorkshire, to deliver vital reliable and flexible power needed by the grid to maintain secure supplies as more renewables come online and the sector continues to decarbonise.

Once the conversion is complete Drax will turn its attention to its remaining two coal units, which it plans to replace with gas-fired power generating units. The Closed Cycle Gas Turbines it is looking to develop could deliver up to 3.6GW of capacity, as well as up to 200MW of battery storage.

Drax's plans for the gas project have been submitted to the Planning Inspectorate, which has 28 days to determine if it will accept the application. If accepted, the proposals will be examined by the Planning Inspectorate and then considered by the Secretary of State for Business Energy and Industrial Strategy with a decision expected in 2019.

Click [here](#) for more information.

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## Construction begins on energy centre at biomass CHP plant



*Wikimedia Commons*

A ground-breaking ceremony took place this week for Glenrothes Energy Network, marking the beginning of construction for a state-of-the-art Energy Centre at RWE's Markinch CHP biomass plant in Fife.

Vital Energi was awarded the contract for the design and development of the Energy Centre by RWE. Balfour Beatty is main contractor for the heat network, and has also appointed Vital Energi as its specialist subcontractor.

Vital Energi has now started preparatory civil engineering works. A full works programme will begin at the end of June, starting with the building of the external structure.

Glenrothes Energy Network is a £24m local heating collaboration between Fife Council, RWE and the Scottish government. It will provide heating to a mix of industrial, commercial, community and domestic properties in Glenrothes as well as the Fife House complex.

RWE will own the Energy Centre and provide the heat required for the network from its biomass plant and Fife Council will own the network and act as service provider. The project is expected to be operational by the end of January 2019.

Click [here](#) for more information.

## 300th Rankine Cycle biomass plant commissioned

Italy's Turboden has sold its 300th Organic Rankine Cycle biomass plant. From the first 300 kWe unit sold in Switzerland, to the latest 5 MWe plant sold in Turkey for AGT.

The Rankine Cycle is a thermodynamic cycle that converts heat into work. The Organic Rankine Cycle's principle is based on a turbogenerator working in the same way as a conventional steam turbine to transform thermal energy into mechanical energy and finally into electric energy through an electrical generator. However, instead of generating steam from water, the ORC-system vaporizes an organic fluid, characterized by a molecular mass higher than that of water, which leads to a slower rotation of the turbine, lower pressures and no erosion of the metal parts and blades.

Turboden attributes its success mainly to customers' loyalty: 90 percent of whom maintain an after-sales contract in place and many are "returning clients". For example, Germany's Ziegler recently inaugurated its third Turboden unit (3 MWe).

Click [here](#) for more information.

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# Biogas

## Engine developed that can run on contaminated biogas



*Wikimedia Commons*

Freedom Motors has developed a version of its Rotapower® rotary engine that can use contaminated biogas to generate electricity. Biogas is a major source of man-made methane emissions which now appear to be driving climate change.

Methane (CH<sub>4</sub>) is the main component in natural gas and has been considered the second-most impactful global warming gas (GWG). That assumption is now being challenged by a growing number of scientists. Carbon dioxide (CO<sub>2</sub>) has dominated most discussions of GWGs. However, the rate of increase in global CO<sub>2</sub> production has recently slowed to near zero while the rate of methane production has increased by a factor of 20. Since a molecule of methane traps 85 times more heat during its lifetime than one of CO<sub>2</sub>, many Earth scientists believe that methane is a far more immediate threat due to its ability to create a "runaway greenhouse gas scenario."

Most of the methane increase is coming from biogas generated from man-made sources such as landfills, wastewater treatment plants, and animal manure. Ideally this biogas would be used in an

engine to produce electricity. However, if the methane content is too low or the hydrogen sulphide or silica contaminants are too high, the biogas may not be usable in a piston or microturbine engine and is instead flared or released to the atmosphere.

The Rotapower® rotary engine is resistant to hydrogen sulphide and silica, the primary contaminants in biogas. It can also operate on biogas with a lower methane content than its piston engine counterpart or at a fraction of the cost of a microturbine. It is uniquely able to generate electricity from highly contaminated biogas.

Click [here](#) for more information.

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## Severn Trent opens new Thermal Hydrolysis plant

Severn Trent's new Thermal Hydrolysis Plant (THP) is starting to become operational, with 100 tonnes of sludge being processed on a daily basis.

The £60m scheme changes the way the company treats waste before generating green power and will make the process considerably more efficient, meaning the amount of clean energy generated will increase by almost a third.

More than half of the plant is now up and running, and the company, which serves eight million people across the Midlands and mid-Wales, hopes to see it fully operational by the end of the summer.

The Minworth site already generates enough clean electricity to power the equivalent of 11,000 homes and enough gas to heat 4,800 homes every year and that's set to increase with THP coming online.

The process works by treating sewage sludge, using heat and pressure in a similar way to a

pressure cooker – the sludge is heated to 170°C before putting under pressure. This combination of heat and pressure sterilises and shatters the cell structure of the bacteria in the sludge. The treated sludge is then fed into huge digesters which biodegrade the volatile solid matter within the sludge and produce methane rich bio-gas.

Once that part of the process is complete, the sludge is then passed forward to the dewatering process where it is thickened, ready to be recycled as fertiliser for agricultural land. The thermal hydrolysis process has an additional benefit as the leftover solids can be classified as 'enhanced' status fertiliser and could potentially be used in the production of crops for human consumption.

By generating renewable energy Severn Trent is able to reduce costs which helps to keep customer bills down – the company currently has the lowest combined average bill in the country.

Click [here](#) for more information.



*Flickr*

## Bin2Grid project sought to promote biomethane from food waste

Funded by the EU's Horizon 2020 scheme, the Bin2Grid project aimed to implement waste-to-biofuel initiatives in Malaga, Paris, Skopje and Zagreb with the goal of developing biomethane as a sustainable alternative to fossil fuels. The two-year project promoted the segregated collection of food waste from specific and various waste producers (food and beverage industry, catering, residential) in order to produce biomethane to be used in local filling stations.

In Paris, for instance, the consortium concluded that new partnerships between stakeholders to balance supply and demand combined with measures such as a favourable tax regime could prove a boost to the sector.

Another key part of the project has been developing economic tools to help boost the profitability of proposed waste to biomethane concepts.

The project's biomethane tool can apparently be used to estimate investment, operating and initial costs of different facilities by providing an idea of economic conditions around biogas production, gas upgrading and the utilisation of biomethane.

Although the project has now come to an end, the consortium members plan to continue disseminating project outcomes and results.

Click [here](#) for more information.

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## AD digestate as a source of microplastic in the environment



*Wikimedia Commons*

A group of German researchers have published a paper in *Science Advances* where they look at organic fertilisers as a vehicle for the entry of micro plastics into the environment. They compared samples of compost and digestate derived from biowaste inputs with digestate from a farm-fed plant and looked for the presence of small plastic particles. They found plastic in all the samples but there was a significant difference in the levels of contamination observed between the samples from different processes.

This is a useful reminder about the importance of ensuring compost and digestate are fit-for-purpose to ensure that the quality meets users' needs and expectations.

Click [here](#) for more information.

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## Profit warning from biogas engineering firm

Sheffield-based specialist engineering group Pressure Technologies has this issued a profit warning, with its divisions being impacted by slow decision making by customers and Parliament which have led to order delays.

Its Alternative Energy Division has been impacted the most, with the firm stating: "The biogas market offers substantial potential, but has been frustratingly slow to deliver and it is disappointing to report that only three new upgrader contracts have been awarded since October 2017. The most common reason for this is delays in customer decision making.

"In North and South America, delays have arisen due to slowness in obtaining environmental permits, complexity of contract negotiations and customer funding arrangements. Delays in the UK have been primarily caused by the Renewable Heat Incentive (RHI) legislation progressing slowly through Parliament, which was approved on 22 May 2018, some four months later than the energy market expected."

Despite this, the listed firm said the division had scored several notable successes since the start of the current financial year. "Notably, we have installed the world's first biogas upgrader which complies with very strict Californian standards and we have commissioned the world's largest biogas upgrader, in Arizona," said Pressure Technologies.

In its manufacturing divisions, which focuses on the global oil and gas market, the firm said that orders had been "muted."

Click [here](#) for more information.

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# Energy from Waste

## Economic benefits of EfW policies highlighted



*Wikimedia Commons*

The Environmental Services Association (ESA), the voice for the UK's resource and waste management industry, has launched its latest report, an overview of the contribution that Energy from Waste (EfW) makes to the UK economy, which demonstrates how simple policy interventions could boost resource productivity and support the diversion of up to 60m tonnes of waste from landfill over the next 10 years, powering the equivalent of all the homes in Birmingham, whilst saving 12m tonnes of CO<sub>2</sub>e.

With the right Government support ESA estimates that up to £10bn of private sector capital will be unleashed across the recycling and resource management sector, delivering 50,000 jobs, boosting GDP by £3bn each year and contributing to economic growth.

In 2016, ESA's members, which represent 97% of the UK's current EfW capacity, diverted 9.6Mt of waste from landfill to EfW and produced 5TWh of low-carbon electricity, enough to power 1.6m homes, as well as 730GWh of heat to district heating networks and industrial users.

ESA's report, Energy for the Circular Economy: an overview of Energy from Waste in the UK, makes three recommendations that will enable the UK to become a world leader in resource productivity and efficiency: develop an ambitious and robust Resources & Waste Strategy and establish a plan for high quality recycling, address the residual waste capacity gap and provide long-term regulatory certainty, and enable CHP plants to help address the energy gap and ensure the planning and permitting regime does not unfairly disadvantage EfW.

By addressing these three areas, we can seize the opportunity of making the most out of the UK's resources.

Click [here](#) for more information.

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### **Dutch EfW plant to capture CO2 for greenhouse use**

AVR will be the first waste-to-energy (EfW) company in the Netherlands to construct a large-scale CO2 capture system that will supply greenhouse horticulture areas.

The CO2, released at AVR after the incineration of residual waste serves as an important raw material for the growth of crops as an alternative to CO2 from natural gas, the company says.

This installation should be operational next year and will contribute directly to the CO2 reduction in the Netherlands and in reaching its climate targets, AVR says.

The construction of the CO2 capture plant in 2019 means that 60 Kton CO2 is expected to be captured and recycled. This is 15% of the total CO2 emissions in the plant's location of Driven.

The CO2 to be captured by AVR will be transported by Air Liquide to greenhouse horticulture areas in the Netherlands. There CO2

needed to stimulate the growth of vegetables, soft fruit, flowers and plants.

Especially in the summer, horticulturists have the need for a substantial amount of CO2 in order to grow their crops. Should AVR find an additional customer during in the winter months, the total CO2 captured may rise to a maximum of 100 kton, it says.

Click [here](#) for more information.

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## Events

### **UK AD & World Biogas Expo Birmingham, 11th-12th July 2018**

UK AD and World Biogas Expo, the largest international trade show dedicated solely to the anaerobic digestion and biogas industry, returns in 2018 to provide the latest market and technology news, sector by sector, as well as a platform for industry professionals from the UK and overseas to network, share experiences and do business.

UK AD and World Biogas Expo 2018 is unique in bringing together an international gathering of new and existing players in this game-changing sector. Over two full days, it will provide a dynamic platform for them to engage with each other.

NNFCC will be present to discuss the strategic direction and potential integration of the AD industry into the wider bioeconomy. Visit us on stand No. L503

Click [here](#) for more information.

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## **International Biogas Congress & Expo Berlin, 10th-11th October 2018**

Brought to you by Bioenergy Insight, the leading biogas industry publication, this two day conference will bring together leading producers, stakeholders and companies within the biogas sector.

Expert international speakers will address a range of biogas related issues and topics within Europe and beyond. Co-located with the International Biomass Congress & Expo as well as the renowned Biofuels International Conference and Expo, this series of bio events will be our largest gathering yet of bio related companies, giving participants unrivalled coverage.

Click [here](#) for more information.

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## **EFIB 2018 Toulouse, 16th-18th October 2018**

Join over 650 bio-based leaders in 2018 for the 11th edition of EFIB in Toulouse, France, on the 16th, 17th and 18th of October.

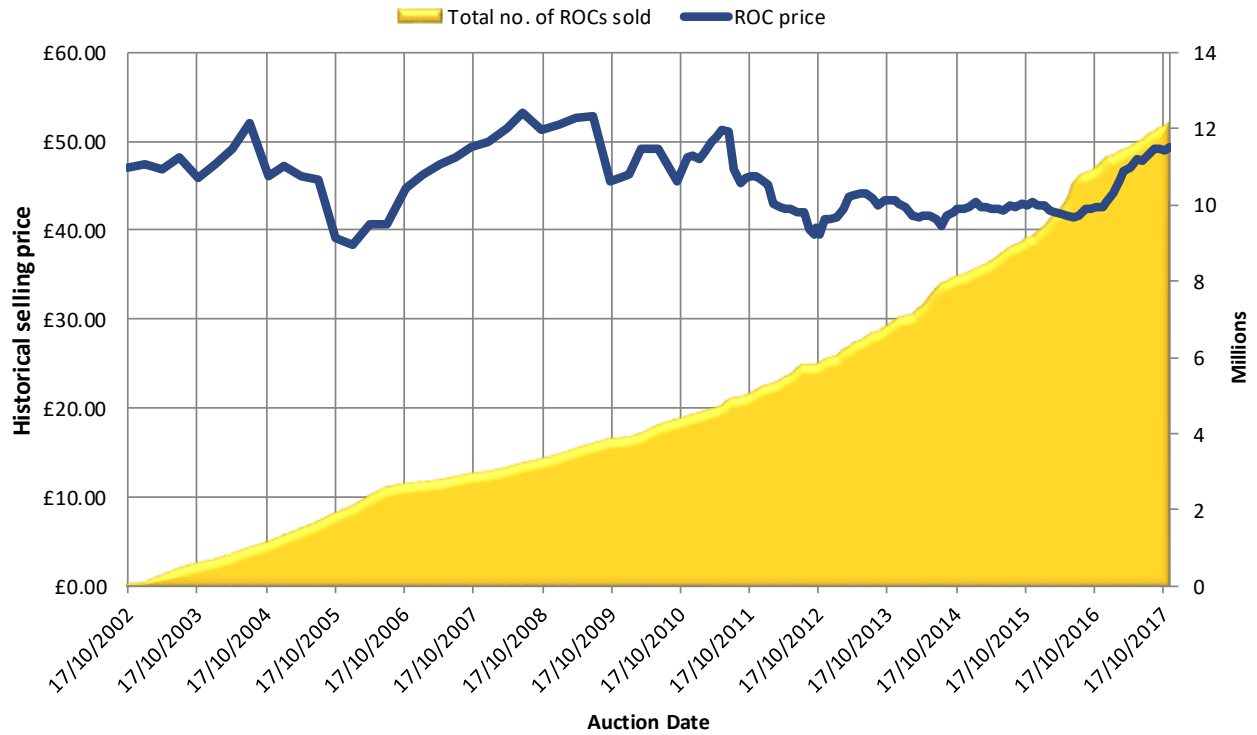
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# Prices

**Historical auctioned prices of ROCs in sterling pounds, and total amounts of ROCs historically sold.**



Click [here](#) for more information

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