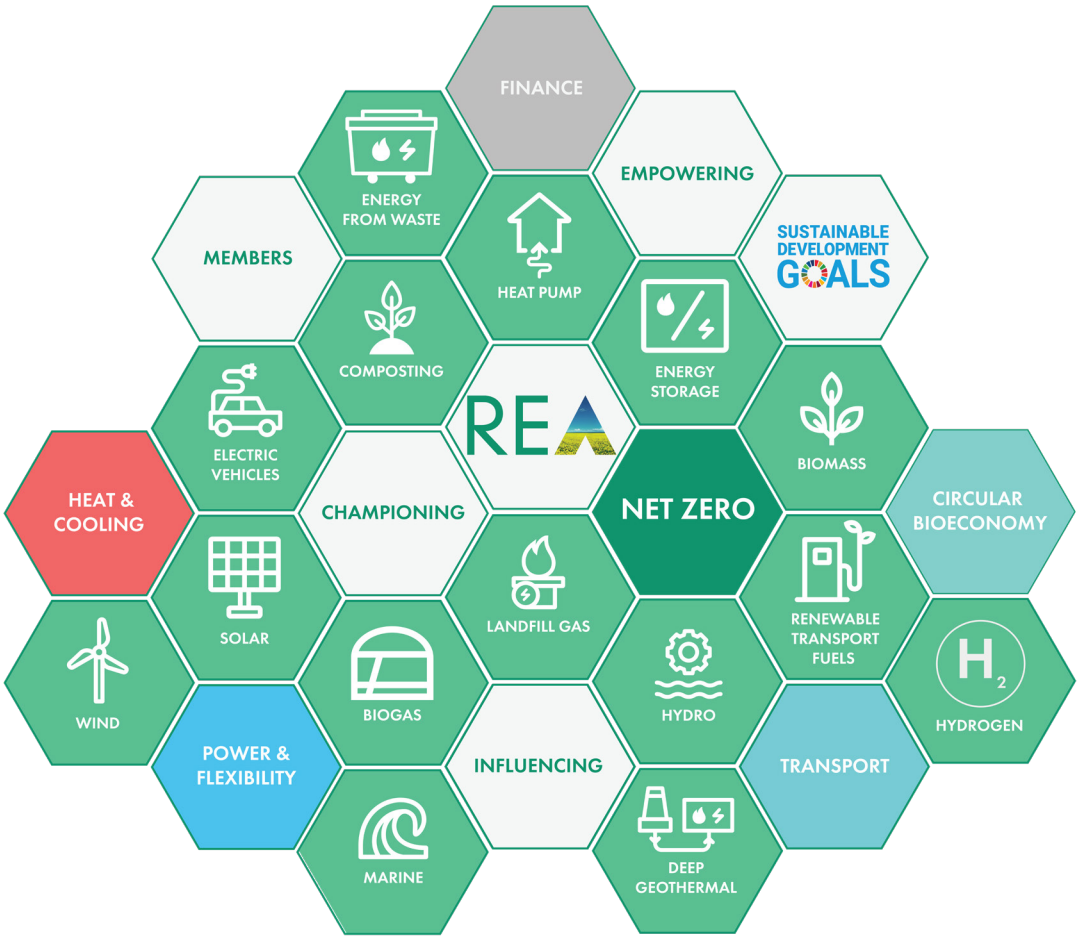
REVIEW22

RENEWABLE ENERGY VIEW



THE AUTHORITATIVE ANNUAL REPORT ON THE UK'S RENEWABLE ENERGY AND CLEAN TECHNOLOGY SECTOR, MAPPING THE ENERGY TRANSITION ON THE PATH TO NET ZERO

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IF YOU believe, as we do, that renewable energy and clean technology is central to the UK's future growth, prosperity and energy security . . .

IF YOU know, as we do, that the potential economic benefits on offer from a green economy points to tens of thousands of new jobs, and billons in added value . . .

IF YOU are serious, as we are, about tackling climate change, and mitigating the impacts of environmental, social and economic disaster, and know that accelerating the roll-out of renewable energy and clean technology has a vital part to play . . .

JOIN US and together, we will work towards a Net Zero future and a greener, more prosperous economy.

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Foreword

On the precipice

Progress, yet frustration. Those were the words we used last year to sum up the state of the nation regarding renewable energy and clean technology.

We said then that, despite the steady advances in the pursuit of Net Zero, the sector's true potential had been stifled by the lack of consistent, proactive and long-term support from the Government. Now, we see the consequences of that inaction.

While geopolitics are fuelling this crisis, a decade of chequered domestic policy has compounded the problems.

As we now know, UK gas imports would have been 13% lower had the Government not 'cut the green crap' (Cameron's famous exhortation). More onshore wind and solar, in addition to a pursuit of energy efficiency measures, would have mitigated some of the worst effects of the current gas crisis.

The REA has published REview22 during the opening days of COP27. While COP26 made positive strides in a number of areas, the tears of Alok Sharma MP, the President for COP26, at the end of the conference spoke volumes. There was a feeling that the need for a decisive watershed moment had been missed.

> "WHILE GEOPOLITICS ARE FUELLING THIS CRISIS, A DECADE OF CHEQUERED DOMESTIC POLICY HAS COMPOUNDED THE PROBLEMS."

Indeed, a year on, it feels like the progress that was made in Glasgow is at risk, certainly from a UK perspective.

There remain huge holes in Government policy, especially when it comes to heat and transport. Worse still, policies which were in place, such as the Green Homes Grant, were scrapped without a suitable replacement.

While not perfect, the scheme should have been

retained and improved. Given what households are facing this winter, it leaves considerable gaps for householders desperate to save energy.

Additionally, despite messaging from across the sector for a national effort to insulate homes before this winter, the Government did not respond, and our calls fell on deaf ears.

If they had listened, the package of support necessary to protect households would not have been so great and long term mitigations would have been built in. That is not to mention the economic stimulus that would have been provided had such a measure been implemented.

The Government must not make the same mistake again. Now is not the time to double down on fossil fuels which have contributed so significantly to the current economic turmoil.

Pursuing new oil and gas licences, over a rapid expansion of onshore wind, solar and a range of other fast to build renewable technologies, is economically and environmentally short sighted.

For this year's REview22, I am delighted to read thought leadership pieces giving insight into the sector's experiences over the past year, and what we need to see going forwards.

Included is commentary from our brilliant REA policy strategic pillar leads - Mark Sommerfeld, Dr Kiara Zennaro, Jenny Grant and Jacob Roberts.

I am also so pleased to also welcome invaluable contributions from Drax's Will Gardiner, and EY's Fernando Valda.

These pieces have added real depth to our presentation of the latest generation, market and employment figures.

On that front, we have again made some important additions to our work. Firstly, we have added an electric vehicle charge point heat map, which indicates where the concentration of new installations are being sited.

In addition, our partners Innovas have built upon their existing technical modelling to better understand the future economic landscape for our sector.

As well as the full-time employment data, there is the addition of the sector's market value for each area, as well as the inclusion of the significant projects that are in the pipeline.

The potential to double the market value of the renewable energy and clean technology sector - and add tens of thousands of new, green jobs - by 2035, should focus the minds of policy makers. Indeed, we believe we can exceed these projections with the right support and conditions.

Government must recognise that it is renewable energy and clean technology that is central to the UK's future growth and prosperity, and act in accordance with that recognition. REview22 shows the potential economic benefits on offer. Yet, the predictions of tens of thousands of new jobs, and billons in added value won't come to pass without the right conditions.

If the Government is serious about tackling climate change and mitigating the impacts of environmental, social and economic disaster, it would accelerate, not curtail, the roll-out of renewable energy and clean technology.

This is the challenge now. As the REA has said repeatedly, the time for warm words is over. Our sector is one of innovation, ambition and progress. The energy crisis we are now seeing is, in part, the culmination of years of insufficient Government policy.

Our sector, with the right support, can be the solution.

Dr Nina M Skorupska CBE
Chief Executive, REA

Executive Summary

State of the industry report 2022

In last year's REview, we included our Strategy's recommendations for each 'pillar': Power and Flexibility, Heat and Cooling, Circular Bioresources, and Transport.

These recommendations were our key asks of Government, which we consider vital to ensuring a smooth, timely and efficient energy transition.

This year we have measured the Government's progress against these recommendations. While the ratings of 'good', 'neutral' and 'bad' may seem a little all-encompassing for what can be complex policy areas, they nonetheless give a good indication of how well the Government are performing in these areas. We have also sought to offer a brief rationale for why we have given each rating.

Advances have been made, particularly when it comes to the decarbonisation of power. However, while power continues to make good progress, with 40% of electricity generated in 2021 coming from renewable sources, and with advances being made in ensuring a broad range of technologies have a route to market, Government action in supporting the other 'pillars' of Net Zero have not fared so well.

In particular, Government progress when it comes to heat decarbonisation leaves much to be desired where major policy gaps are failing to enable the growth of potentially game-changing technologies.

The continued lack of support for deep geothermal heat, for example, continues to be a source of real frustration for the REA. The technology can be locally deployed relatively quickly with a limited footprint, but at this stage requires tariff commitments from the Government - commitments that still are yet to be forthcoming.

For circular bioresources, progress is being made, with both composting and anaerobic digestion seeing encouraging rises in the tonnages of waste feedstocks received in 2021 - 4.1% and 7%, respectively.

However, household recycling rates fell from 44.3% in 2018 to 43.6% in 2020. This is significantly below the 50% required by the EU Waste Framework Directive and underlines that there is much more work to do in this area.

When it comes to transport, there is again a mixed picture.

We were delighted to see the introduction of E10 fuel (10% renewable blend in standard petrol) after years of campaigning, The increase in sales of Electric Vehicles has been astonishing, no doubt in part accelerated by the cost of fossil road transport fuel due to the energy crisis.

While the Government has a 2035 target for all new car and vans sold to be zero emission vehicles, it is clear consumers are making the transition ahead of time. The challenge now is ensuring that the roll-out of a future-proofed charging-network can keep pace with rising demand and that key policy commitments are seen through.

The sector has continued to be the largest emitting sector since 2016 and sub-sectors such as marine and rail have been slower to decarbonise. While the share of emissions from the transport sector fell from 34% in 2019 to 24% in 2020, this was driven by the impact of Covid-19 and the associated lockdowns.

However, the sector remains the largest emitting one because of the steep fall in emissions from the power sector, which means that the transport sector now has the greatest opportunity to capitalise on, to successfully and rapidly decarbonise our economy.

13.6%

UK'S TOTAL ENERGY CONSUMPTION FROM RENEWABLE SOURCES IN 2020, FAILING TO MEET THE 15% TARGET

While REview22 is a story of some progress, the Government's Net Zero targets remain a work in progress.

Under the European Union's Renewable Energy Directive (RED), the UK committed to deriving 15% of total energy consumption from renewable sources by 2020. However, the UK failed to meet that target, reaching just 13.6% by the deadline.

Of the 29 European countries with RED targets, not including the UK, 25 exceeded their targets; three met their targets; and only one other country failed to meet their target: France, which reached 19.1% of their energy consumption from renewable

sources, rather than their target of 23%.

When it comes to the economy, the renewable energy and clean technology sector has shown itself to be remarkably resilient.

As highlighted in Dr Nina Skorupska's foreword, our partners Innovas have built upon their existing technical modelling to better understand the future economic landscape for our sector.

The REA has expanded this report to include projections for the market value of the industry in every nation and region in the UK. This is in addition to the estimated levels of full-time employment. Significant projects in the pipeline are also highlighted.

Projections show a more than doubling of the market value of the sector from around £22bn today to £46bn in 2035, and reaching 210,000 jobs.

Looking ahead there are significant opportunities for the Government. For example, REMA could offer major market reform which would benefit consumers, ensuring that the low cost of renewables would be felt in peoples' energy bills. Decoupling gas from renewable prices is one such mechanism that we would encourage the Government to adopt.

A message from our sponsors, Drax

Will Gardiner, CEO, Drax Group

Global events of 2022 have necessitated stark warnings to governments and economies the world over. The war in Ukraine has highlighted the volatility of the global energy supply, while the IPCC and scientists worldwide have increased calls to deliver action, not words, to fight the climate catastrophe. Now more than ever, the UK must invest in renewables to ensure security of supply and energy resilience in the UK. Generating reliable, renewable power here in Britain is the best way to support energy security – with the additional benefits of cutting emissions, creating jobs, and boosting opportunities across the country.

Which is why it is encouraging to see Government making progress on a solution to achieve all these objectives – while at the same time, presenting an opportunity for the UK to lead the world in pioneering, climate-saving technology.

Bioenergy with Carbon Capture and Storage (BECCS) produces reliable, renewable power whilst also permanently removing carbon dioxide from the atmosphere – no other technology can do both. BECCS is proven, shovel-ready, and the most scalable negative emissions technology. In National Grid's Future Energy Scenarios, negative emission technologies play the largest role in removing emissions across all scenarios. BECCS is named as the largest provider.

The UK Government has made important announcements this summer which demonstrate bold ambition and continued commitment to BECCS. BEIS has launched a consultation on supporting the development of BECCS in the UK over the next decade, as well as a submission process to bring forward suitable power BECCS projects into Government's Track-1 process for Carbon Capture and Storage Clusters. Successful Track-1 projects will be supported to begin capturing carbon in the mid-2020s.

These milestones are consistent with Drax's ambition for deploying BECCS at Drax Power Station in Selby, North Yorkshire by 2027 – we are ready to invest and work with Government to bring this technology to scale.

BECCS has already been trialled and proven at our Selby site, and its growth represents the station's next chapter. Drax plans to invest £2bn in what will be the biggest carbon capture in power project in the world. Scaling up BECCS will mean beginning construction in 2024, capturing 8mn tonnes of carbon by 2030, and permanently storing those emissions under the North Sea.

Furthermore, BECCS at Drax will support over 10,000 jobs and create employment and supply chain opportunities in the Humber region and across the North. Our ambition to source 80% of construction materials and services from British firms, along with a supplier engagement programme and MoU with British Steel, means the project will deliver millions of pounds in contracts for UK companies, large and small.

The export potential of BECCS for the UK should also not be underestimated. In the 2020s, Drax Power Station will become a global showcase for climate-saving UK technology, and help give the UK first mover advantage in scaling up negative emissions, an industry which could create 4–10 million new jobs worldwide.

BECCS will enhance the unique role which Drax already plays today. Our sustainable biomass and pumped storage hydro sites are critical to the UK's energy mix - we generate energy when the wind isn't blowing and the sun isn't shining, and help keep the UK's energy system stable.

Drax today produces 12% of the UK's renewable electricity - more than any other generator. At Selby, the UK-generated baseload power we produce from sustainable biomass is used by 4 million homes, and has never been more important to this country's energy security.

With the right policies, Britain can lead the world in delivering clean, secure energy which keeps the lights on, creates jobs and opportunities, and helps meet national and global climate targets. The UK Government's recent announcements have shown its commitment to bring these cutting edge solutions closer to fruition here in Britain. With continued momentum, by backing BECCS, the UK can pioneer this innovation and reap the benefits nationally as well as globally.

REA Strategy

A Pathway to Enabling Net Zero

The UK transitions to 100% renewable energy and clean technology by 2050 delivering Net Zero CO_2 emissions, improving and valuing natural capital.

Our recommendations for reaching the targets for each pillar are set out after each section in the report.

INTERIM GOALS ALONG THE PATHWAY

CIRCULAR BIORESOURCES

By the end of 2023 all bio-waste is either separated and recycled at source or is collected separately and is not mixed with other types of waste.

Organics recycling is recognised in the reformed Packaging Producer Responsibility System.

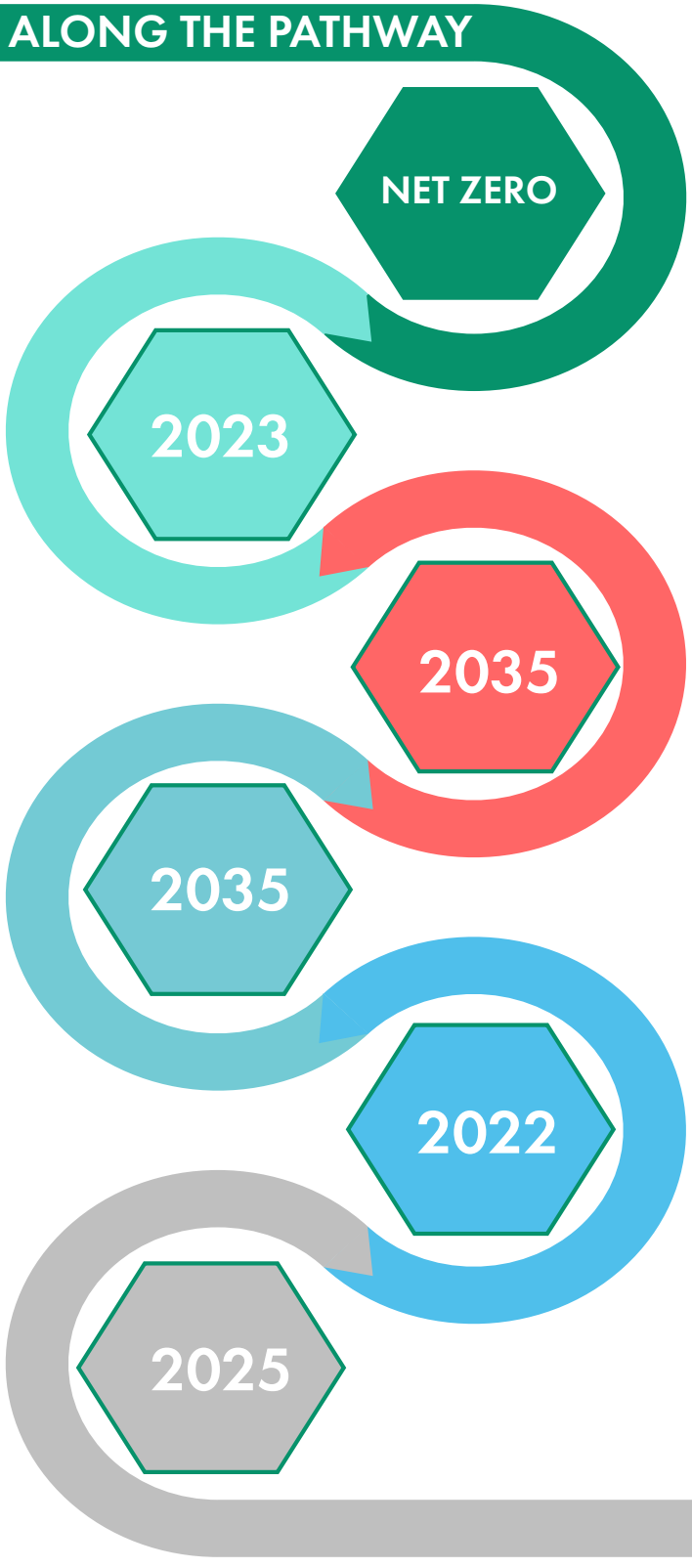
TRANSPORT

By 2035, renewable fuels and electricity are the majority source of energy used in the transport sector.

FINANCE

Finance and investment groups invest more in Net Zero agenda and drive corporate Environmental, Sustainability Governance (ESG).

Tipping the balance away from a fossil fuel-based economy by 2025.



HEAT & COOLING

Renewables and clean technology solutions are the dominant form of heat by 2035.

POWER & FLEXIBILITY

Renewable power generation is the largest producer of TWhs by end of 2022, facilitated by clean technologies which operate in a deep and transparent flexibility markets.

Deployment

Renewable Deployment Summary

In last year's REview21, it was stated that, while the UK Government's Net Zero ambitions were laudable, slowing renewable generation showed that action is yet to match the rhetoric. A year on, there has been little to challenge that assumption.

While REview21 covered generation and consumption data in 2019, a later publication date of REview22 has indicated that both 2020 and 2021 has been included. This has meant that data covering both 2020 and 2021 is now analysed across all of the REA 'pillars' - power & flexibility, heat & cooling, circular bioresources and transport.

In previous years, the Association for Renewable Energy and Clean Technology (REA) has measured the UK's progress of renewable energy deployment against targets set by the European Union (EU) through the Renewable Energy Directive (RED) in 2009.

The UK's objective, in line with RED targets, was to source 15% of its total energy consumption from renewable sources by 2020. However, the UK was one of just two countries in the EU not to meet its RED targets, with a final outcome of 13.6%.

Despite a fall in renewable power generation in 2021, much of the UK's progress towards Net Zero continues to be driven by the power sector, with 40% of power generation now coming from renewable sources. In 2019 it was 35%.

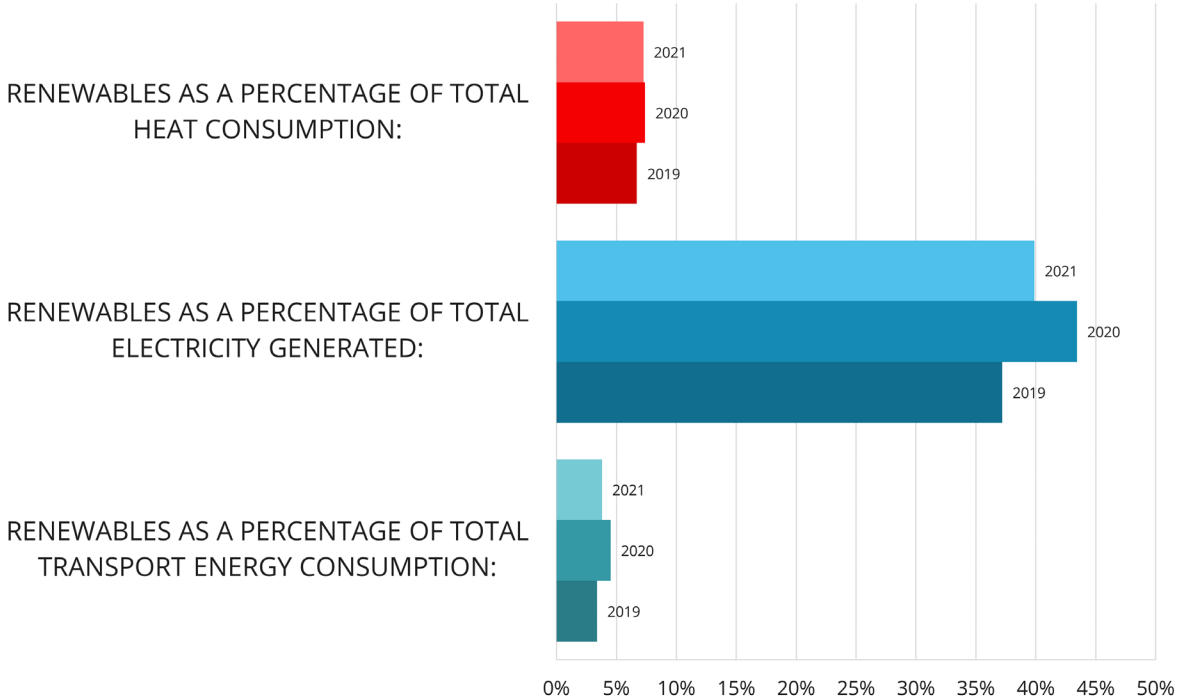
However, as with last year's REview21, sluggish progress in decarbonising the heat and transport sectors is slowing the UK's energy transition.

The heat sector, particularly, has suffered from large gaps in supportive Government policy. For example, the Non-Domestic Renewable Heat Incentive (ND RHI) was closed in March 2021 with no comparative initiative taking its place.

In short, while the UK's power sector has long met and exceeded its RED deployment targets, until supportive Government policy measures are forthcoming for heat and transport, it will continually be a challenge for the UK to meet its Net Zero commitments in the short, medium and long term.

While this has major environmental consequences, the economic ramifications of such policy gaps are significant, as we are now finding out to our great cost.

RENEWABLE ENERGY DEPLOYMENT BY REA PILLAR



Deployment: Power & Flexibility

Renewable Power Generation Summary

In 2021, the share of UK power generation coming from renewable sources now stands at 40% - in 2011, this figure had not yet reached 10%.

Despite a fall in generation last year, wind remains the dominant renewable power generating technology - 53% of all renewable power generation comes from offshore and onshore wind, an extraordinary 65,000 GWh.

Biomass and solar also continue to be major contributors, providing 9% and 4% of all the UK's electricity needs, respectively.

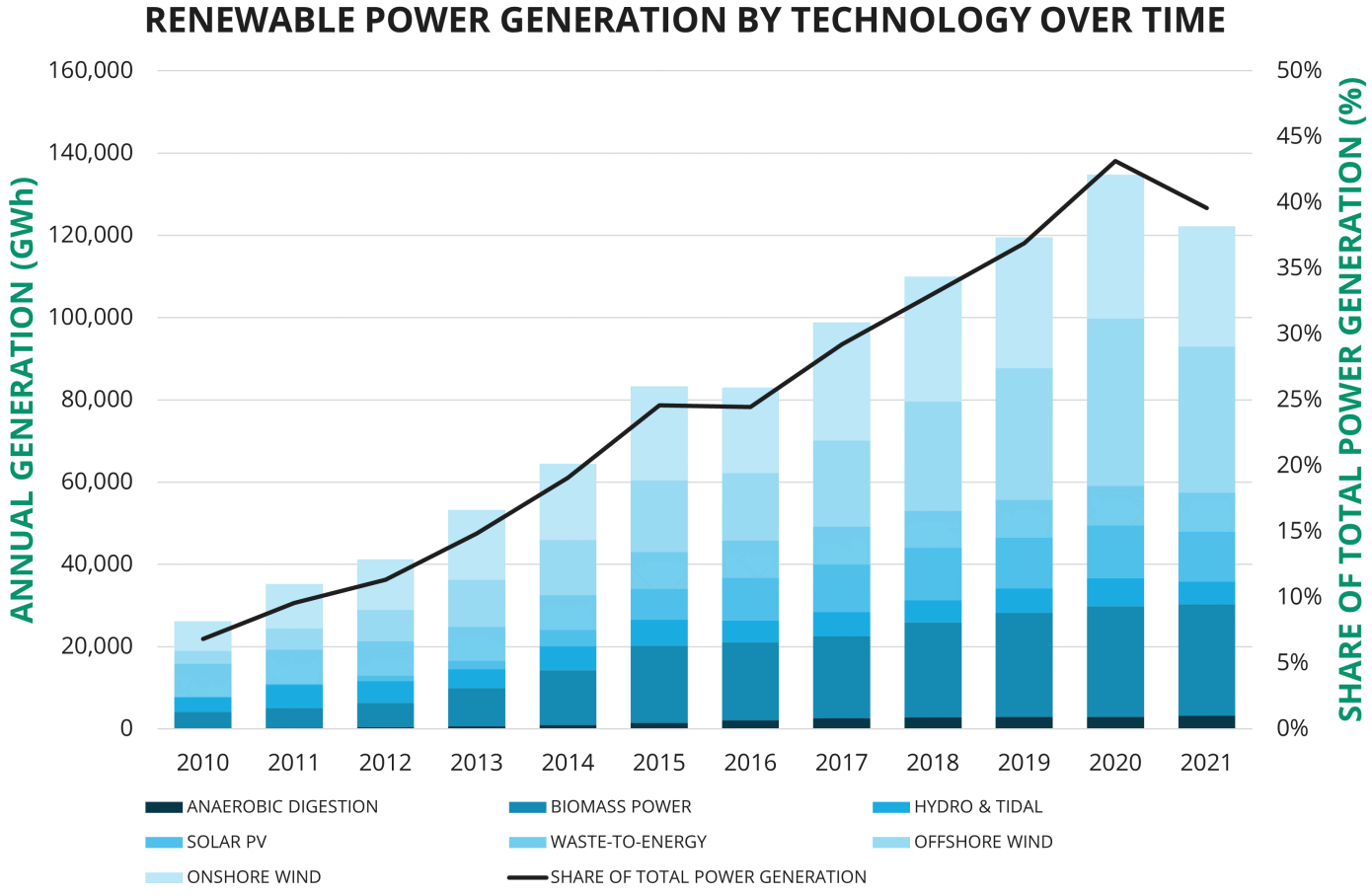
After a period of relatively slow generation increases for solar, it is expected that the next one to two years will see renewed growth for the sector with significant capacity coming online.

40%

SHARE OF UK POWER GENERATION COMING FROM RENEWABLE SOURCES

While remaining relatively small contributors, anaerobic digestion and the technologies that make up the wider waste-to-energy sector have continued to grow consistently.

Hydro and tidal continue to see consistent levels of generation.

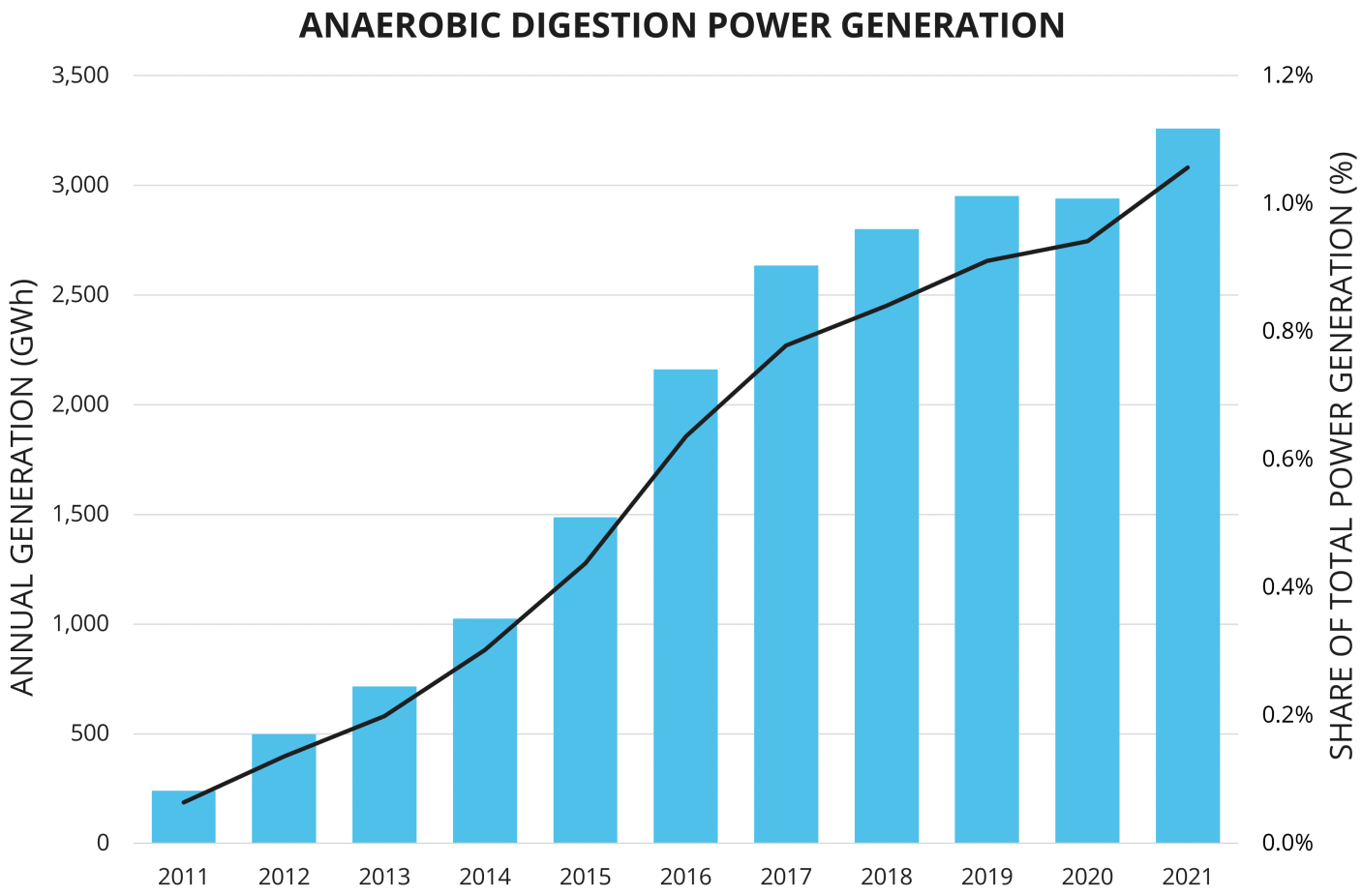


Deeper Insight: Power & Flexibility

Anaerobic Digestion

After a small dip in 2020, power generation through anaerobic digestion grew significantly in 2021, with more than 3,250 GWh being produced.

Indeed, a near 11% rise in anaerobic digestion power generation is the largest increase since 2017. This is, in part, due to food waste volumes returning to pre-pandemic levels after lockdown throughout most of 2020, as well as biogas combustion projects which were delayed in 2020 eventually commissioning in 2021.



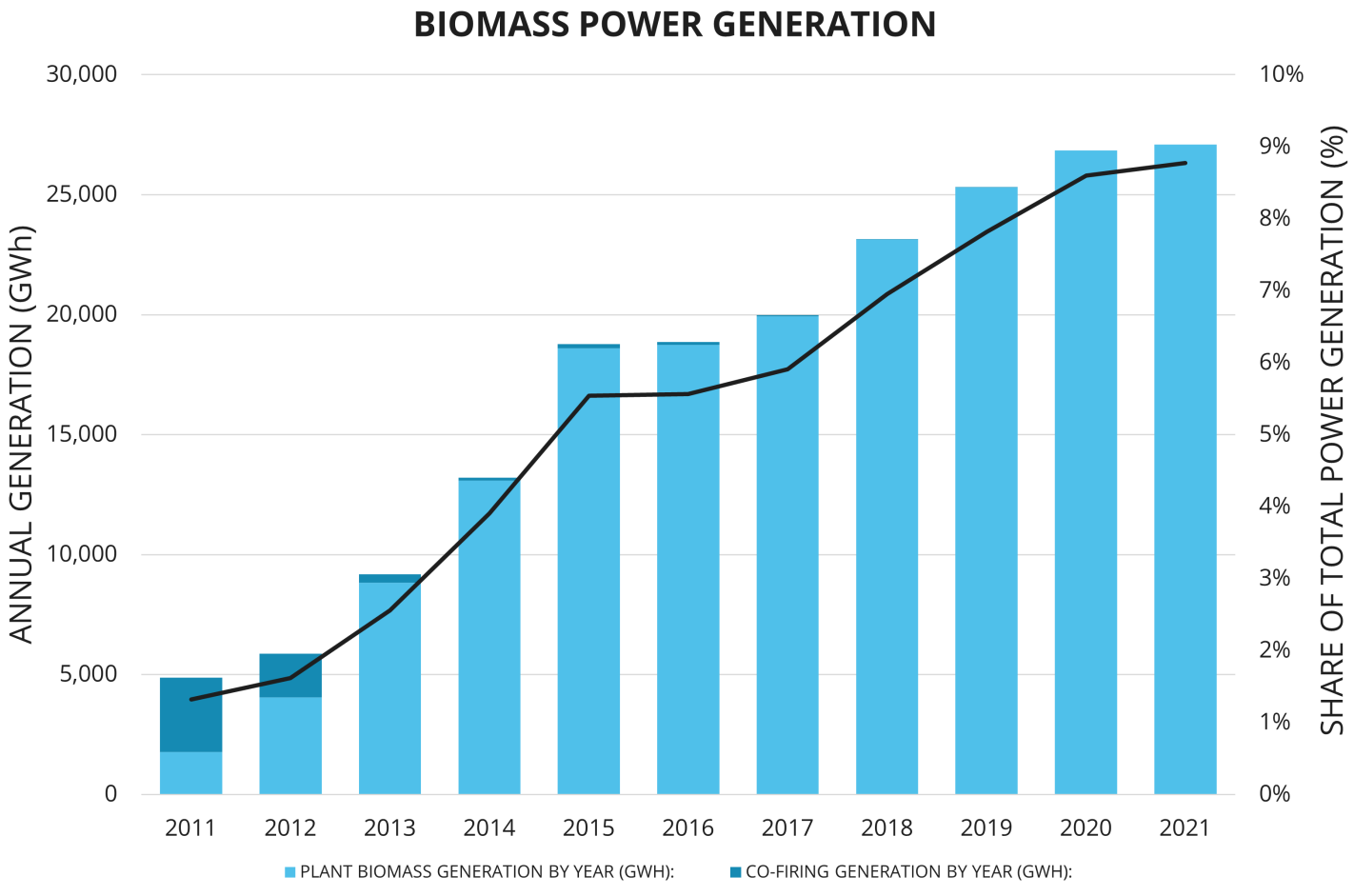
Biomass Power (e.g. energy crops, straw and wood pellets)

Biomass power continues to be the largest producer of renewable power behind offshore and onshore wind.

More than 27,000 GWh of power was generated in 2021, representing extraordinary growth from a decade ago when the UK was producing just 1,771 GWh.

Biomass power generation levels remained steady in 2020 following previous growth rates of 9.4% from 2018 to 2019 and 6.1% from 2019 to 2020.

The UK has ceased to generate power from co-firing from fossil fuels. This represents remarkable progress over the past decade, with 3,000 GWh of power being produced in 2011. As highlighted in REview21, this is the result of the conversion of large plants which now run exclusively on biomass.

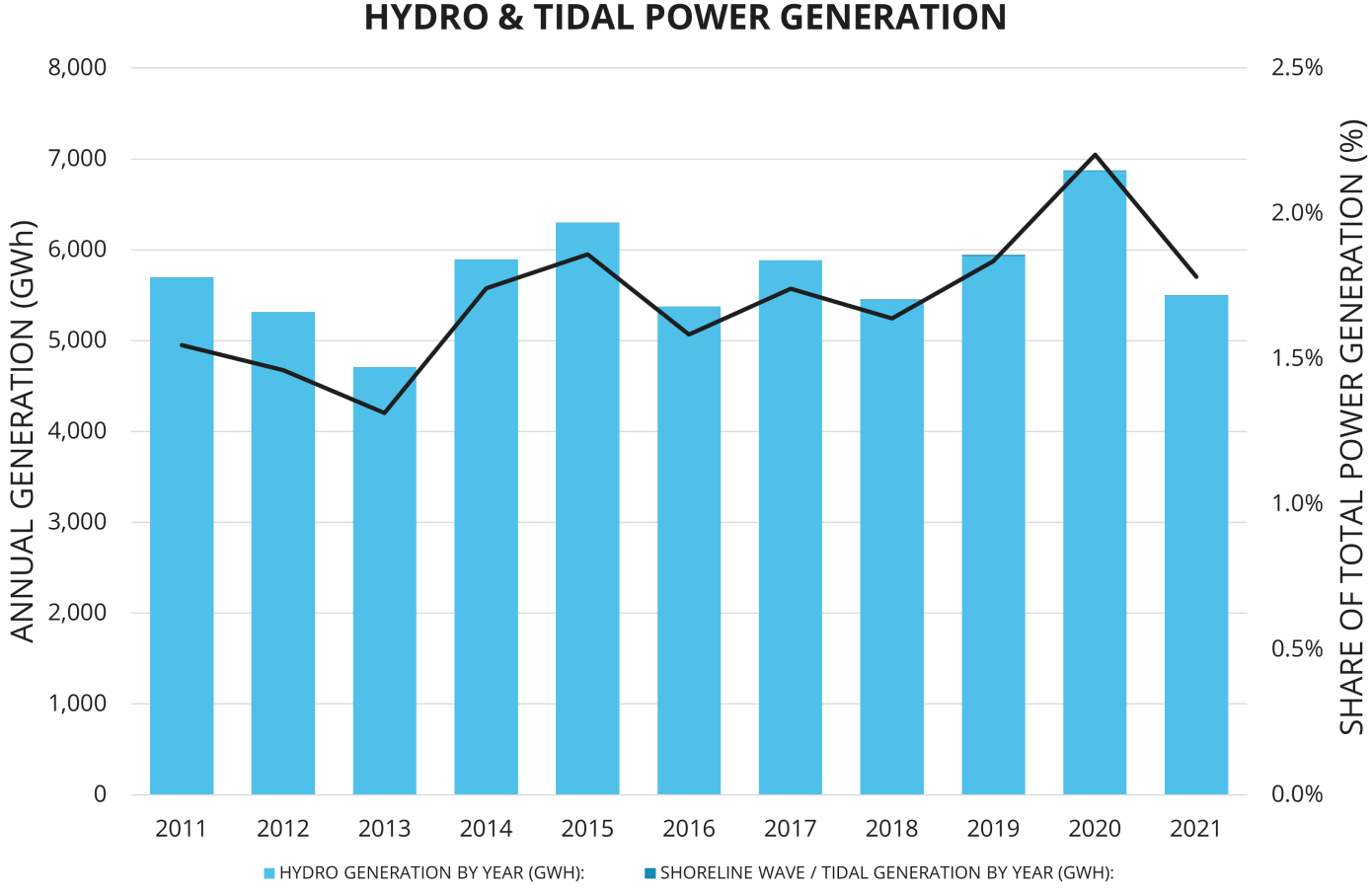


Hydro & Tidal

Hydro generation suffered a near 20% fall in 2021, with just under 5,500 GWh of power being produced.

However, this is not out of the ordinary. As highlighted in REview21, hydro generation is broadly stable, fluctuating between 5,000 - 7,000 GWh per annum depending on levels of rainfall. 2020, for example, saw a record 6,865 GWh being produced, a 16% increase on the previous year.

Shoreline wave and tidal generation continues to remain low. Indeed, power from this source more than halved in 2021, with just 5.5 GWh being produced in 2021. However, recently awarded contracts for the deployment of four tidal stream projects by 2027 should mean growth in the coming years.

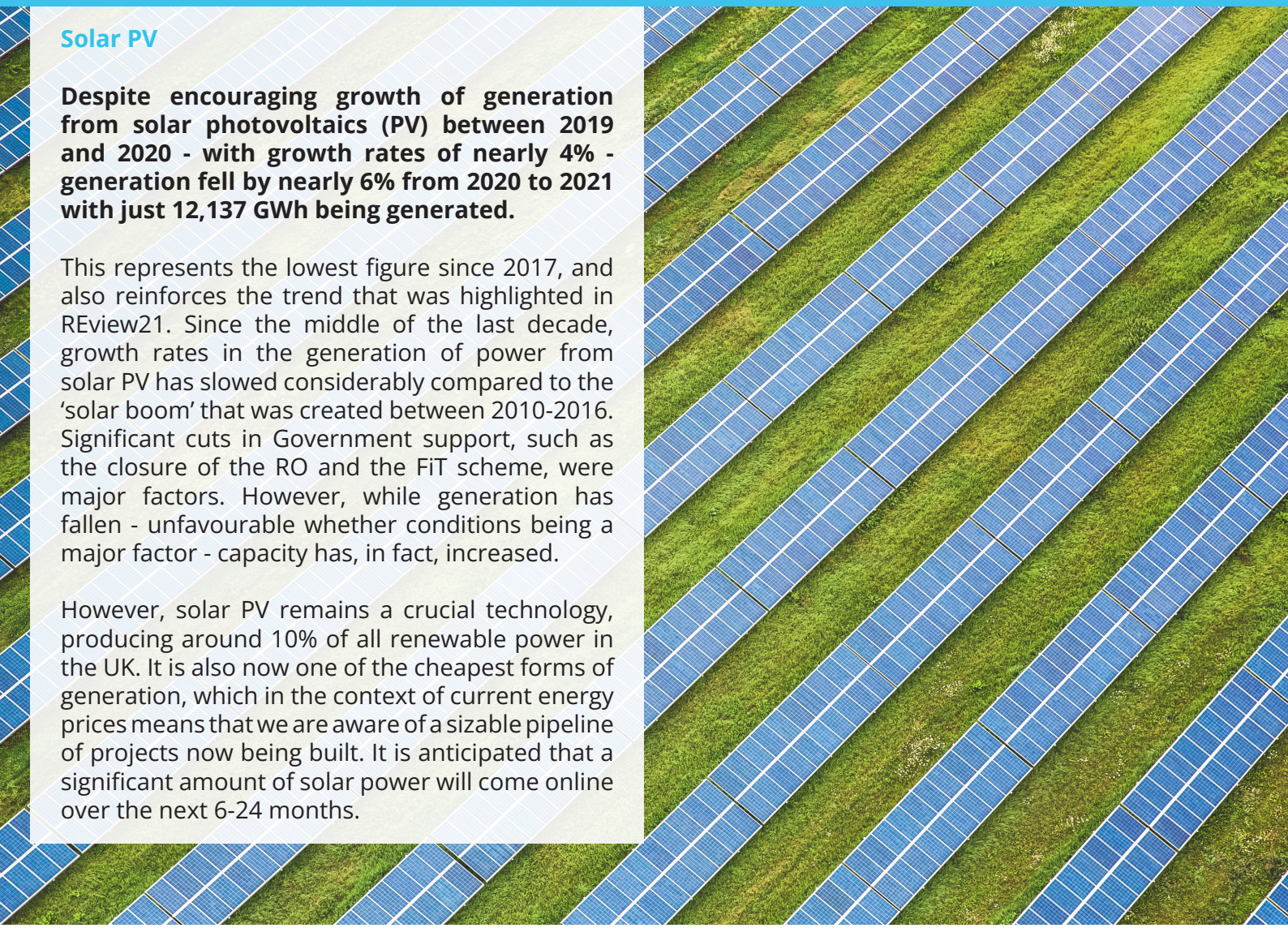


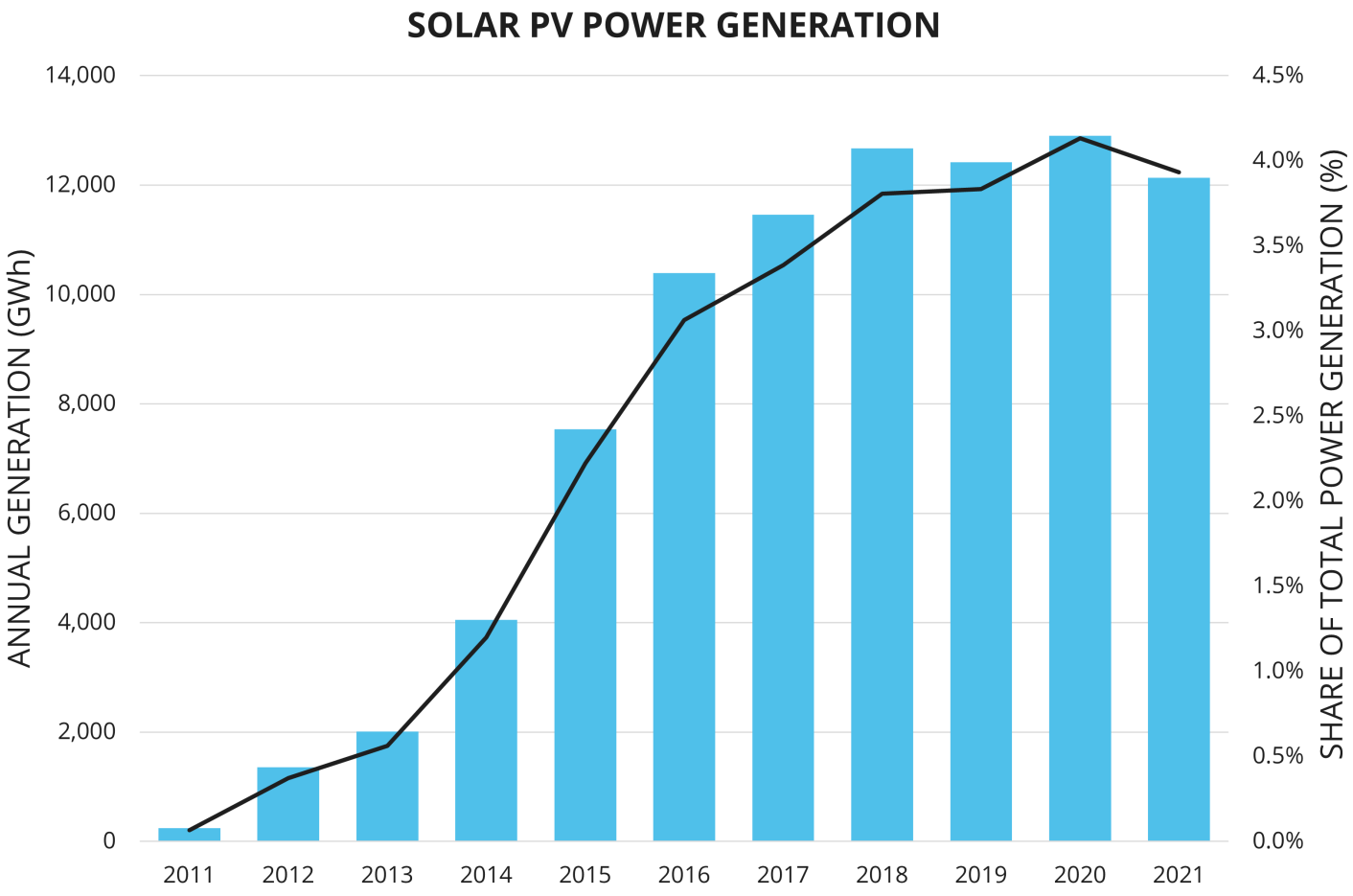
Solar PV

Despite encouraging growth of generation from solar photovoltaics (PV) between 2019 and 2020 - with growth rates of nearly 4% - generation fell by nearly 6% from 2020 to 2021 with just 12,137 GWh being generated.

This represents the lowest figure since 2017, and also reinforces the trend that was highlighted in REview21. Since the middle of the last decade, growth rates in the generation of power from solar PV has slowed considerably compared to the 'solar boom' that was created between 2010-2016. Significant cuts in Government support, such as the closure of the RO and the FiT scheme, were major factors. However, while generation has fallen - unfavourable whether conditions being a major factor - capacity has, in fact, increased.

However, solar PV remains a crucial technology, producing around 10% of all renewable power in the UK. It is also now one of the cheapest forms of generation, which in the context of current energy prices means that we are aware of a sizable pipeline of projects now being built. It is anticipated that a significant amount of solar power will come online over the next 6-24 months.



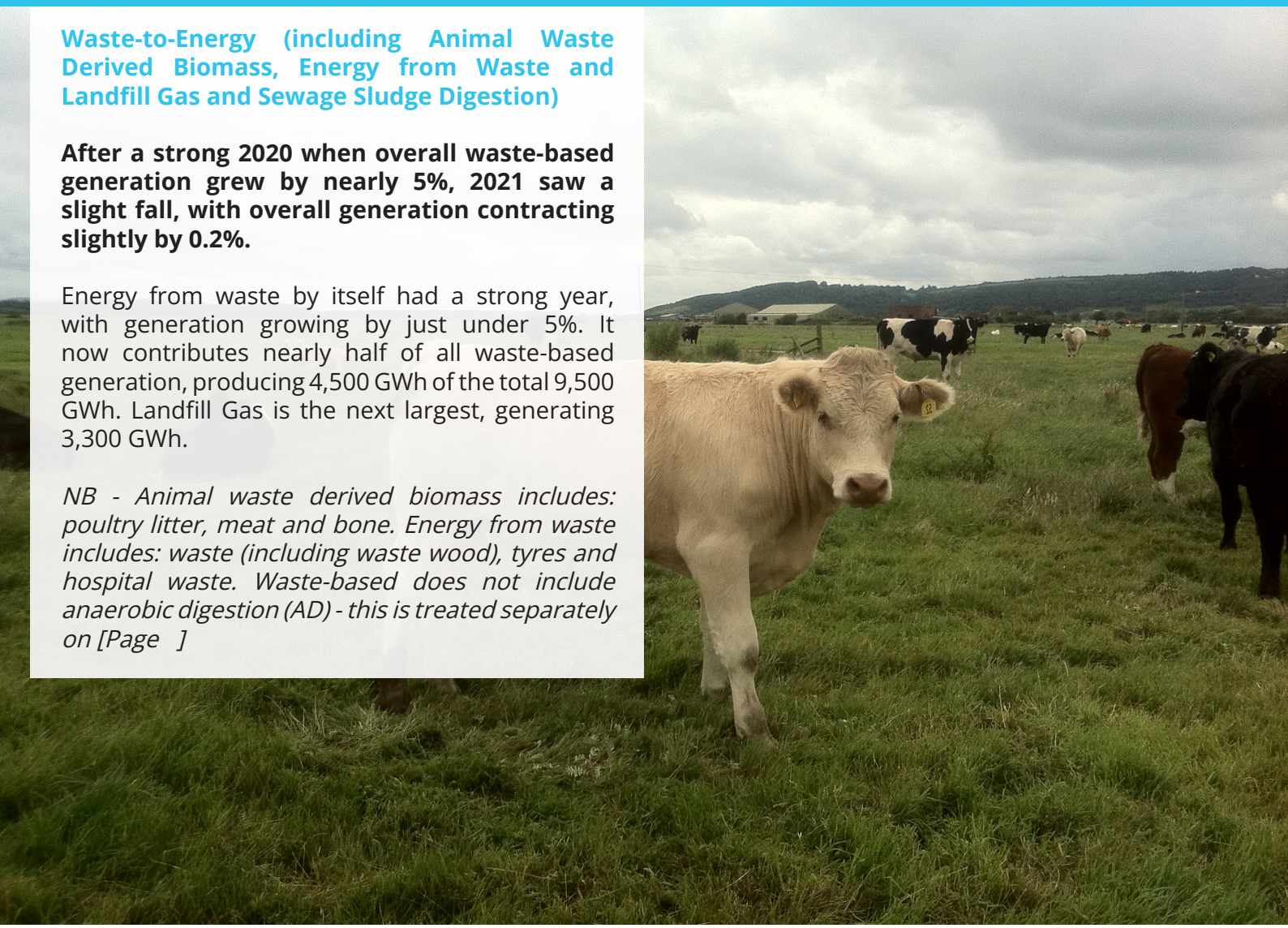


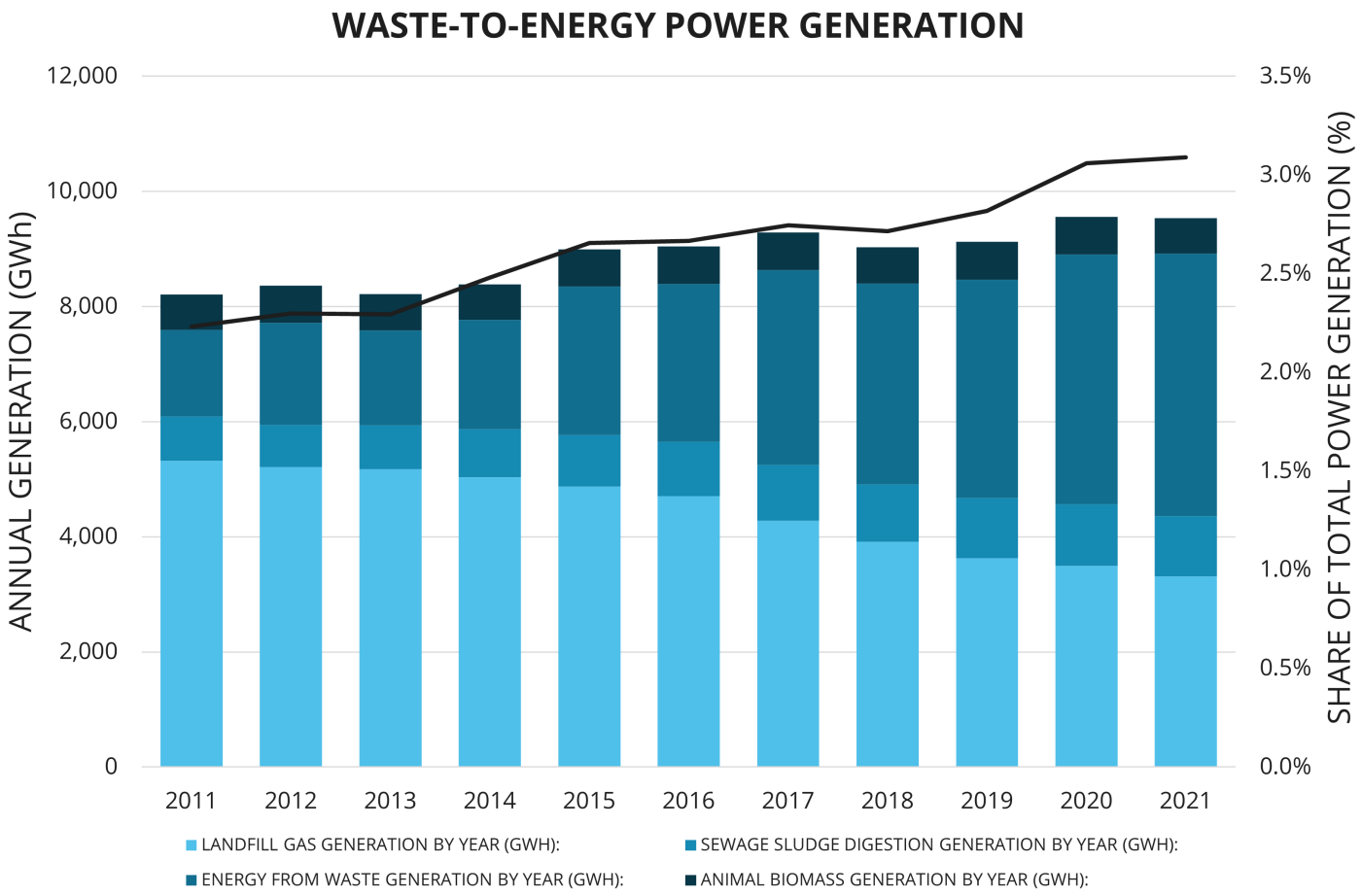
Waste-to-Energy (including Animal Waste Derived Biomass, Energy from Waste and Landfill Gas and Sewage Sludge Digestion)

After a strong 2020 when overall waste-based generation grew by nearly 5%, 2021 saw a slight fall, with overall generation contracting slightly by 0.2%.

Energy from waste by itself had a strong year, with generation growing by just under 5%. It now contributes nearly half of all waste-based generation, producing 4,500 GWh of the total 9,500 GWh. Landfill Gas is the next largest, generating 3,300 GWh.

NB - Animal waste derived biomass includes: poultry litter, meat and bone. Energy from waste includes: waste (including waste wood), tyres and hospital waste. Waste-based does not include anaerobic digestion (AD) - this is treated separately on [Page]





Wind

Once again, wind is the largest producer of renewable power, with nearly 65,000 GWh being generated when aggregating offshore and onshore generation.

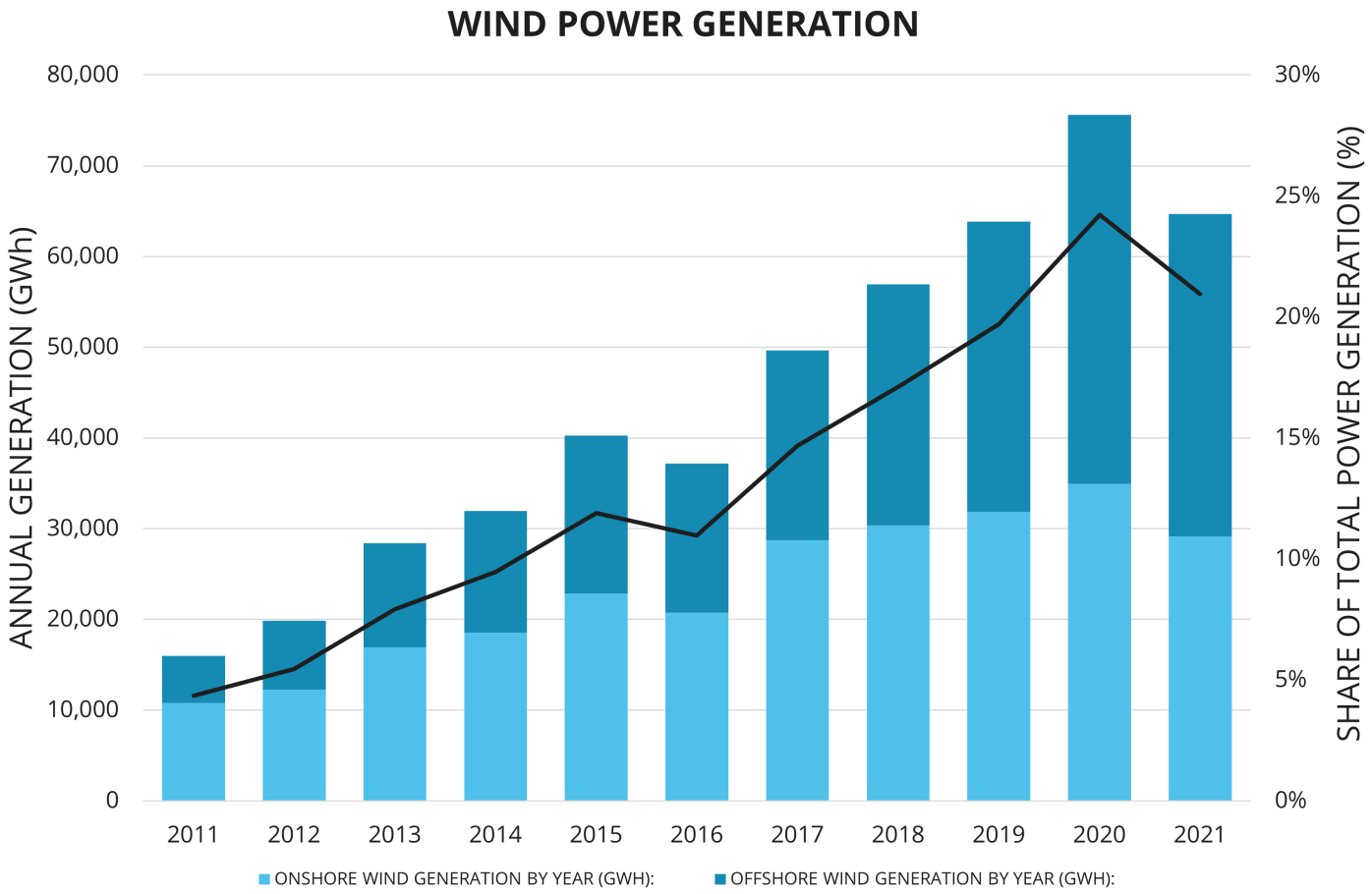
Offshore wind generation is a marginally larger contributor to this figure, generating 35,000 GWh compared to onshore's 30,000 GWh.

53%

OFFSHORE AND ONSHORE WIND ACCOUNTS FOR 53% OF ALL RENEWABLE POWER GENERATION.

While generation last year fell by 15% compared to 2020, due predominantly to less wind, overall generation has quadrupled since 2011.

In addition, aggregate capacity grew by more than 5%.



A Power System that Delivers Everything the UK Needs

Mark Sommerfeld,
Head of Power and Flexibility, REA

November 2021, in energy policy terms, feels a lifetime ago. Back then the REA were at COP 26 in Glasgow, where discussions focused on how net zero was going to be realised by 2050. However, by February 2022, the context of those discussions had radically changed. Global gas demand and the Russian attack on Ukraine have brought energy security and affordability to the forefront. The change in focus has been stark.

The Government rapidly produced a new British Energy Security Strategy less than six months after the Net-Zero Strategy. Despite this, when it comes to thinking about the future of the UK power grid, the answers remain the same. The rapid deployment of renewable and clean technologies, accompanied by meaningful market reform, is not only the answer to decarbonisation but the undeniable solution to the delivery of an affordable secure power system.

The power system has been the backbone of UK decarbonisation efforts. In 2011, renewables accounted for only 9.4 % of generation, and in the decade since we have reached about 40%. The price for renewables generation has tumbled, with wind and solar being many times below the current cost of fossil gas generation. What's more, this is energy that isn't reliant on fossil fuel imports, delivering real energy security. Renewables are the route to taking control of the means of meeting our electricity needs and delivering lower bills at the same time.

However, there is more to it than just building lots of cheap renewable energy assets. We also need diversity of supply, with technologies like bioenergy, tidal, geothermal and hydropower all providing potential for predictable firm generation to complement rapid increases in solar and wind capacity. In addition, flexibility is crucial. This requires a wide range of energy storage technologies to discharge at different durations to manage peaks and troughs in low carbon generation and demand. Such systems need urgent access to a market that rewards the valuable balancing services being provided to the grid.

This may now be delivered through the current Review of Electricity Market Arrangements (REMA). This government review considers how the energy market should be structured going forward, to both help consumer prices fall and enable decarbonisation. This includes exploration of options for decoupling the wholesale market from the marginal generation price. The fact that renewable generation is significantly cheaper than gas generation is not recognised by a market where fossil gas sets the market price.

Redesigning the market must be done carefully, including recognising that existing low-carbon generation assets have been financed based on current market arrangements. However, the opportunities for REMA to both favour renewable deployment and pass on cost savings to consumers must now be a priority for Government and industry in 2023.

The final piece of the puzzle is focusing on the very physical and real-world constraints of the infrastructure itself. By far the largest barrier to delivery of the above vision continues to be grid capacity constraints. New grid connections requiring six-to-eight years are incompatible with delivering the low-cost, low-carbon, and secure system we are striving for.

Whether we are talking about decarbonisation, the price of electricity or ensuring energy security, the future direction of the power system is clear. A lot has already been achieved but a step change is needed. This means expediating the deployment of low-cost renewables and storage technologies, redesigning the market to create better price signals and ensuring that physical grid systems are up to scratch. Now is the time to be fully engaged in this process and the REA intends to be at the heart of informing and directing this change.

REA Strategy 'pillar' recommendations: Power & Flexibility

ENSURE A ROUTE TO MARKET

Progress rating: Good

Government has moved to annual CfD auctions and is consulting on further market reforms for mass renewable's role out. However, there remains no route to market for Long Duration Energy Storage.

DEVELOP DEEP, TRANSPARENT FLEXIBILITY MARKET

Progress rating: Neutral

There has been some slow progress on implementation of the Smart System and Flexibility Plan. However, there remains little transparency around flexibility products across the distribution network.

REFORM INNOVATION FUNDING

Progress rating: Good

There has been progress on delivering new innovation thanks to both the Net Zero Innovation Portfolio competitions and development of business models for carbon capture and hydrogen.

SUPPORT FOR ALL RENEWABLE TECHNOLOGIES

Progress rating: Bad

The Energy Security Strategy indicating important roles for some renewables, particularly wind and solar, and the Biomass Strategy is still in development. However, there was a serious step backwards when the Government reverted to oil and gas to address the energy crisis.

GRID REFORMS

Progress rating: Neutral

There has been slow progress this year, especially in relation to a lack of capacity for new grid connections. It is hoped that operability reforms may be helped by the Review of Electricity Market Arrangements and the establishment of a Future System Operator, announced this year.

REGULATORY REFORM

Progress rating: Neutral

Ofgem have come under greater scrutiny this year due to the energy market crisis, however this has not led to greater focus on decarbonisation, with it still remaining outside of their key KPIs.

Deployment: Heat & Cooling

Renewable Heat Summary

Despite a lack of cohesive government support after the closure of the Non-Domestic Renewable Heat Incentive (NDRHI), the UK's renewable heating industry continues to show strong growth, with heat pumps and energy from waste having particularly good years.

As fossil fuel prices started to rise in 2021, renewable heating became more competitive with fossil heating and, thus, we expect this sector to grow even further in 2022.

Policy mechanisms such as the Boiler Upgrade Scheme and the Industrial Fuel Switching Competition have provided some small growth for the industry but are not as effective as the NDRHI., nor ambitious enough to deliver full decarbonisation of heat.

The closure of the NDRHI has left a serious policy gap opening around the decarbonisation of businesses and industrial-scale heat.

1/4

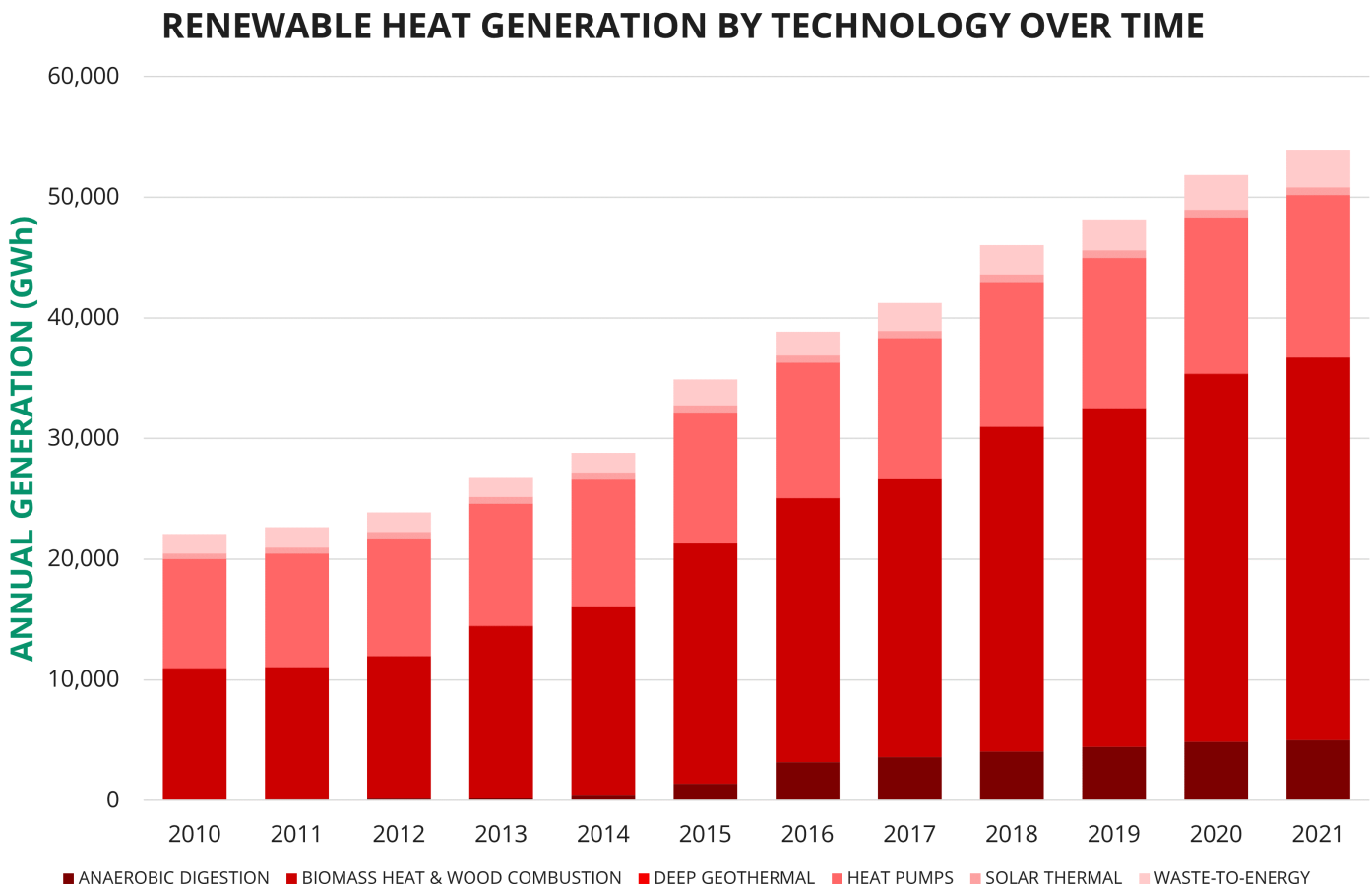
HEAT PUMPS NOW PRODUCE A QUARTER OF ALL RENEWABLE HEAT GENERATION IN THE UK - 13,000 GWh

So far there has been no significant announcements on what will replace the NDRHI.

The Green Gas Support Scheme was launched on 30 November 2021, so we expect to see further expansion of the biomethane sector from 2022 onwards.

The 2023 Green Gas Support Scheme mid-scheme review and the development of the GGSS successor will be critical to maintain and support this sector's growth.

The Government must give solid policy support to the industry if we want to achieve heat decarbonisation.



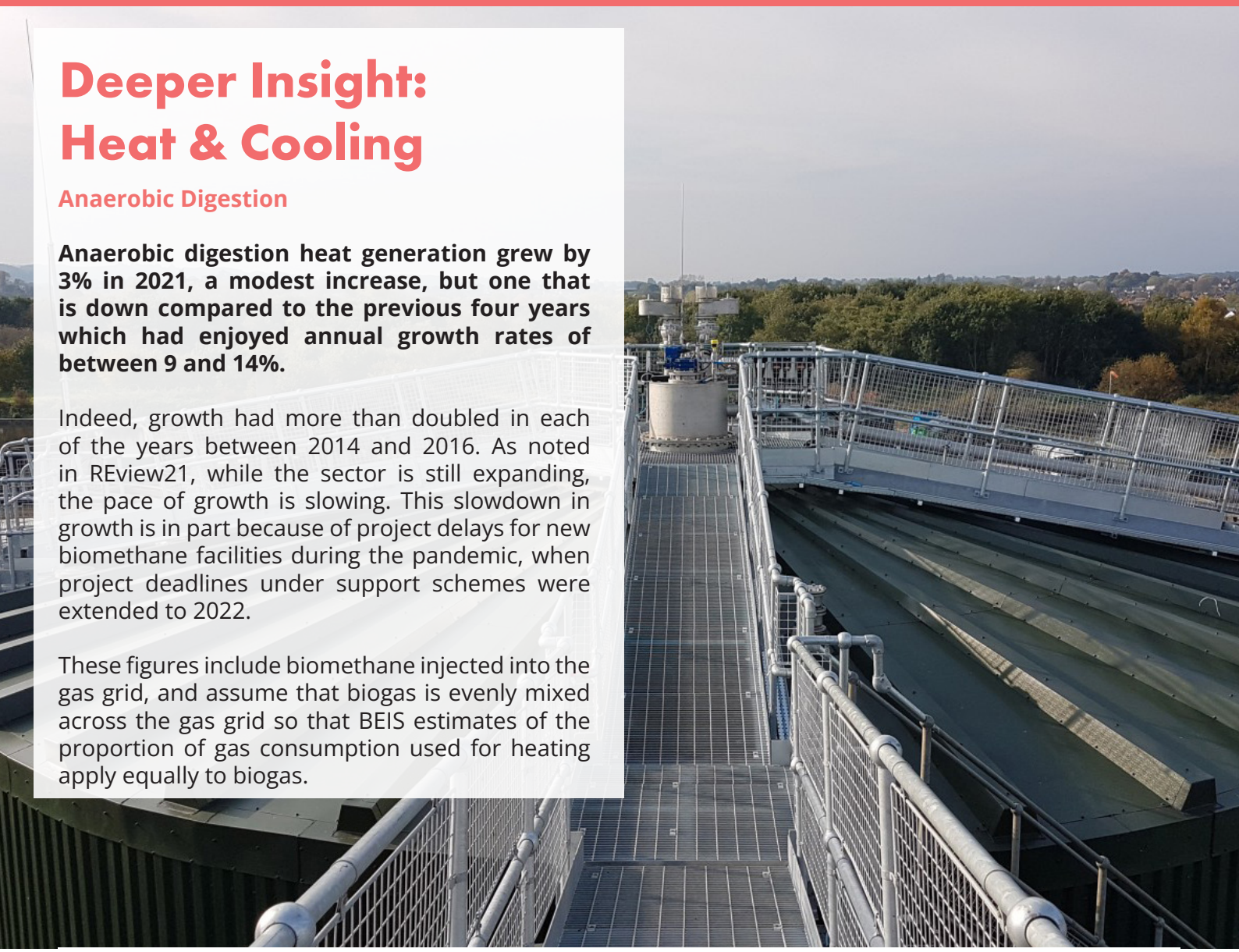
Deeper Insight: Heat & Cooling

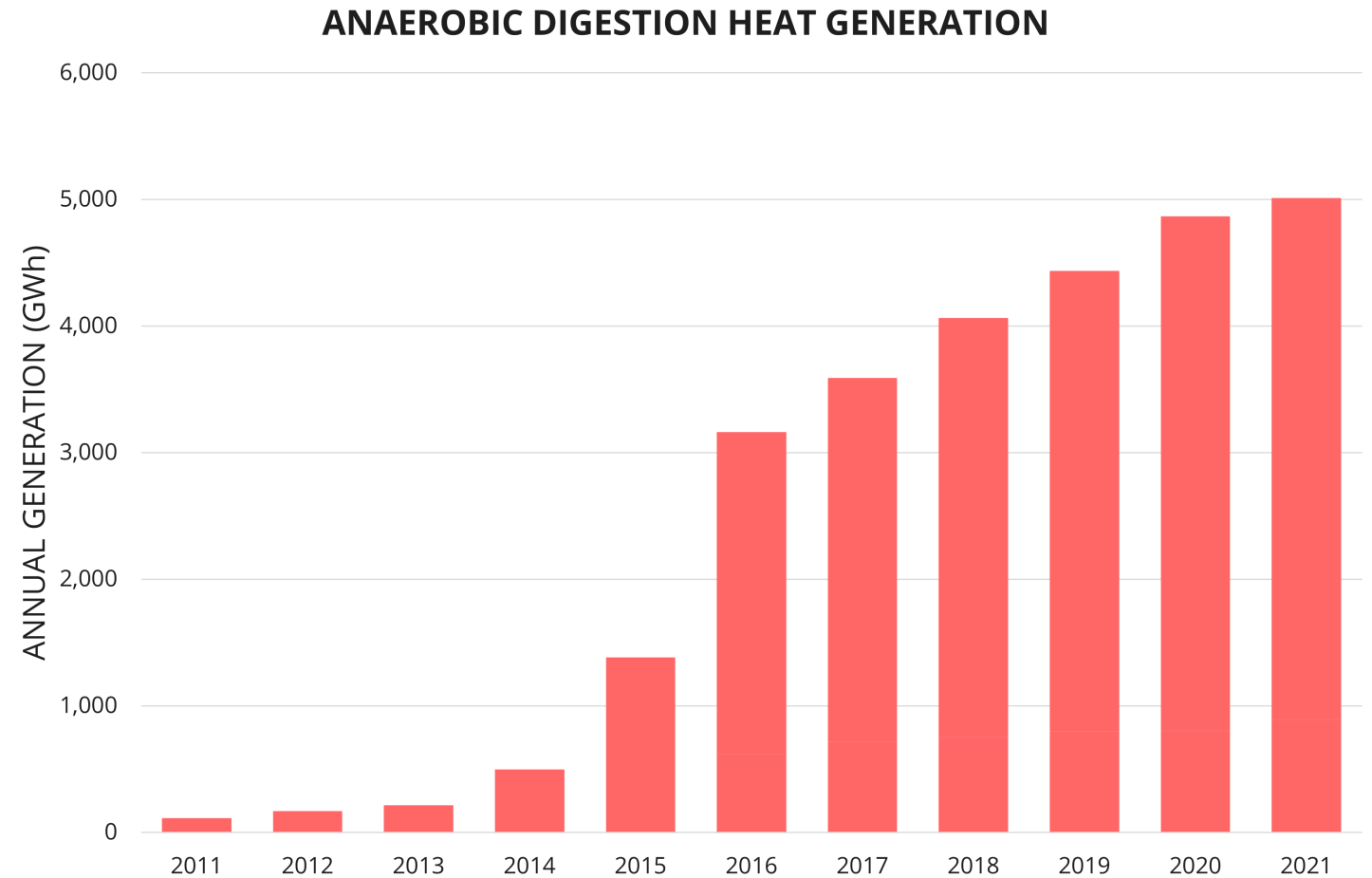
Anaerobic Digestion

Anaerobic digestion heat generation grew by 3% in 2021, a modest increase, but one that is down compared to the previous four years which had enjoyed annual growth rates of between 9 and 14%.

Indeed, growth had more than doubled in each of the years between 2014 and 2016. As noted in REview21, while the sector is still expanding, the pace of growth is slowing. This slowdown in growth is in part because of project delays for new biomethane facilities during the pandemic, when project deadlines under support schemes were extended to 2022.

These figures include biomethane injected into the gas grid, and assume that biogas is evenly mixed across the gas grid so that BEIS estimates of the proportion of gas consumption used for heating apply equally to biogas.





Biomass Heat (wood pellets, wood chip or energy crops)

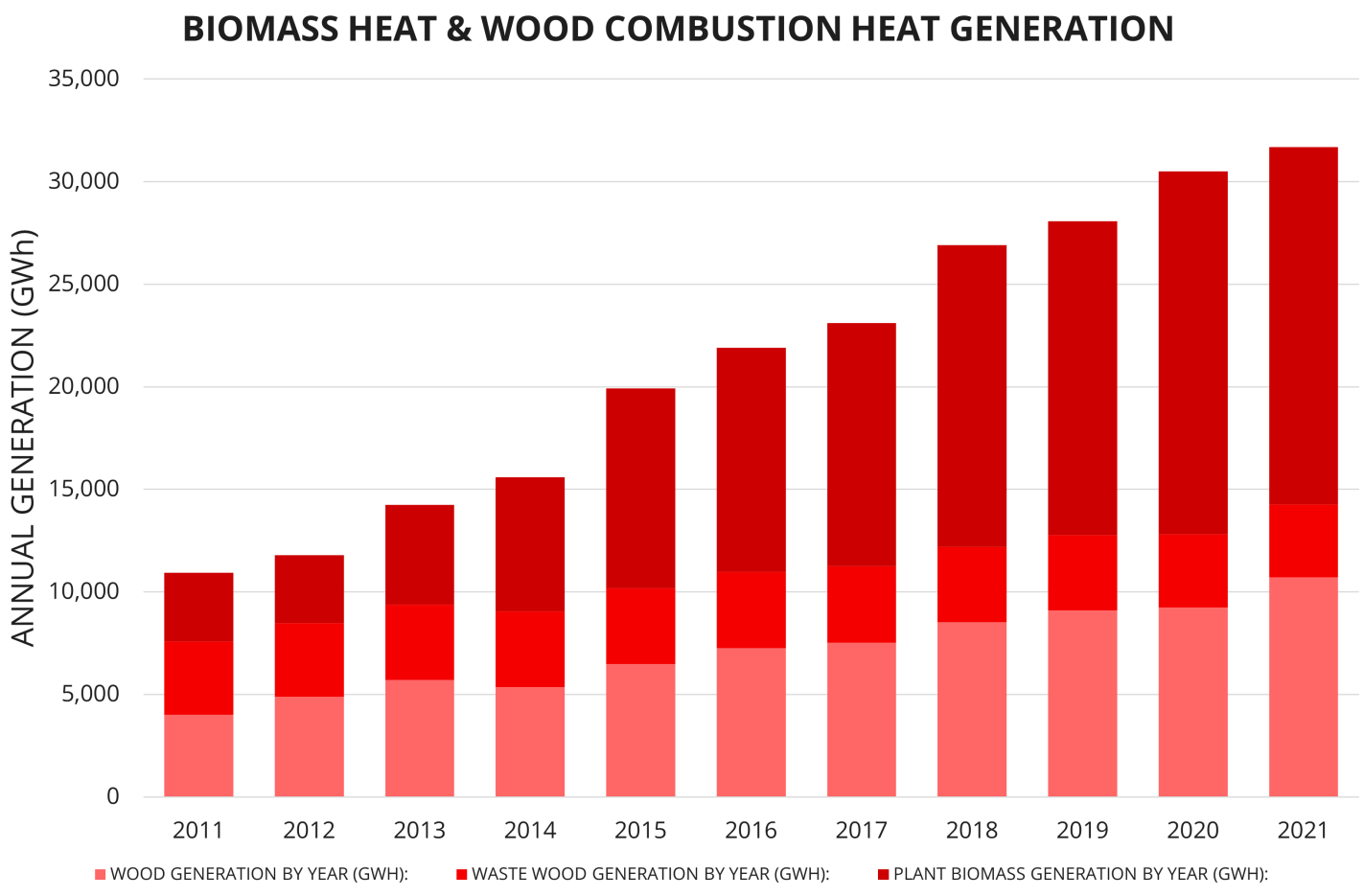
Biomass heat has continued to show solid growth, with an increase in overall generation of 4% in 2021. Combined, it generated more than half of all renewable heat in the UK.

Around 32,000 GWH were produced last year, with biomass heat (referred to as plant biomass in the Government statistics) account for more than half of that figure, despite a small dip in 2021. Plant biomass is also the single largest generator of renewable heat, producing nearly a third of the UK's output.

Wood Combustion (Domestic and Industrial)

Waste wood heat generation stayed stable at a little over 3,500 GWh - broadly the same figure since 2011.

However, wood generation (e.g. fireplaces and stoves) grew significantly with an increase of nearly 16%. Now generating over 10,000 GWh per annum, it produces one fifth of all renewable heat.



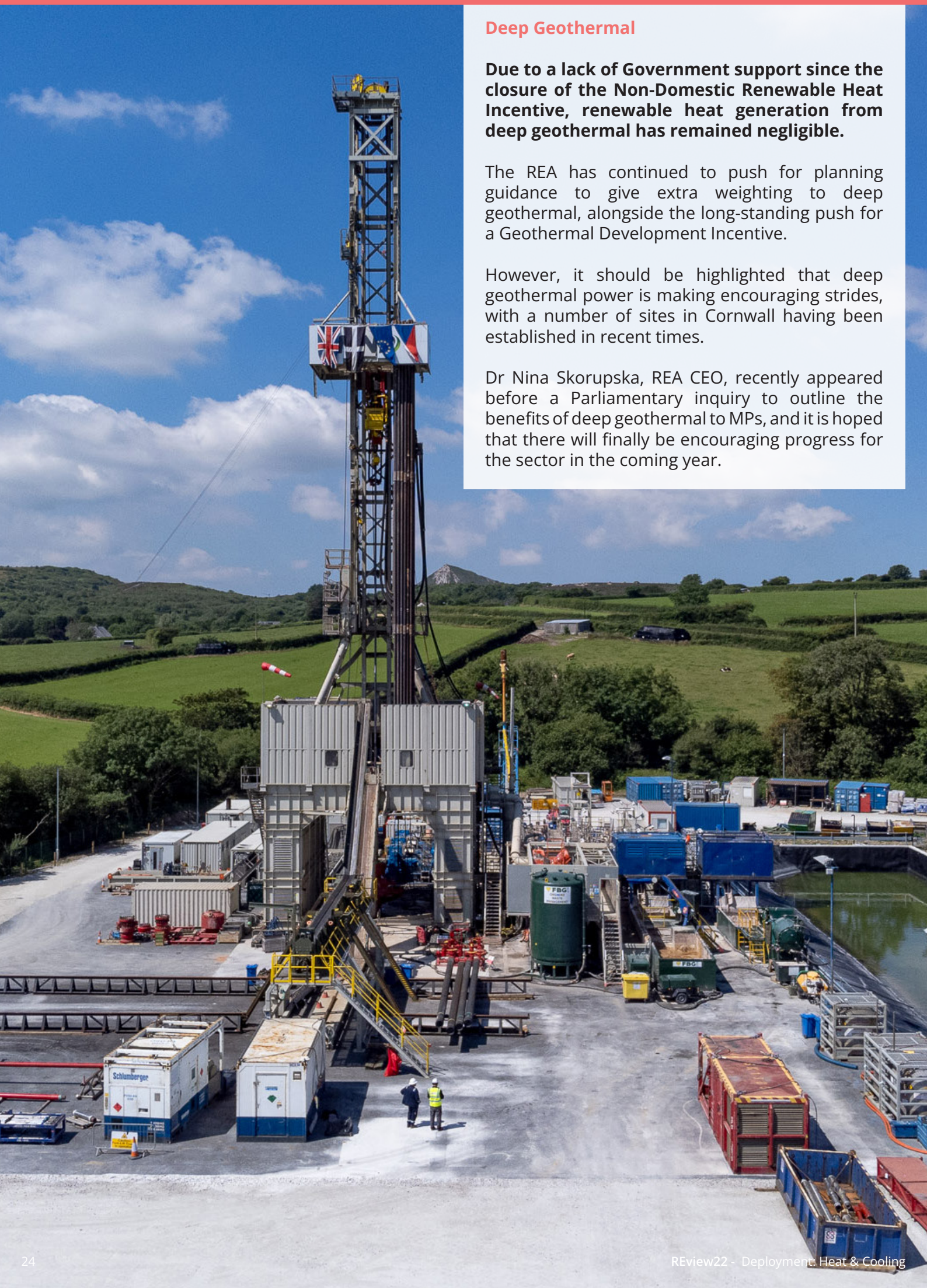
Deep Geothermal

Due to a lack of Government support since the closure of the Non-Domestic Renewable Heat Incentive, renewable heat generation from deep geothermal has remained negligible.

The REA has continued to push for planning guidance to give extra weighting to deep geothermal, alongside the long-standing push for a Geothermal Development Incentive.

However, it should be highlighted that deep geothermal power is making encouraging strides, with a number of sites in Cornwall having been established in recent times.

Dr Nina Skorupska, REA CEO, recently appeared before a Parliamentary inquiry to outline the benefits of deep geothermal to MPs, and it is hoped that there will finally be encouraging progress for the sector in the coming year.



Heat Pumps (Air and Ground Source)

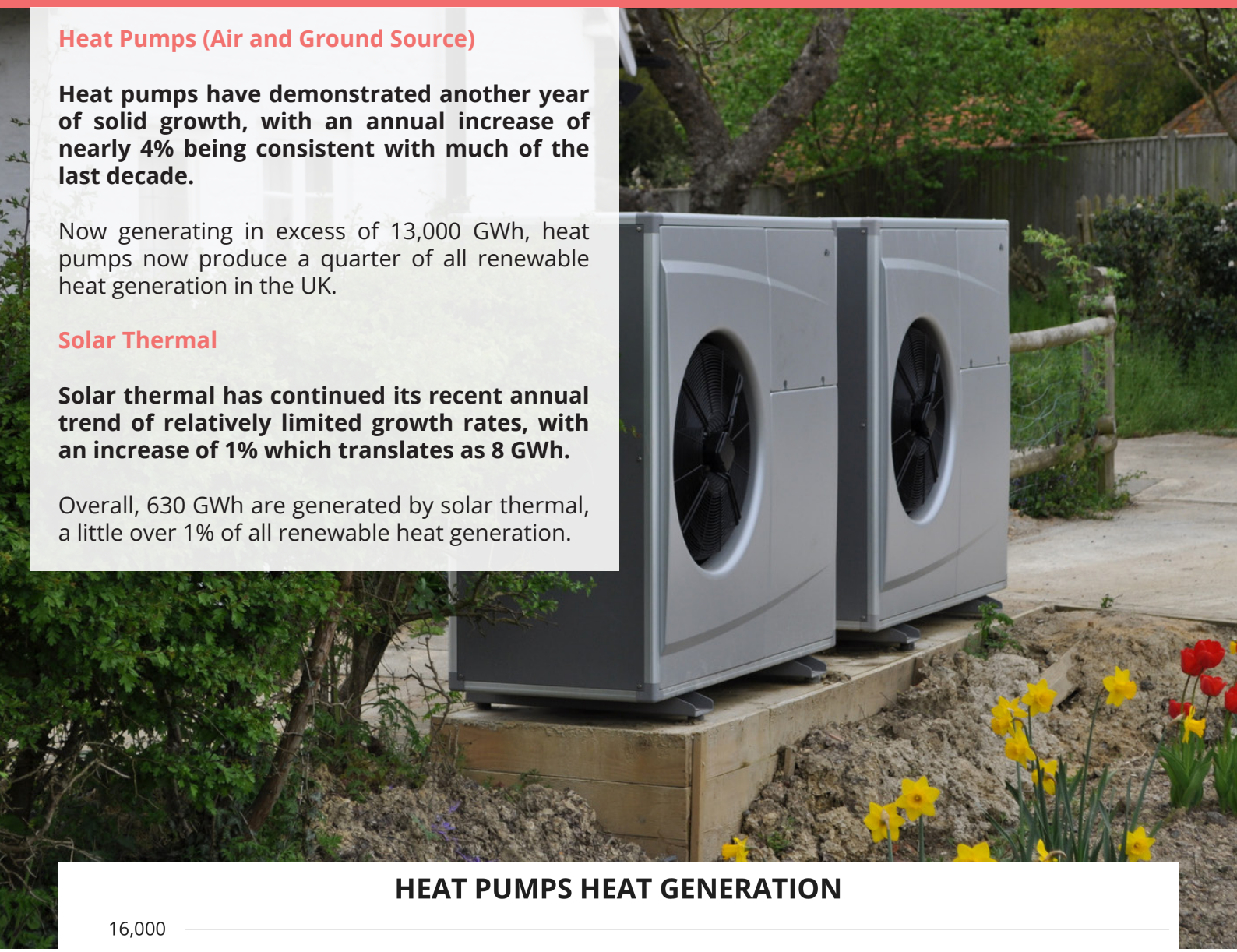
Heat pumps have demonstrated another year of solid growth, with an annual increase of nearly 4% being consistent with much of the last decade.

Now generating in excess of 13,000 GWh, heat pumps now produce a quarter of all renewable heat generation in the UK.

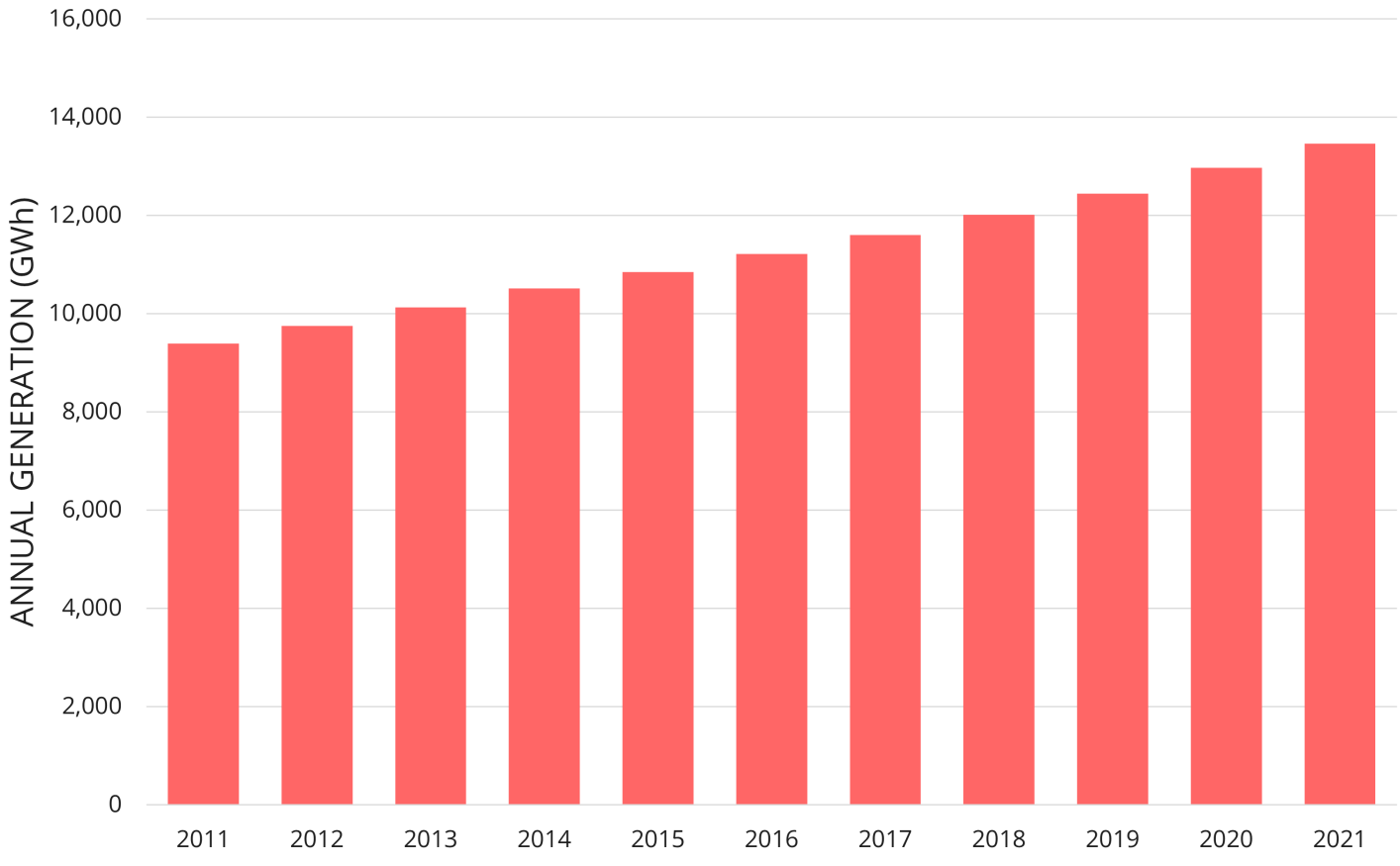
Solar Thermal

Solar thermal has continued its recent annual trend of relatively limited growth rates, with an increase of 1% which translates as 8 GWh.

Overall, 630 GWh are generated by solar thermal, a little over 1% of all renewable heat generation.



HEAT PUMPS HEAT GENERATION



Waste-to-Energy (including Animal Waste Derived Biomass, Energy from Waste and Landfill Gas and Sewage Sludge Digestion)

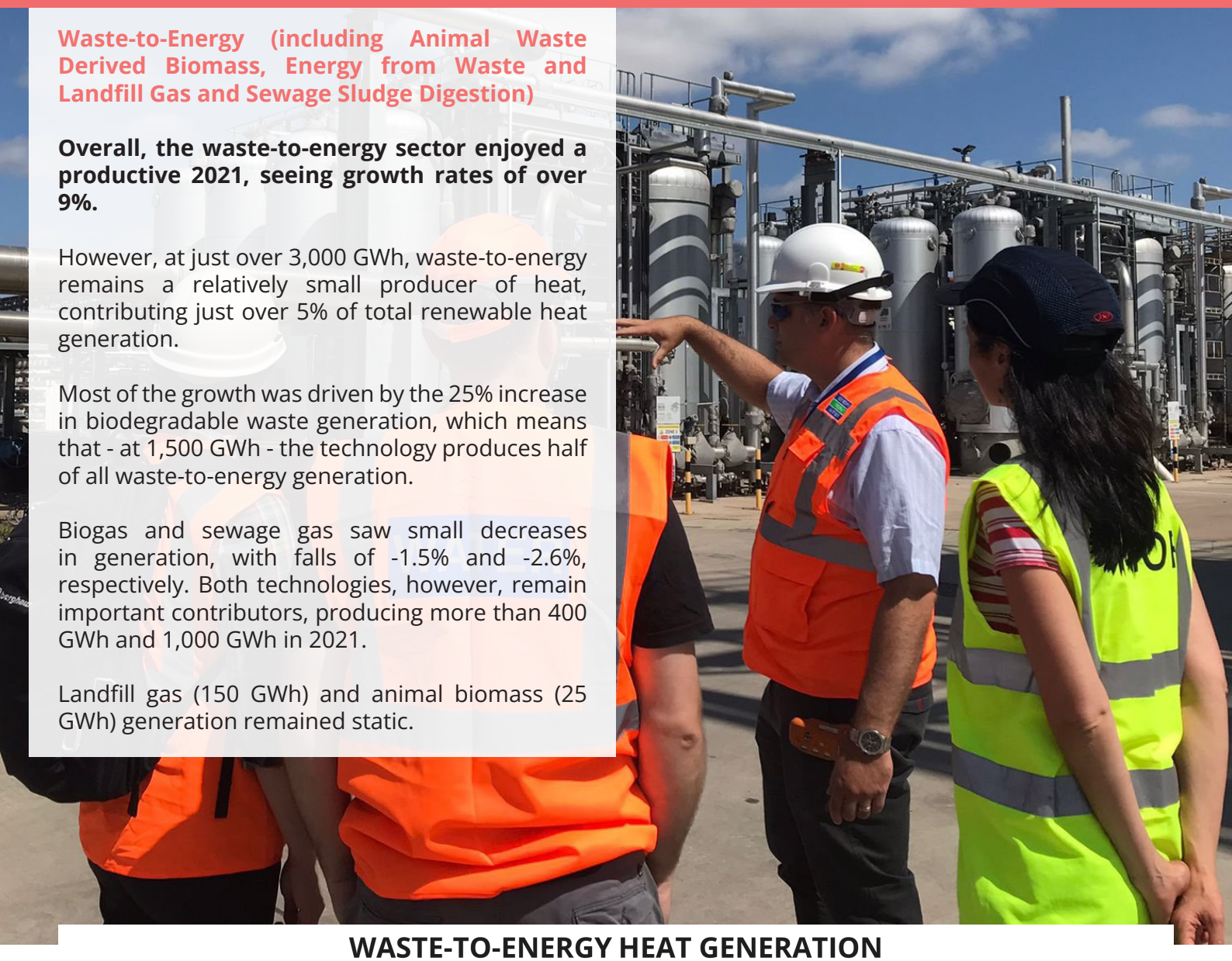
Overall, the waste-to-energy sector enjoyed a productive 2021, seeing growth rates of over 9%.

However, at just over 3,000 GWh, waste-to-energy remains a relatively small producer of heat, contributing just over 5% of total renewable heat generation.

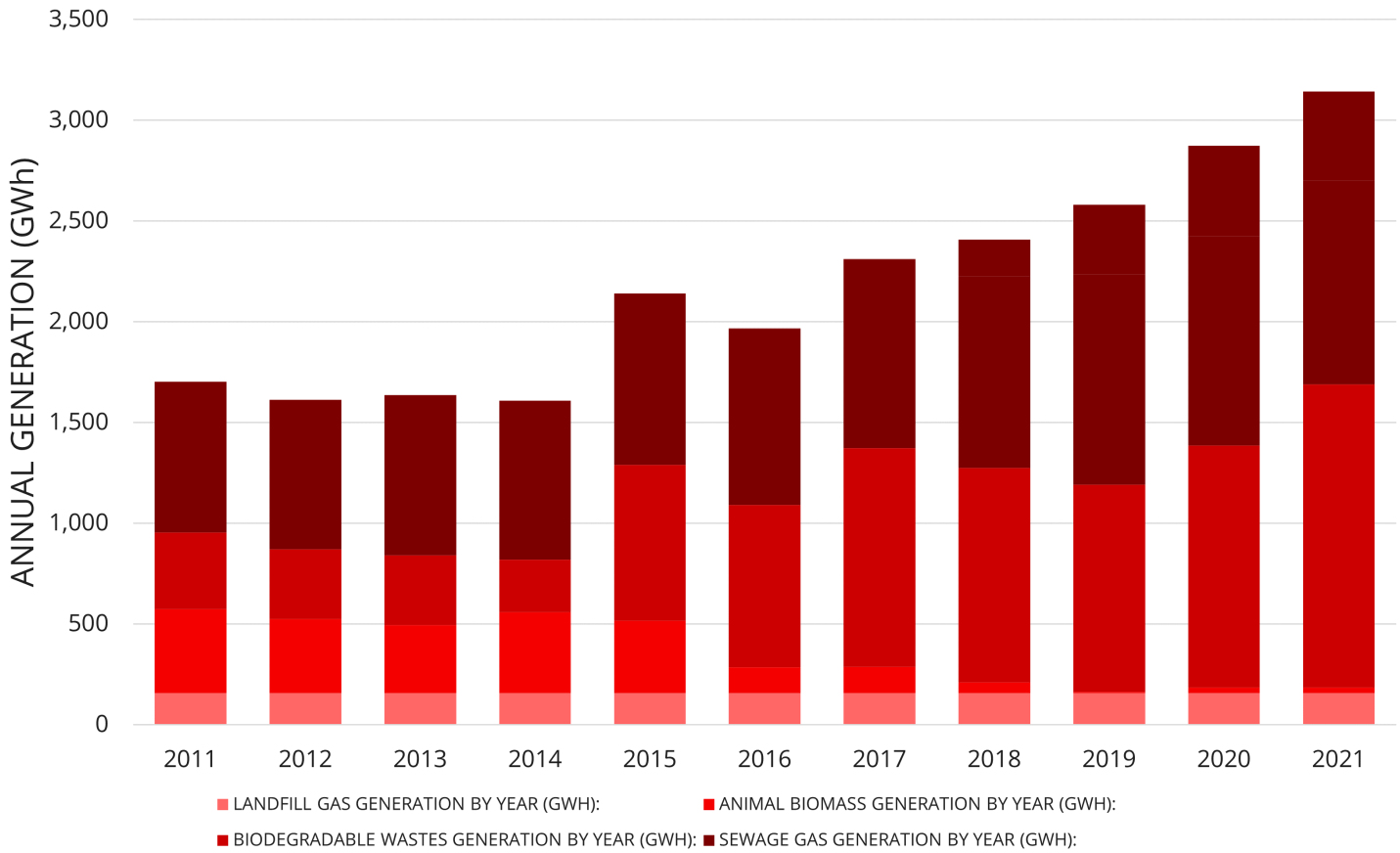
Most of the growth was driven by the 25% increase in biodegradable waste generation, which means that - at 1,500 GWh - the technology produces half of all waste-to-energy generation.

Biogas and sewage gas saw small decreases in generation, with falls of -1.5% and -2.6%, respectively. Both technologies, however, remain important contributors, producing more than 400 GWh and 1,000 GWh in 2021.

Landfill gas (150 GWh) and animal biomass (25 GWh) generation remained static.



WASTE-TO-ENERGY HEAT GENERATION



Filling in the gaps

Dr Kiara Zennaro
Head of Heat and Green Gas lead, REA

It has almost been a year since the publication of the Heat and Buildings Strategy. Although we have seen some progress in policy development, this is nowhere near where it should be given the immense challenge we face.

There is no doubt the Government has made some positive inroads on heat decarbonisation. Government have developed regulatory frameworks and zoning to support heat networks. They also supported roll out of heat pumps under the Boiler Upgrade Scheme as well as the development of innovative solutions with its Heat-Pump Ready Innovation programme. They are also introducing a market-based mechanism to drive the appliance market towards low-carbon. The Boiler Upgrade Scheme (BUS) is indeed the largest subsidy for renewable heating since the closure of the Renewable Heat Incentive. We were pleased that this scheme has taken a pragmatic attitude towards renewable heating technologies, such as biomass.

However, it is clear that the Boiler Upgrade Scheme is not ambitious enough to meet the target of 600,000 heat pumps to be installed every year by 2028. We need a much bolder approach. The entire BUS pot of £450m only has enough money to fund around 80,000 installations, less than 15% of the PM's per year target. The impact assessment also suggests that it will only support the deployment of around 300 biomass boilers across its lifetime. This is a underestimation of where biomass could prove to be the most suitable decarbonisation solution. Furthermore, when costs are included, £5,000-6,000 will not be enough for a high-quality heat pump or an automatically-fed biomass boiler. The scheme needs to be far more ambitious if we are to meet our ambitious targets and go beyond to reach net zero. Every year around 1.5m boilers are installed in the UK. Even if we hit the Government's target of 600,000 heat pumps a year by 2028 - there are still 900,000 fossil boilers going in. We need to replace 26 million fossil boilers across the UK, heat pumps cannot shoulder the burden of decarbonising our homes alone.

There is no silver bullet when it comes to heating. Overreliance on a single technology is what got us into this carbon-fuelled mess in the first place. Some in our industry have portrayed this strategy as a pitched battle for dominance between technologies. This is unhelpful. Decarbonising our homes needs a nuanced, multi-technology approach if we are to meet the immense challenge before us.

We have said to the Government that making homes and buildings more energy efficient is essential. The lack of Government's focus on delivering energy efficiency across our leaking building stock is frustrating.

When we look at industrial and commercial heating, the gap is even greater, along with the paucity of Government policy in this area. The closure of the non-domestic RHI has left a serious policy gap opening around the decarbonisation of businesses and industrial-scale heat. We have seen no significant announcements on what will replace the non-domestic RHI. The Heat and Building Strategy does not even mention industrial heat.

With policies focused on small-scale domestic deployment, contraction of renewable heat sectors like biomass, geothermal, larger-scale heat pumps are expected.

Several grants and competitions to decarbonise industries have been announced by the Government in the last couple of years, for example under the Net Zero Innovation Portfolio or the Industrial Energy Transformation Fund. Still these schemes only address initial capital expenditure and do little to cover operational costs.

The only way the Government can close the policy gap for the industry is to introduce an ongoing tariff support for the replacement of fossil fuels. This needs to be in the form of a funded CfD for industrial heat decarbonisation, or a fuel switching tariff.

It is imperative that the government goes further, faster and deeper in decarbonising British buildings and industries.

REA Strategy 'pillar' recommendations: Heat & Cooling

OVERARCHING POLICY FOR HEAT DECARBONISATION

Progress rating: Neutral

Government published the Heat and Buildings Strategy in October 2021, which sets out key policy decisions and a coherent framework for decarbonising heat. However, the strategy is not yet comprehensive, leaving significant policy and funding gaps that need addressing urgently if we are to fully decarbonise this sector.

SUPPORT ALL RENEWABLE TECHNOLOGIES

Progress rating: Bad

Despite the recognition from Government that a mix of low-carbon technologies is needed for heating, some technologies, such as geothermal, still lack support from Government. We have also seen bioenergy either excluded entirely or severely limited in policies like the Industrial Energy Transformation Fund. The lack of Government's focus on delivering energy efficiency across our leaking building stock is also extremely concerning.

CLOSE POLICY GAP FOR BUSINESS AND INDUSTRY

Progress rating: Bad

The closure of the non-domestic RHI has left a serious policy gap opening around the decarbonisation of businesses and industrial-scale heat, which so far has seen no significant announcements on what will replace the non-domestic RHI.

HYDROGEN

Progress rating: Good

Government has made significant progress in setting out a clear strategy and framework to support the hydrogen economy. We have seen the release of the Hydrogen Strategy in August 2021, and the Hydrogen Investment Package in April 2022, including a Low Carbon Hydrogen Standard, a Hydrogen Business Model and the Net Zero Hydrogen Fund, as well as many other funding streams to support fuel switching and industrial decarbonisation.

ASSESSING ALL OPTIONS

Progress rating: Bad

In the Heat and Building Strategy, the Government committed to launch a Fairness and Affordability Call for Evidence on options for energy levies and obligations to help rebalance electricity and gas prices and to support green choices, with a view to taking decisions in 2022. This, however, hasn't happened. In September 2022, the Government's Energy Crisis Package announced a suspension of green levies, with these costs being transferred to the Exchequer, but this is only temporary. The Review of Electricity Market Arrangements underway will be key to cutting costs of electricity for consumers in the long term.

Circular Bioresources

Natural Resources & the Circular Bioeconomy

Circular Bioresources covers the management of biodegradable wastes and materials. It covers composting, aerobic and anaerobic digestion, landspreading and other biological treatment techniques and the use of biologically treated materials for the enhancement of our natural capital.

With regards to recycling, the rates of all wastes from UK households (excluding Incinerator bottom ash metals) has decreased from 45.2% in 2019 to 43.6% in 2020.

Wales continues to lead the way with a 55.6% recycling rate. England and Northern Ireland are at 43% and 49.1% respectively with Scotland having the lowest rate of 40.8%. These figures represent all recycling, not just the materials covered by Circular Bioresources.

Apart from Wales, these rates are significantly below the 50% required by the EU Waste Framework Directive and the individual targets set by the devolved Governments.

43.6%

THE UK'S WASTE RECYCLING RATE IN 2020 - THE EU WASTE FRAMEWORK DIRECTIVE'S TARGET IS 50%

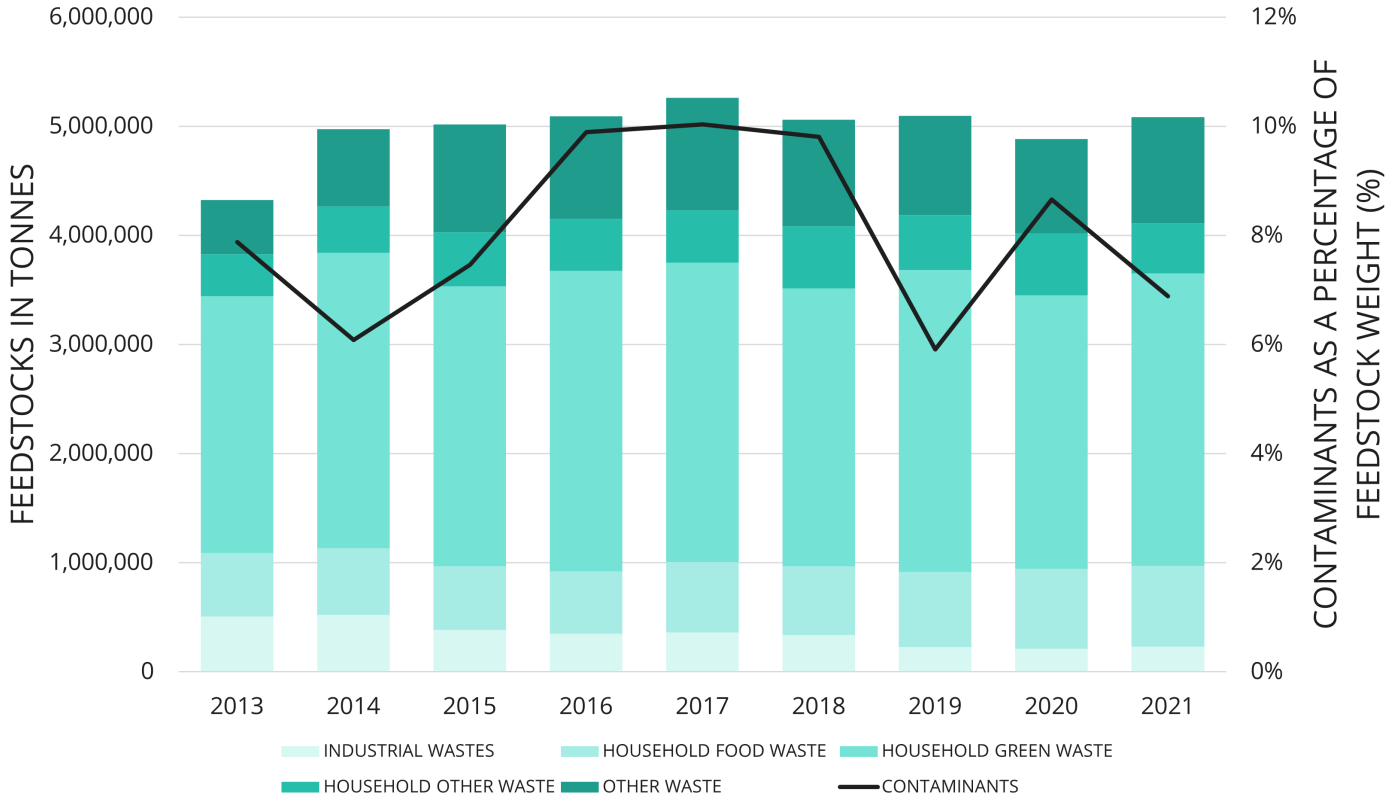
Given the fairly static rates over the past few years and the slight drop in 2020, it leaves most of the UK with much more to do to reach the targets set by the Government.

England has set out proposals in the Resources and Waste Strategy but not all of these have been implemented yet. This year Scotland consulted on a Routemap with proposals to reach their 2025 recycling targets.

With regards to biodegradable waste received at composting facilities, 2021 represented a broadly successful year for composting with the tonnages received in England increasing slightly by 4.13% compared to 2020. Waste sources remain roughly the same.

In terms of the quality of feedstocks, contaminant tonnages also fell by 17% compared to 2020, but had had risen in 2020 by 40% compared to 2019.

COMPOSTING FEEDSTOCKS RECEIVED IN ENGLAND, AND CONTAMINATION RATES



The increase in 2020 may have been related to disrupted collections and different patterns of consumption during the pandemic. Further work is ongoing to try to reduce contamination so it will be interesting to see what effect this has on future figures.

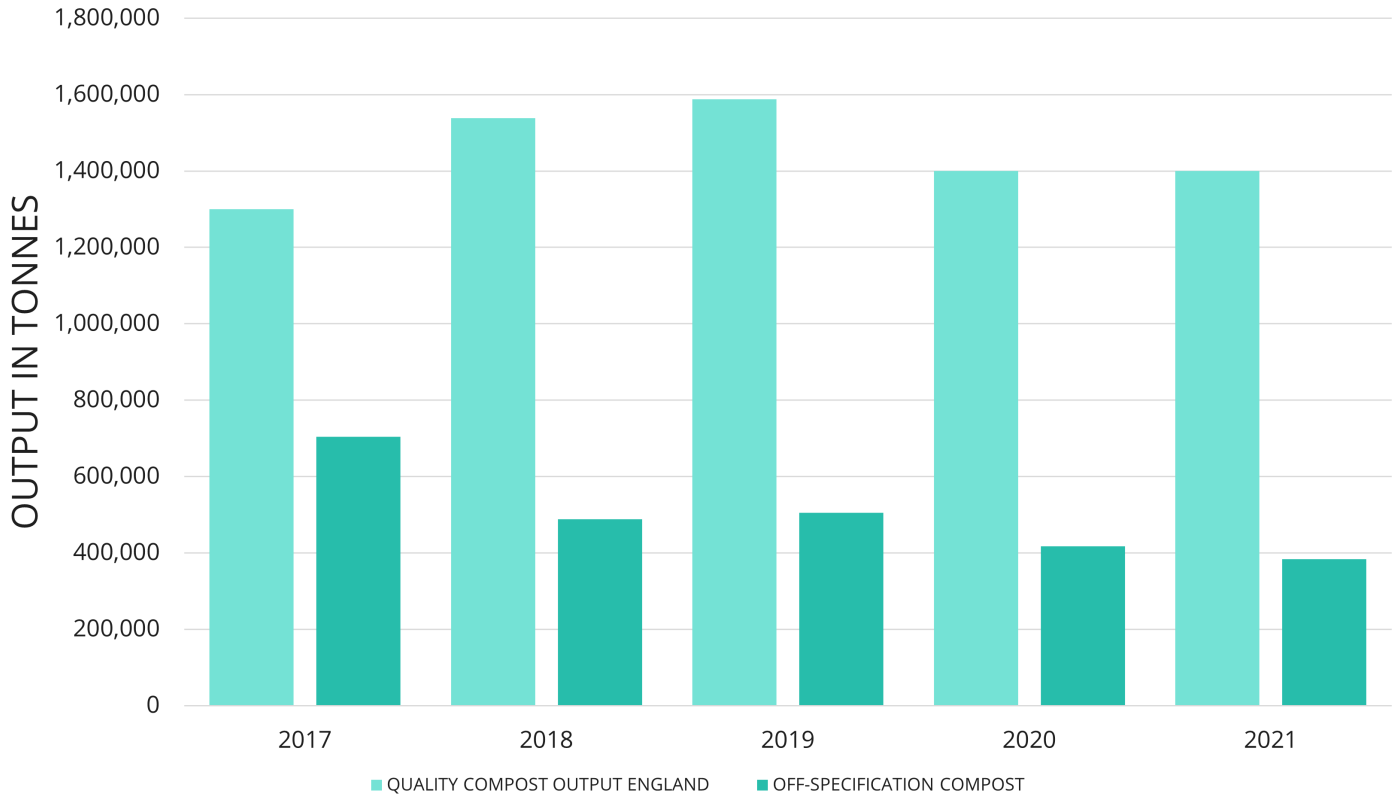
Outputs from composting have remained fairly static in England, with certified quality compost (certified under the Compost Certification Scheme) produced remaining at around 1.4 million tonnes.

Off specification compost decreased again, contracting by 8.1% in 2020-2021. This follows a fall of 17.43% in 2019-2020.

The amount of wastes processed through anaerobic digestion in England continued to grow, with a 7% increase in 2021.

While there was a fall in the tonnages received from industrial waste, the increase in tonnages from other waste categories more than compensated for this. The impending requirements for food waste collections should see a further increase in future years.

AMOUNT OF QUALITY AND OFF-SPECIFICATION COMPOST PRODUCED



6.2m

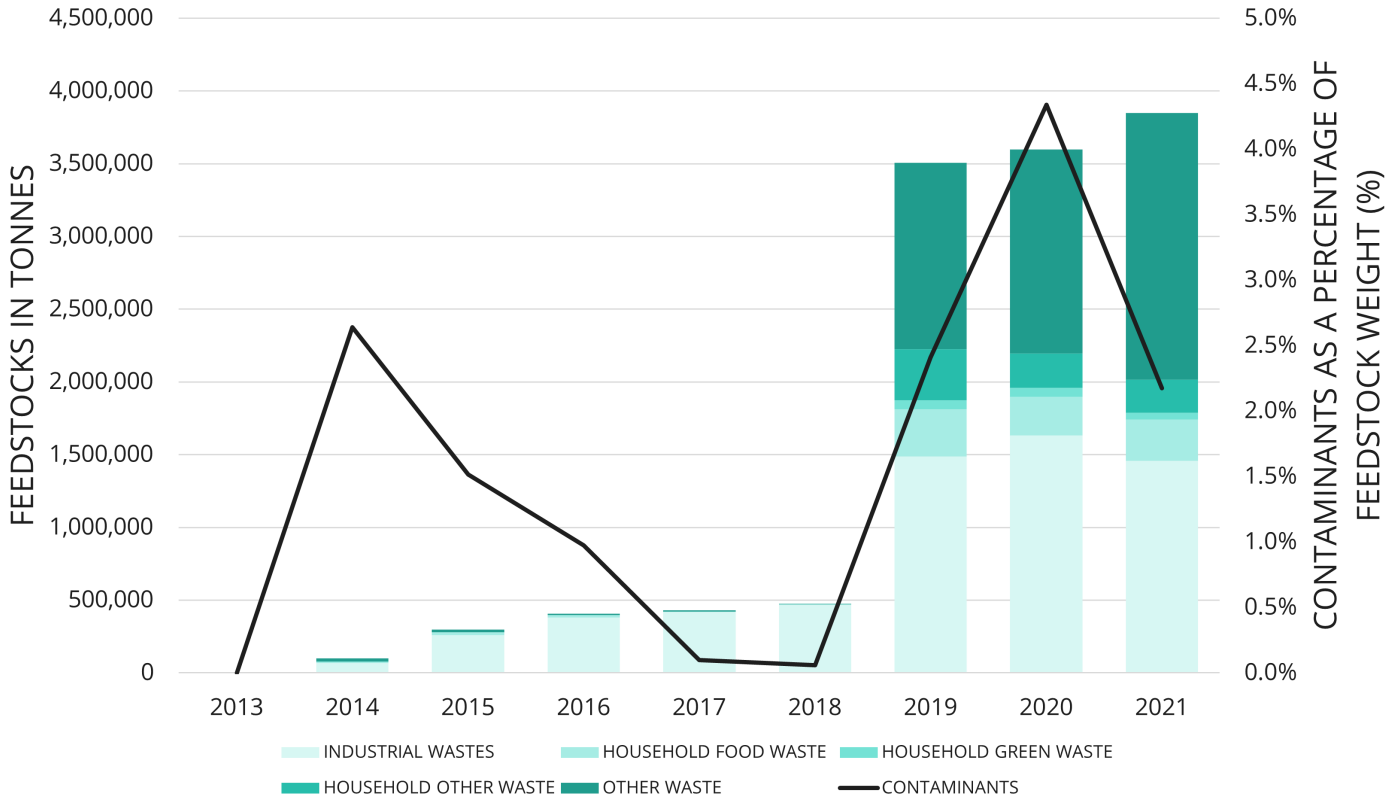
TONNES OF QUALITY COMPOSTS AND DIGESTATES PRODUCED

With regards to quality, like compost, there was a decrease (46%) in contaminants compared to the previous year. This was connected to an 85% spike in contaminants in 2020.

Overall, this represents a 1% fall in contamination AD feedstocks in 2021 compared to 2019. A move in the right direction but still work to be done to improve the quality of material arriving at AD sites.

There was a corresponding increase in the amount of digestate produced, with a slight increase in the amount of certified digestate (certified under the Biofertiliser Certification Scheme) and a 3% rise in off specification digestate produced.

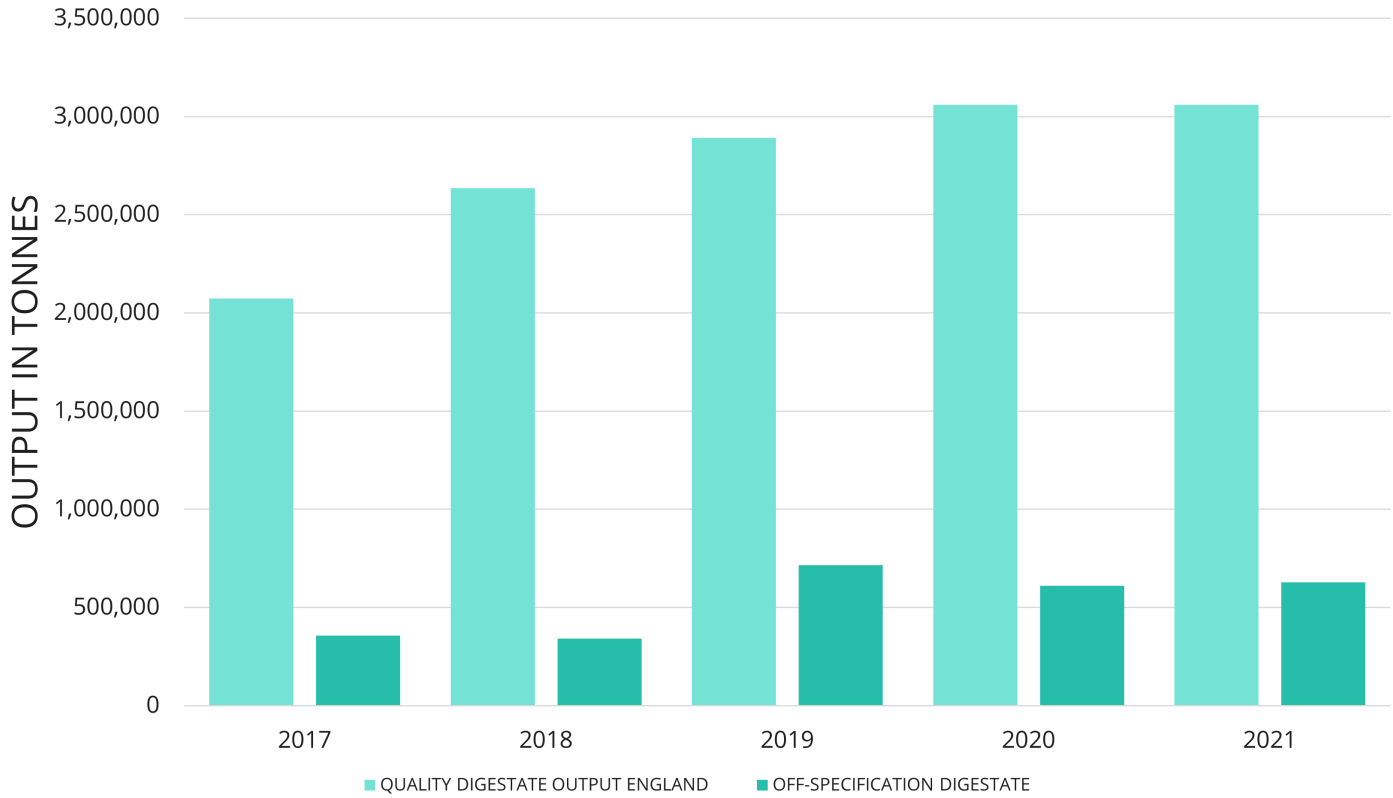
ANAEROBIC DIGESTION FEEDSTOCKS RECEIVED IN ENGLAND, AND CONTAMINATION RATES



The total amount of quality compost and digestate produced in the UK was approximately 6.2 million tonnes of quality organic fertilisers and soil improvers that can be recycled to land with many environmental and agricultural benefits, replacing the need for fossil fuel derived fertilisers and improving soil quality and health, which in turn enables soil carbon sequestration.

It should be noted that waste data, especially for biodegradable wastes, is extremely difficult to collect and significant changes in data from one year to another could be due to changes in data collection methodologies.

AMOUNT OF QUALITY AND OFF-SPECIFICATION DIGESTATE PRODUCED



No time to waste for organic recycling

Jenny Grant
Head of Organics and Natural Capital, REA

There is set to be considerable change in the organics recycling sector in the coming years, and the sector will continue to play a major role in achieving Net Zero.

Proper management of our food and garden waste is important to reduce GHG emissions and generate renewable energy. Valuable materials produced through organics recycling can replace mineral fertilisers that are energy-intensive to produce and bring multiple soil health benefits too. Anaerobic digestion plants can also produce CO2 and we may see more plants retrofitting carbon capture to improve resilience and security of CO2 supplies in the UK.

At the end of last year, the Environment Bill became the Environment Act, bringing forward the requirements for separate collections of food and garden waste from households and businesses in England. With many details still to be confirmed, the industry is eagerly awaiting the Government's response to the consultation and further details on timings. We should see an increase in the amount of unavoidable food waste and garden waste available to be treated through composting or anaerobic digestion.

In terms of funding, last year's Net Zero Strategy gave a commitment of £295M for separate food waste collections by 2025. We also await Defra's decision on liner types for food waste collections and whether the government will fund local authorities to supply them free-of-charge to householders. We also await further details on the wider waste reforms on extended producer responsibility and the deposit return scheme.

Elsewhere, we have the Scottish Government's Circular Economy consultations which include proposals for designing high-performing collections to increase the amount of food waste captured and a future consultation on requirements to collect garden waste. With already high recycling rates of 65%, the Welsh Government are looking at their strategy 'beyond recycling' and considering a ban on biodegradable waste to landfill.

August saw the implementation of the requirements for operators of IED installations to use best available techniques (BAT) to prevent or reduce emissions from their sites. Regulators across the UK are contacting sites to determine their compliance and are varying permits when required. The Environment Agency have published their new standard rule permits for composting and anaerobic digestion and will expect operators to transition to the new permits.

The quality of feedstocks and outputs is an ongoing issue for the sector and something we continue to work on. In England, the EA are tightening input contamination limits in permits and have been very clear that they intend to tighten plastics limits in composts and digestates by revising quality protocols.

The importance of protecting our soils should not be underestimated, and compost and digestates can play a vital role. When returned to our soils, these materials provide valuable nutrients and organic matter that contribute to soil health. Compost can help grow more nutrient-dense crops, serves as a carbon bank, helps store carbon in soil and contributes to water conservation and quality. There is currently a great deal of innovation going into digestate processing. Various technologies can transform the nutrient density of digestate, extract or recover nutrients into specialised products, such as pelletised fertilisers that can lock up the carbon and help with some challenges of storage and spreading.

Further policy and regulatory developments are expected over the next year. We expect consultations under the Clean Air Strategy looking at covers for slurry and digestate stores, low emission spreading and rapid incorporation of solid manures. There will also be an overhaul of the fragmented UK Fertilisers Regs. Defra have also confirmed that the use of peat in retail horticulture will be banned from 2024.

We have no time to waste if the UK wants to achieve Net Zero. Organics recycling can play a valuable role not only in contributing towards net zero, but also in providing products that can improve soil quality, increase soil organic matter and enable food production for future generations.

REA Strategy 'pillar' recommendations: Circular Bioresources

FOOD AND GARDEN WASTE COLLECTION

Progress rating: Neutral

Positive that the Environment Act mandates food and garden waste collections but awaiting secondary legislation and information on dates.

BETTER PACKAGING SYSTEM PROVISIONS

Progress rating: Bad

Organics recycling not recognised under EPR.

EDUCATION

Progress rating: Bad

Awaiting outcome of the consistency of recycling collections and associated details regarding guidance and funding for education.

STORING TREATED ORGANIC MATERIALS

Progress rating: Neutral

Awaiting government consultation on clean air strategy storage requirements. Additional guidance published on farming rules for water, however enforcement inconsistent.

INCREASE QUALITY, VALUE AND USE OF ORGANIC MATERIALS

Progress rating: Neutral

Addition of organic matter acknowledged in sustainable farming initiative but little progress on the revision of the quality protocols. Quality requirements introduced in revised standard rule permits but more work needed to communicate with waste producers and local authorities.

PEAT PHASE-OUT

Progress rating: Good

Recent announcement banning peat containing products for amateur horticulture and further work in professional sector.

Deployment: Transport

Renewable Transport Summary

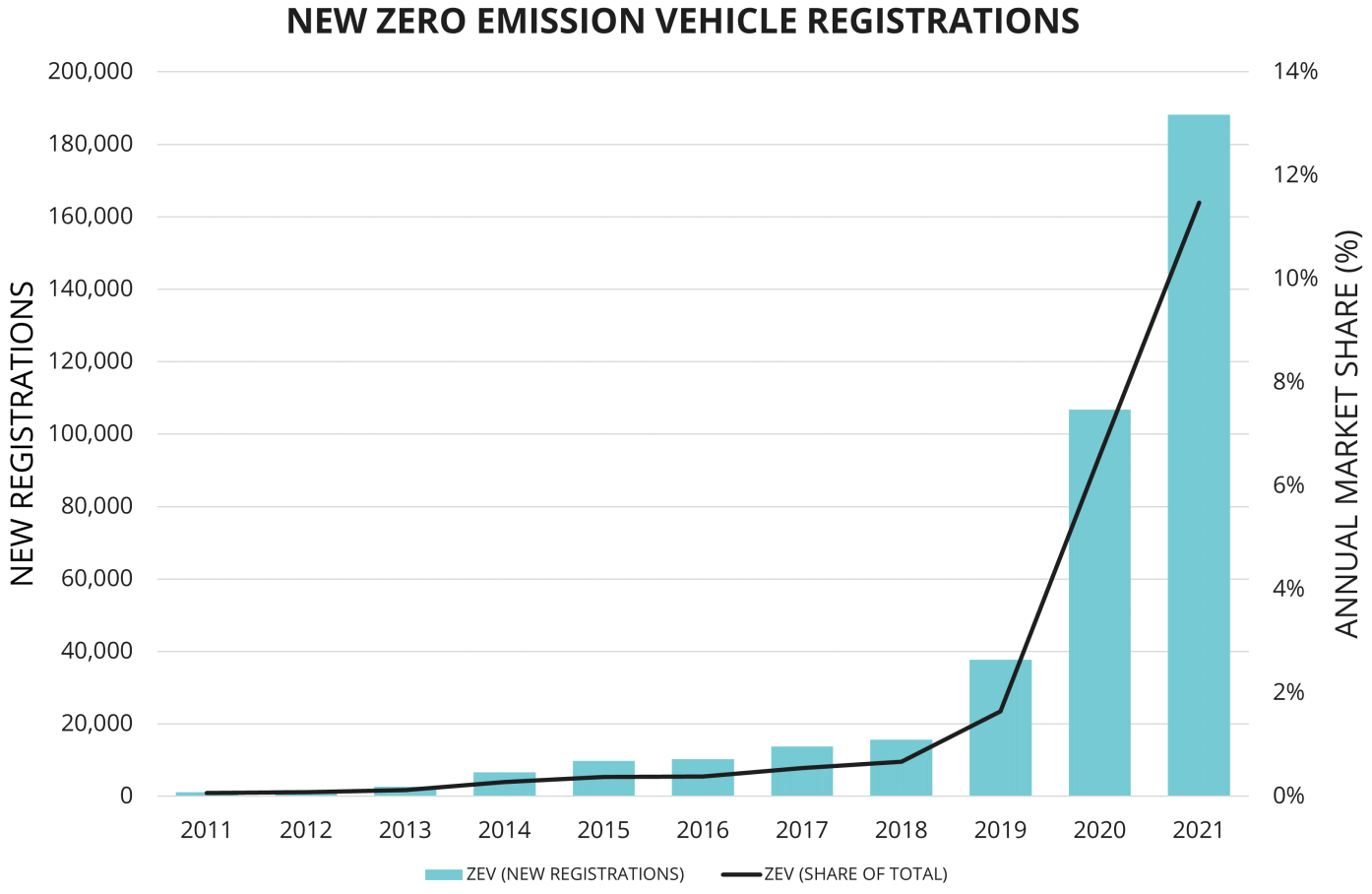
In 2020, the transport sector accounted for nearly a quarter of the UK's greenhouse gas emissions, continuing to be the largest emitting sector since 2016, following a sharp fall in emissions from the power sector.

However, while this compares favourably to 2019 - when the figure was 34% - it should be considered that the large reduction is in no small part due to the impact of Covid-19. Indeed, emissions from domestic transport and international aviation fell by 19% and 61%, respectively. It is to be expected that this figure will again rise to reflect 'lockdowns' ending.

After years of REA and industry campaigning, 10% renewable fuel blended E10 petrol was introduced in September 2021 and, as highlighted in last year's REview21, this is projected to reduce emissions per road vehicle by 2%.

While there have been attempts to pressure the Government into reversing or watering down its targets with regards to the 2030 ban on new sales of petrol and diesel cars and light vans, the Government has remained firm in its commitments. In addition, given the exceptional rise and continuing volatility in petrol and diesel costs, many consumers are choosing to switch to EVs and hybrids ahead of time.

This, alongside supply chain pressures, has contributed to demand for EVs outstripping supply, with waiting lists of several months reported for many models.



Deeper Insight: Transport

Electric Vehicles and EV Charging

As mentioned in the summary, the growth of new ZEV registrations has been extraordinary.

76%

INCREASE OF NEW ZEV REGISTRATIONS BETWEEN 2020 AND 2021

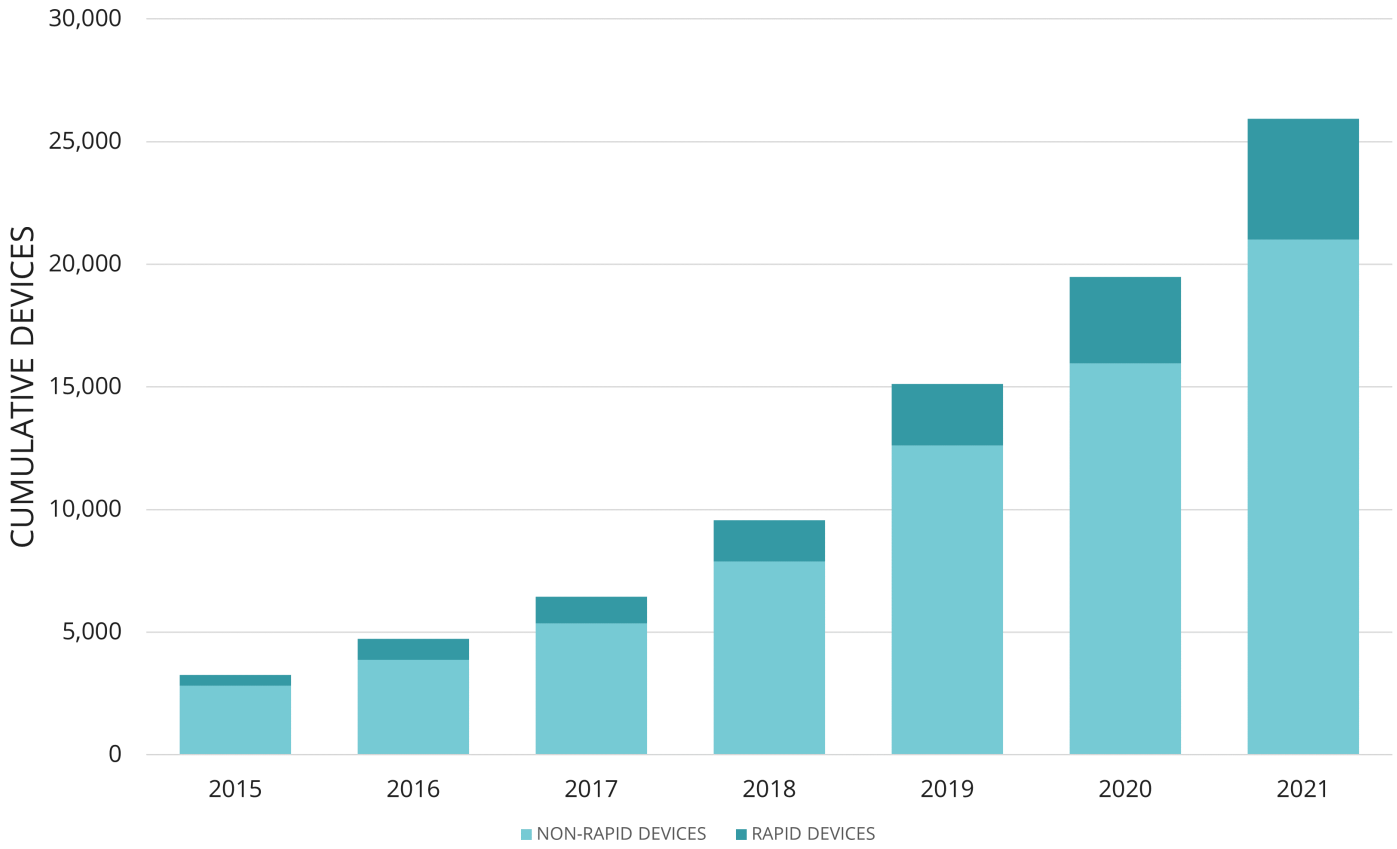
In 2021, 188,155 new ZEVs were registered, an increase of 76% on the previous year. This represents a market share of 11% in 2021 - in 2018, it was less than 1%. This underlines the importance of ensuring that the country delivers a charging-network that keeps pace with demand, ensuring that rapid charge points are strategically deployed to future proof the transition to Electric Vehicles and their role in consumer transport across the entirety of the UK.

In this regard, progress is being made, at least in terms of the overall volume of charge points that have now been established in the UK. In 2021 alone, nearly 6,500 charge points were added to the network, an increase in the cumulative number of chargepoints of 33% compared to 2020. This marks another year of astonishing growth, and yet is down from growth rates in previous years of between 40% and 50% - this is most likely because of the impact of Covid-19 on installations in 2020 and 2021. Most importantly, this rate of growth puts the industry on track to meet the UK Government's ambition to have installed over 300,000 public chargepoints by 2030. However, the distribution of those charge points is geographically inequitable, with the vast majority being established in England. A third of the UK's overall charge points are situated in London.

There are now almost 35,000 charge points across the UK, with 6,400 are classified as 'rapid' charge points. While there is still much work to do, the share of rapid EVSE has continued to increase over time. It should be celebrated that in the last three years alone, the number of charge points across the UK has more than doubled.

While data on ultra-low emission vehicles (ULEVs) and EV charge-points is readily available, these figures only represent new registrations. The variation in the lifespan of cars, and the existence of second-hand markets, makes it difficult to track the actual presence of ULEVs on the road.

NUMBER OF ELECTRIC VEHICLE CHARGE DEVICES



Electric vehicle chargepoints

EV chargepoint data considers the total number of devices active in the UK, and the total number of rapid devices active in the UK.

Data is sourced from EV charging device statistics, recompiled quarterly by DfT, in turn sourced from Zap-Map.

The overall trends are based on summed totals from all local authorities, on the last publication of each calendar year (October). The heat map of chargepoints in the UK is broken down geographically by local authority for the latest month of data.

The heatmap on this page shows the density of public EV chargepoints across the country – red corresponding to the greatest density and grey to the lowest. *Source: DfT, Zap-Map, REA Research.*

The below image is from the Parliamentary launch of the REA and Hitachi Energy's report on Transport Decarbonisation in the Solent region.

Deeper Insight: Transport

Renewable Transport Fuels

Due to Covid-19 and the imposition of lockdowns, fewer journeys were made leading to a decrease in fuel consumption, including renewable transport fuels (RTFs).

In 2021, there was a decrease of 6.98% in the consumption of bioethanol and biodiesel. Yet, due to the near 20% drop in the consumption of fossil fuels, the proportion of RTF used by consumers actually increased by one percentage point to 6.64%.

Driving habits are not expected to have significantly altered following the pandemic and therefore fuel consumption overall is projected to increase once again, which could reduce the proportion of RTFs being consumed.

However, it should be noted that the overall proportion of total RTF usage has steadily grown over the past half a decade.

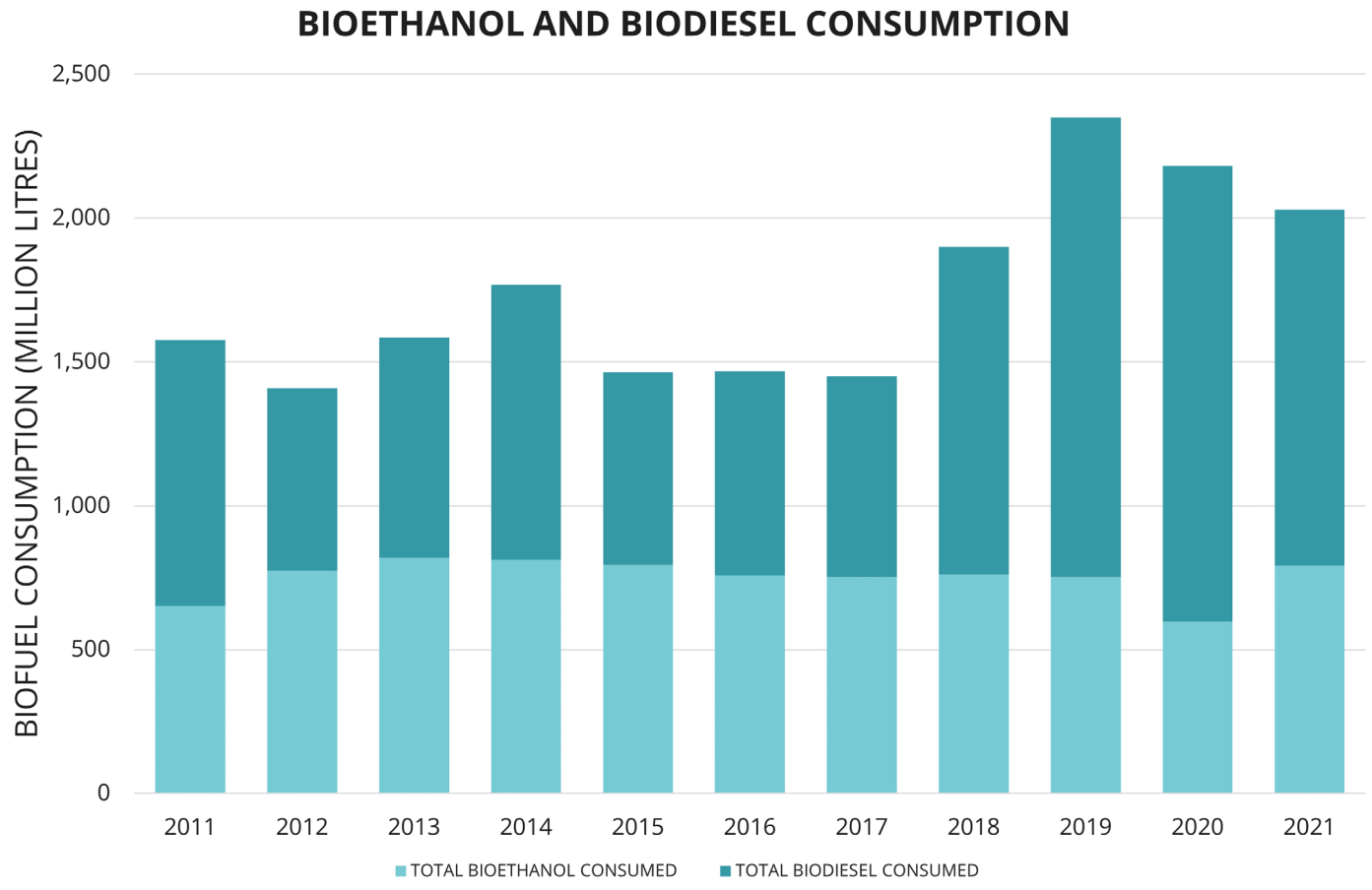
In 2016, the total RTF consumed as a percentage of total transport fuel consumption stood at 3.27%, but this has increased annually to constitute 6.64% of total transport fuel consumption in 2020.

6.64%

PROPORTION OF RTF USED BY CONSUMERS IN 2020, AN INCREASE OF 1%

As highlighted in REview21, the market for deployment and use of these fuels is largely driven by the Government's support policy, the Renewable Transport Fuel Obligation (RTFO). Under the RTFO, biodiesel and bioethanol constitute the types of fuel with the largest volume of certified fuel. However, since 2018, the share of other RTFs certified under the RTFO in terms of volume have grown considerably, notably biomethane, biopropane, and hydrogenated vegetable oil (HVO) constituting between 2% and 5% of the volume of fuels certified under the RTFO each.

E10 was introduced in September 2021 and this was projected to reduce emissions per road vehicle by 2%. Other changes to the RTFO should stimulate further growth in the market for biofuels also.



Significant barriers, but rewards on offer

Jacob Roberts
Transport Policy Manager, REA

In 2017, 150,000 fully electric vehicles (EVs) were added to UK roads. Fast forward less than five years and nearly three times as many EVs were registered in the first quarter of 2022 alone.

It is for this reason that many now believe that we have reached the "tipping point" in the UK's transition to zero-emission mobility.

It is no secret that the requirements for recharging an EV are fundamentally different to those of refuelling a petrol or diesel vehicle.

To make EVs a feasible option for both private and business users, we must meet these requirements by providing an abundance of opportunities to recharge. These opportunities come in different shapes and sizes.

ON RENEWABLE TRANSPORT FUELS, IT WAS ENCOURAGING TO SEE E10 INTRODUCED IN SEPTEMBER 2021 AND THIS IS PROJECTED TO REDUCE EMISSIONS PER ROAD VEHICLE BY 2%. WE NOW NEED TO MOVE FURTHER AND FASTER TO RENEWABLE BLENDS IN PETROL AND DIESEL AT THE PUMP.

Ensuring that people have the opportunity to charge an EV near to where they live and work is essential to providing convenient, cost-effective recharging.

Equally, providing people with the opportunity to charge near to wherever they happen to be driving is necessary to provide the confidence to use EVs for longer journeys, particularly through rural areas.

Developing a robust and reliable nationwide infrastructure for recharging electric vehicles is a significant challenge. Whether it is at the end of a driveway, at the side of the road, or off a motorway junction, there are a myriad of factors that can significantly inflate both the time and cost of installing EV charging infrastructure.

The process of establishing grid connections for ultra-rapid charging hubs can add months and even years to the development time. A lack of engagement from some local authorities has, in some areas, significantly delayed the rollout of local charging infrastructure, making EV ownership less feasible for those who cannot charge at home.

Tenants and leaseholders can be made to wait indefinitely for their landlords and freeholders to provide permission to install EV charging at their property. We need not, should not and, in REA's view, we must not accept and allow these kind of barriers to persist.

In the past year alone, the UK's EV charging network has grown by a third, from 24,000 to 32,000 chargepoints. That means twice as many chargepoints were installed in the past year than were installed between 2015 and 2018.

To ensure that the growth of the UK's EV charging infrastructure network continues to accelerate at this rate, we need to act to remove barriers that complicate the installation of EV chargepoints.

The action required spans multiple policy themes including transport, energy, planning and local government, making it inherently difficult to co-ordinate through the traditional structures of government.

It is for this reason that the EV charging industry needs a strong voice and acts as the common denominator across hitherto disparate policy areas.

The challenges we face to remove barriers to growth in the EV charging industry are significant, but we believe that the reward for doing so offers ample justification: a future where zero-emission mobility is affordable and accessible to all.

REA Strategy 'pillar' recommendations: Transport

OFFER LONG-TERM SUPPORT

Progress rating: Neutral

Targets increased up to 2032 but no progress on further ahead.

BRING INNOVATIVE TECHNOLOGIES TO MARKET

Progress rating: Neutral

£165m competition for Sustainable Aviation Fuel but not sufficient on its own without wider policies in place.

GO BEYOND E10

Progress rating: Bad

Nothing on this in last year.

INTRODUCE AMBITIOUS POLICIES

Progress rating: Neutral

Progress on Aviation, with some decisions made but many important details await a further consultation, expected later 2022. No tangible progress on marine.

FOCUS ON HGVS

Progress rating: Good/neutral

Phase out date confirmed (which was what we asked for) but no focus on reducing GHG emissions from the sector in the interim.

EV SUPPORT

Progress rating: Good

£450m Local EV Infrastructure Fund launched to provide capital and revenue funding to support local authorities procuring EV chargepoints. £950m rapid charge fund not yet available, but making progress. Additional grants made available for multi-occupancy buildings.

Finance

Employment: Renewables & Clean Tech

In last year's REview21, we covered the period preceeding the global outbreak of Covid-19. For REview22, we are able to analyse the impact the pandemic had on the UK's renewable energy and clean technology sectors from an economic perspective.

There are a number of situations which will remain challenging for a significant period of time into the future; Covid-19, supply chain issues, war in Ukraine and Brexit - which are all impacting on the sector in 2021-22.

Covid-19 is now a less direct negative, though a higher level of older experienced people are leaving the sector and working practices are having to be more flexible to cope with changing employee demands and requirements.

The supply chain issues are slowing down deployment of technology areas such as air source heat pumps though also leading to more UK based supply as previously cheap logistics are now making it more attractive to purchase locally.

The impacts of the war in Ukraine will mainly be felt in the supply of biomass for large users, but with the massive increase in energy costs this is making renewable energy sources much more attractive cost wise. A potential issue is that with oil and gas being more expensive this makes the extraction of offshore reserves, previously thought to be too expensive to develop, much more attractive along with fracking.

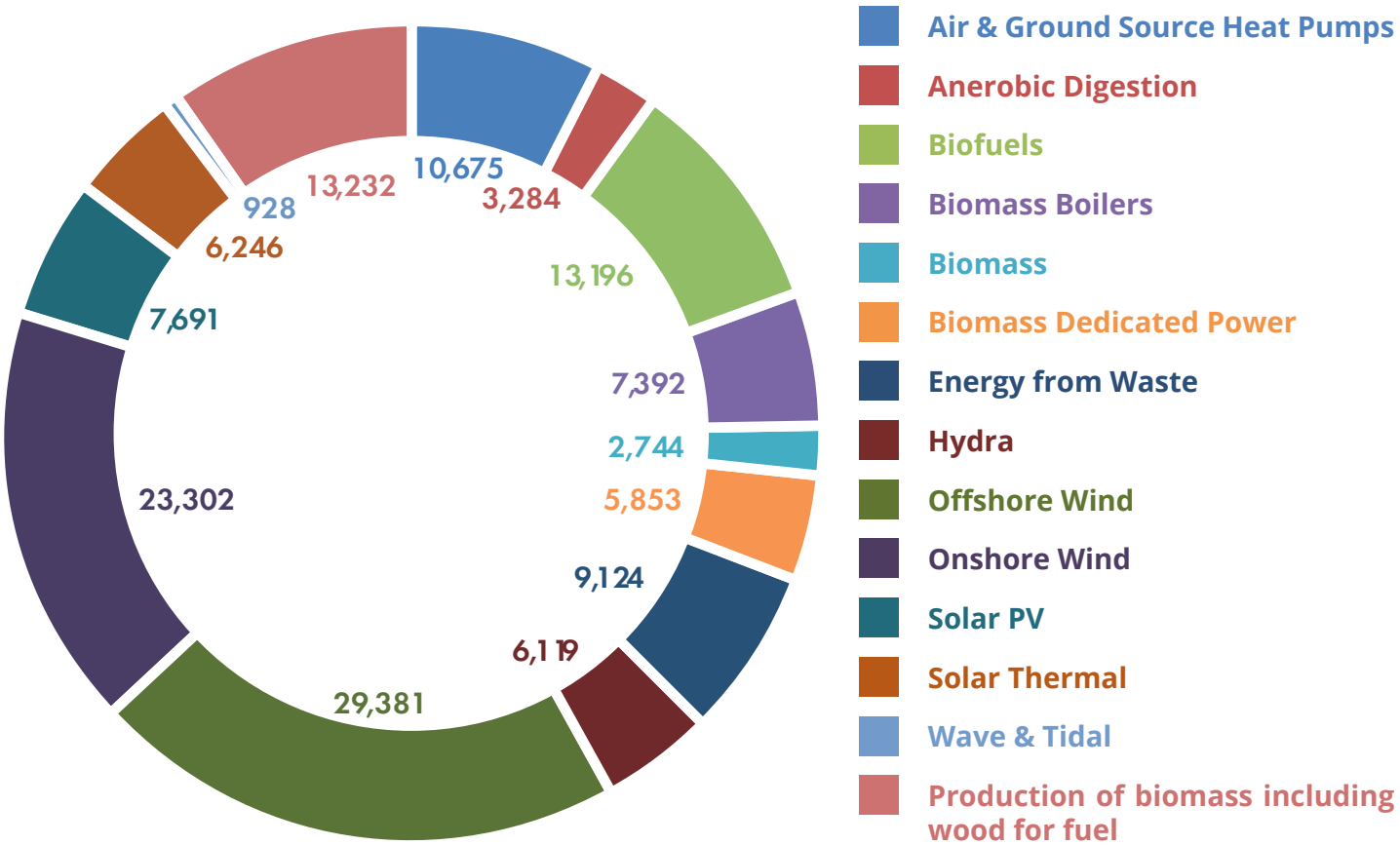
£22.2bn

MARKET VALUE OF THE RENEWABLE ENERGY SECTOR IN 2020-2021

Brexit has had an impact in the availability of experienced and qualified staff and initial costs of importing/exporting products/services, however it has also increased engagement with local supply chain and engineering companies many of whom have seen increased sales and employee numbers. The full impacts of all of these are still to be seen in the figures.

In last year's REview21, we incuded a breakdown of both the current and projected full-time employment numbers for the renewable and

EMPLOYMENT IN 2020-2021 BY SECTOR



clean technology sector for each nation and region of the UK.

This year, with our partners Innovas have have built upon their existing technical modelling to better understand the future economic landscape for our sector.

As well as the full-time employment data, there is the addition of the sector's market value for each area, as well as the inclusion of the significant projects that are in the pipeline.

Over 140,000 people were employed in the renewable energy and clean tech sector in 2020/21 – the REA projects that this could increase to 210,000 by 2035. The market value of the sector will more than double from around £22bn to £46bn in the same time period.

It shows that, while the climate is uncertain for many industries, the renewable energy and clean technology sector's resiliance, adaptability and innovation will continue to see it grow.

Looking Back

Analysing the UK's employment & investment

Covid-19 undoubtably had a impact on all sectors

The overall UK renewable energy sector in 2020-21 has seen a small decrease in market value of 0.9% and small increase in employment of 0.7% to £22.2 billion and about 139,000 full-time equivalents.

There are around 6,700 companies involved in this sector directly and indirectly as part of the supply chain. This is a substantial sector and one that has seen growth from £18.8 billion to £22.2 billion in the last four years with an additional 10,000 people employed.

The previous steady growth of nearly 10% per year has stalled as a result of the Covid-19 pandemic. Impacts have not been uniform across the sub-sectors with reasonable levels of growth still being seen in offshore wind energy, anaerobic digestion, biomass boilers and, a touch surprisingly, solar PV, which seems to have made a bit of a recovery in new capacity based mainly on larger industrial scale deployments.

Biofuels, after a few years of good growth, took a major hit due mainly to the lockdowns which reduced normal vehicle use drastically and hence sales of petrol/diesel fuels with biofuel content. This is expected to be a temporary situation as the restrictions were eased in 2021-22 and vehicle usage went back to more normal levels.

139,167

NUMBER OF PEOPLE EMPLOYED BY THE RENEWABLE ENERGY SECTOR IN 2020-2021

Solar thermal continues its steady decline, partly due to other alternatives such as heat pumps being seen as more flexible and efficient as part of an integrated heating and hot water system. Also having an impact is the development of new hybrid solar thermal systems which use heat pump technology and will be classed as heat pumps in the future. The reduction in the RHI for solar thermal also has led to it not being seen as less attractive compared to heat pumps which still retain a level of RHI support.

Biomass dedicated power and CHP also saw a decrease in market value as large-scale deployments had come online and there was a lower level of deployment than in previous years.

The immediate impacts on employment as a

Sectors	Full-time Employment 2020-2021	Market Value (£'millions) 2020-2021	Company Numbers 2020-21
Air & Ground Source Heat Pumps	10,675	1,624	506
Anaerobic Digestion	3,284	437	160
Biofuels	13,196	2,300	653
Biomass Boilers	7,392	1,076	325
Biomass CHP	2,744	420	166
Biomass Dedicated Power	5,853	968	242
Energy from Waste	9,124	1,315	423
Hydro	6,119	742	304
Offshore Wind	29,381	5,804	1,097
Onshore Wind	23,302	3,885	999
Solar PV	7,691	790	746
Solar Thermal	6,246	790	336
Wave & Tidal	928	157	55
Production of biomass including wood for fuel	13,232	2,066	675
Totals	**139,167**	**22,193**	**6,687**

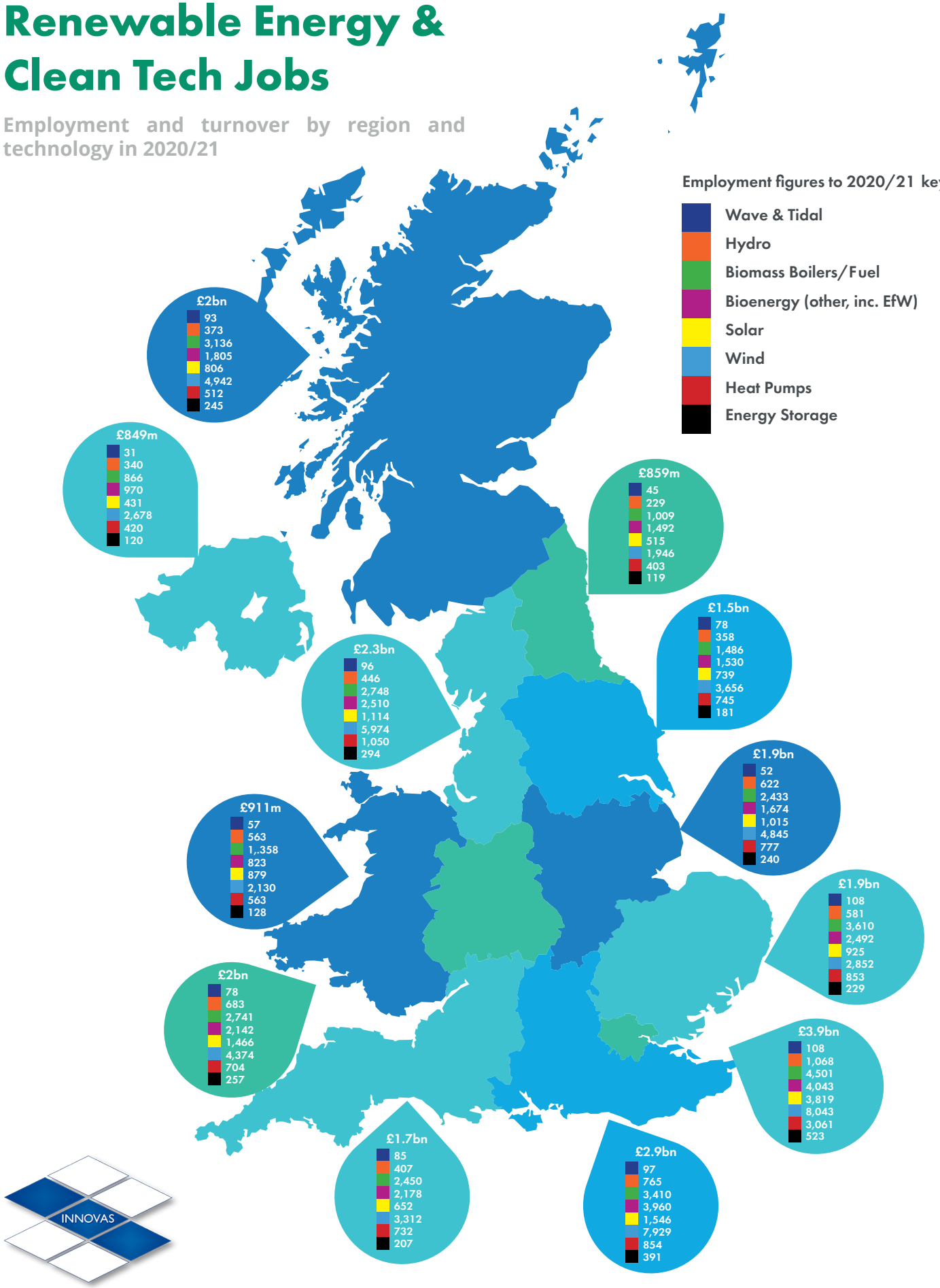
result of the slow down has been tempered by the massive government support through the furlough scheme and bounce back loans.

There is also a degree of learning from previous recessions and economically challenging times when companies reduced their workforces early then found it very difficult to recruit experienced and effective staff once the economic situation improved. Companies have been more willing to support the retention of their workforces, especially with the government support provided. The initial indications are that this approach has been effective and companies in the higher growth sub-sectors are well placed to continue the expansion from previous years.

Made in Britain 2020/21

Renewable Energy & Clean Tech Jobs

Employment and turnover by region and technology in 2020/21



Looking Forward

Employment and investment to 2035

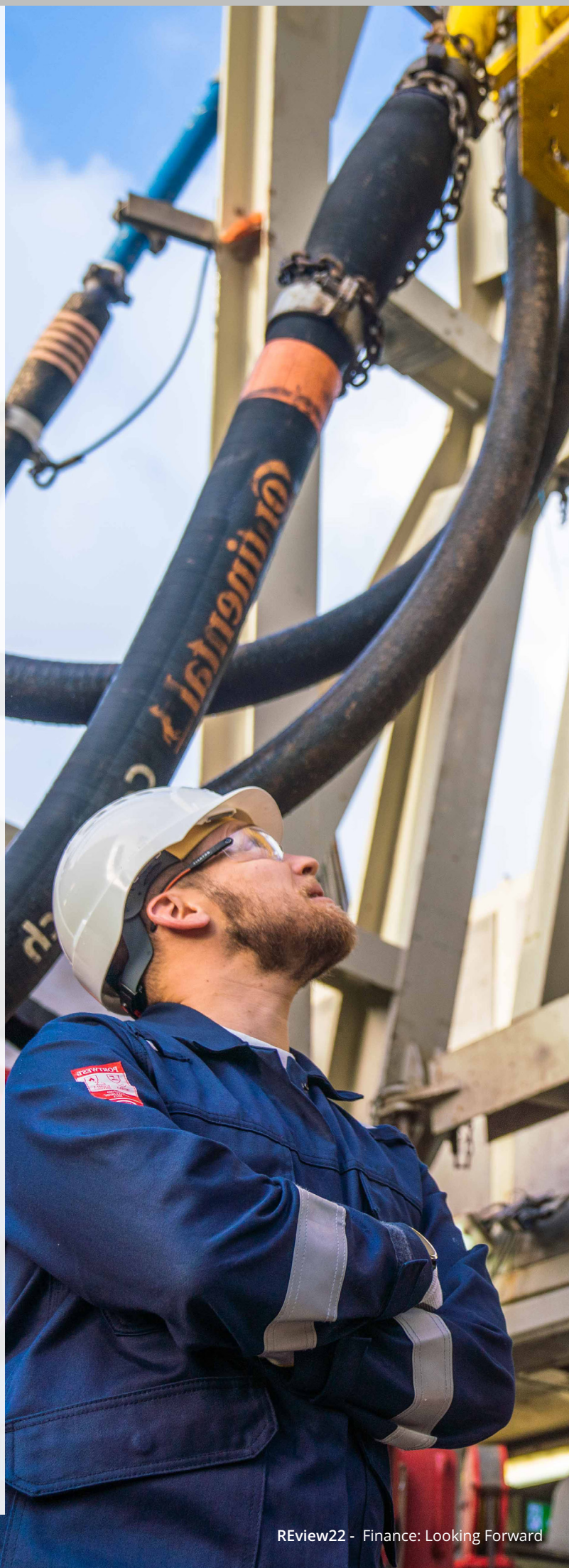
Overall the Renewable Energy sector is forecast to grow to £41.8 billion and employ around 185,700 people by 2030. This is set to reach a peak of £47.5 billion employing about 221,000 people by 2040. This is an increase of investment of around £19 billion and £25 billion with a boost to employment of 44,000 and 80,000 people, respectively.

Air and ground source heat pumps are forecast to have a steady and prolonged growth as a result of government strategies and aims to move away from gas fired heating and hot water. The technology area is fairly mature and efficiencies are improving year on year. For new builds and more modern buildings with external space heat pumps are a good technology solution. Retrofitting into older buildings and those without the necessary external space are reasons why growth is expected to be steady rather than at higher levels. This will however still lead to growth from £1,608 million employing about 10,675 to £2,717 millions employing about 13,900 by 2030 and £5,664 millions employing about 20,200 people.

Anaerobic Digestion is set to continue its growth trajectory with steady growth rates rather than a spectacular explosion. There is a large untapped potential in the UK with plenty of opportunity for growth especially with the current energy price situation and restriction in global natural gas supply.

Biofuels are predicted to continue a relatively high growth increasing from £2.9 billion, employing about 13,200 people, to a peak of £6.3 billion, employing about 20,400 people in 2030. It should remain fairly stable until 2035 when a gradual decline is forecast as the move to electric and fuel cell vehicles impacts on the use of petrol and diesel fuels. This decline may well be more rapid than forecast, but this depends on the speed of rollout of new vehicles and phasing out of existing vehicles.

Biomass Boilers is expected to grow at a relatively slow rate increasing from £1 billion, employing about 7,400 people to £1.4 billion employing about 8,400 people in 2030. There are competing technologies which will impact on the future take up of biomass boilers and a finite supply of sustainable biomass which will limit future growth. Current energy price increases may well see a short term increase over and above the forecast levels.



Biomass CHP will also see a slow rate of increase to £600 million, employing about 3,200 people in 2030. This should then remain stable from there on until a decline from 2040 as existing facilities are decommissioned.

Biomass Dedicated Power sees a continued high growth rate until 2030 as planned large scale facilities are built and come on stream. Increasing from £993 million, employing about 5,850 in 2020 to £1.7 billion millions about 7,640 people. It is then forecast to stay stable until 2050 as new facilities come on stream and older ones are replaced.

Energy from Waste is forecast to show steady growth to around £2 billion and employing about 11,000 people in 2035. A decline is then expected as the amount of waste is reduced and therefore the need for new facilities and operation of existing ones reduces.

Hydro is forecast to show consistent growth to 2050 as newer and more efficient micro-hydro systems which minimise impacts on local ecologies are developed and commissioned.

Offshore Wind Energy is predicted to have the highest initial growth of the sub-sectors based on current and planned deployment in the North and Irish Seas. It is forecast to increase from £5.4 billion, employing 28,300 people, to £13.7 billion, supporting around 45,500 jobs in 2035. Technology development on the turbines, cables and power connections along with the potential to use excess capacity to be stored or used to generate green hydrogen will see deployment increase in the UK and internationally. The growing export market for offshore wind will benefit UK companies who are now recognised as being amongst the world's leading suppliers and manufacturers of products and services.

Onshore Wind is in a bit of a slow growth stage, with current forecasts showing an increase from £3.8 billion, employing about 23,100, to £5.1 billion, employing 27,200 by 2030. Unless there is a major change in UK government policy, the forecast is for no further growth, but also no decrease.

Solar PV is due to grow steadily until 2050, increasing from £722 million and employing about 7,500 people, to £1.6 billion and supporting around 11,300 jobs in 2050. There are an increasing number of mixed power generation/energy storage facilities planned or being considered which along with large scale deployments and increasing numbers of new build homes using solar PV – these are all forecast to drive growth in this sub-sector.

Solar Thermal is forecast to steadily decline over the forecast period. Heat pump technology is developing and being seen as more flexible and effective in providing low carbon heating and hot water. There are new solar thermal hybrid systems which use heat pump technology and will be counted in the heat pump sub-sector.

Wave and Tidal are likely to grow and to increase quicker in the future once new technologies are proven and deployed. Despite there being many attempts over the years to develop commercial wave and tidal systems, these are still not being deployed on a large scale yet. However, the forecast is for a substantial sector to develop from 2030 onwards.

Production of Biomass is set to grow along with biomass dedicated power, boilers and CHP to 2030 from £2 billion, employing 13,200 people, to £3 billion supporting around 16,300 jobs. It is forecast to remain steady from 2030.

Energy Storage is predicted to grow rapidly as the UK's power supply network becomes smarter to a peak of £4.6 billion, employing around 36,500 people in 2040.

Renewables & Cleantech 2022 – From cost to collaboration?

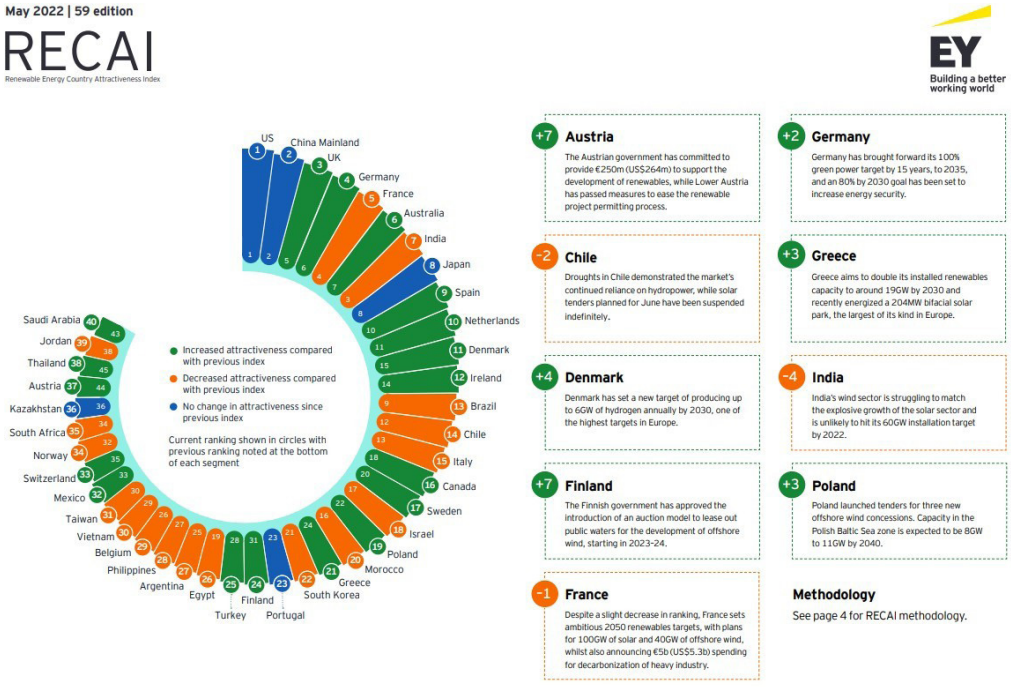
Fernando Valda
Director, EY

The scale of investment into renewable energy and aligned sectors continues to grow at a remarkable rate. Notwithstanding the Covid-19 period, the amount of capital committed to the UK's net zero transition has expanded across new capital providers and deepened in scale.

In the UK, the hosting of COP26 reaffirmed the UK Government's commitment to zero emissions by 2050; although the path and pace may be impacted by a change in Prime Minister and recession concerns. Supply chain issues emerging from the pandempic continue to drive price inflation and construction challenges. The Ukraine war, exacerbating 'energy security of supply' concerns, has pushed not only wholesale power prices but also grid balancing pricing to ever greater heights. Whilst in the short term, calls for fossil fuel based back up generation have emerged, the dye is cast that renewables are the most economic form of power. Power prices are at a level where renewable energy investment returns are even more attractive despite the equipment supply headwinds. The age of renewables is here and now, it is a matter of how fast it can be deployed to decarbonise our economies and one day again yield lower power prices and energy security.

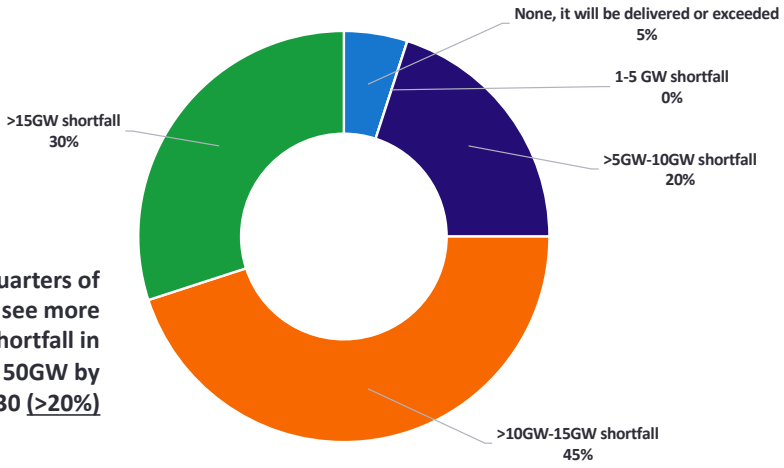
The UK has seen £5.33bn of investment in new capacity (2028 MW) with offshore wind increasing its share based on the larger scale of these projects in 2021. Onshore wind has observed £0.67bn (417 MW), solar £0.73bn (730 MW) and offshore wind £3.91bn (872 MW). In contrast, new biomass is more muted at £0.01bn (9MW) and based on Kwasi Kwarteng's recent comments will cause concerns for this baseload energy source. EY's latest assessment of global renewable energy markets (RECAI May 2022) has seen the UK elevate to third position driven by pricing, regulatory support and progressive Government targets. The recent outcome of Auction Round saw CfD prices continue to trend lower, with onshore wind auction winners securing 15 year bankable supply at £42.47/MWh (2012 prices), solar £45.99/MWh and offshore Wind a mere £37.35/MWh. This continued reduction in the LCOE of renewable energy is praised by many, however due to the power price mechanics based on marginal generator costs (i.e. fossil fuelled), this does not feed into lower wholesale prices at this time. Instead, it serves to widen EBITDA margins for generators and will encourage more investment capital from those companies directly exposed to these high-power prices.

In 2022/23, and likely extending for many years, the economic imperative for increased renewables investment will remain strong. There is now a clear shift to a much faster increase in capacity, aided by reducing the consenting delays and power intermittency challenges. Supply chains remain stretched and the required increase in capability (people as well as equipment manufacturing capacity) is by no means certain. The Government 'market led' price focus has served to reduce LCOEs quicker than many expected, but it alone is not sufficient for the desired speed of installation. The



EY Offshore Wind Survey Question

Under a 'Business As Usual' approach by how much could the 50GW target be missed?



Three quarters of respondents see more than a 10GW shortfall in the target of 50GW by 2030 (>20%)

business as usual (BAU) approach to consenting, grid procurement and supply chain support is leading to an industry view that some Government targets are at risk. A recent survey conducted by EY (paper issued in September 2022) indicates that 75%+ of senior industry respondents foresee a 10-15GW shortfall against the 50GW Offshore wind target announced earlier this year. Solutions will need to include regulatory changes, increased project transparency and potentially new forms of innovative collaboration focused on delivery at a societal rather than solely a corporate level.

Increased renewables' impact on energy system balancing has increased the economic rewards in the shorter term flexibility markets driving a 20GW+ planning pipeline for electricity storage alone. Increased electricity demand from the continued deployment of EVs (domestic and industrial) plus heating/cooling could further stretch the thin margins of power supply compared to power demand. The decentralisation of energy generation, promising alternative technologies and now also the prospects for Hydrogen mean the energy mix is set for even more paradigm shifts on the road to 2050. The various colours of Hydrogen based on their source (Pink for Nuclear based) and its own inevitable cost reduction pathway will add to the equation to deliver decarbonisation. In the rush towards deployment, the newer technologies must not be left behind as they represent the opportunity to not only supplement wind/solar but also add to the scaling and speed of deployment within this decade. The REA is a central voice and activist to ensure Government keeps these real options on the table including Energy from Waste, Heat and Cooling technologies, transport reimagination plus a genuinely circular bioresource economy.

In summary the prospects for renewables, be they large or smaller scale, are greatly encouraging despite the very real prospect of a near term recession in the UK. The amount of 'dry powder' in committed but not yet deployed investment capital will continue to grow and it is a new question of the speed of deployment. The recent 'Energy Strategy' released by Government, following on from the '10 point plan for a Green Revolution' and 'Net Zero' pronouncements will require further refinement to steer this path of delivery. EY is a proud new Patron member of the REA and looks forward to leveraging our capabilities, notably financing, to lean into the REA's strategic objectives across the expanding Net Zero value chain.

The UK's Net Zero target by 2050 recently crossed the threshold of 'less than 10,000 days' - coordinated delivery of renewables capacity, not solely price, needs to be the new focus for 2022 and beyond.

Region by Region

Regional economic forecasts to 2035

For the first time last year, the REA's REview publication provided employment projections on a regional and technological basis.

For this year's REview22, the REA have gone further. With our partners Innovas, we have added market value projections and highlighted some of the key projects that are in the pipeline in every nation and region of the UK.

Nearly 140,000 people were employed in the renewable energy and clean tech sector in 2020/21 – the REA projects that this could increase to 210,000 by 2035. The market value of the sector will more than double from around £22bn to £46bn in the same time period.

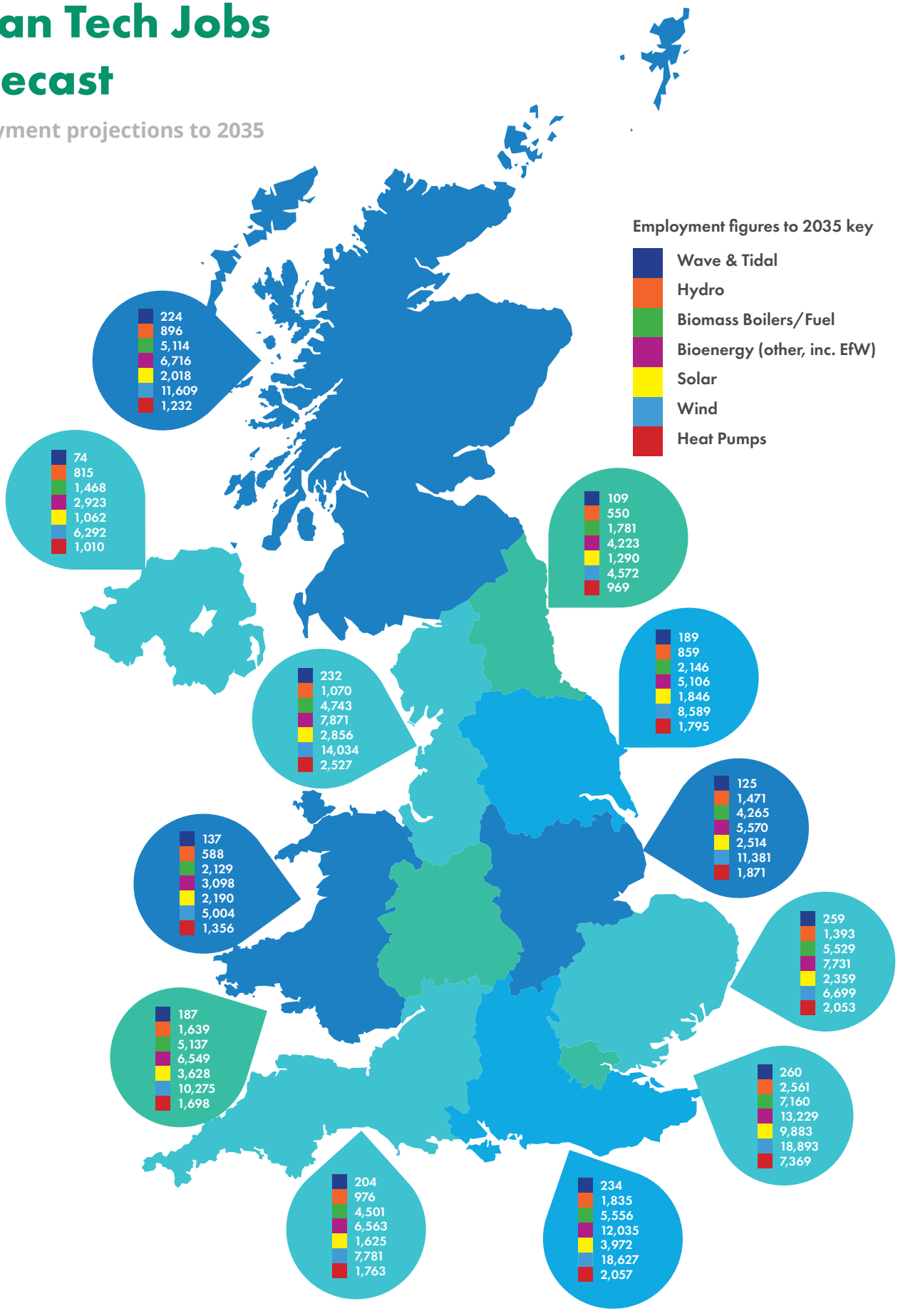
Significantly, due to the very nature of renewables, whose location is often influence by resource availability and centres for demand, these are jobs that fully dispersed across the UK.

Headline figures will show that the West Midlands will see a 132% increase in market value by 2035, the North will support around 30,000 jobs with another 13,000 jobs held in Yorkshire and the Humber.

There are positive signs of growth in all regions and nations in the UK on current trajectories, and these numbers could all be surpassed with the right Government policy.

Made in Britain 2035
Renewable Energy & Clean Tech Jobs Forecast

Employment projections to 2035



EAST MIDLANDS 2035

As with many other regions, the most significant contributor to the East Midlands' renewable energy employment numbers is wind.

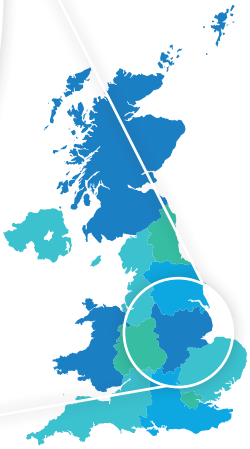
Between offshore and onshore, the sector supports nearly 5,000 out of the total 11,500 jobs in the region. At £900 million, the wind industry accounts for around half of the region's total renewable energy market value.

However, hydro in the East Midlands is also noteworthy, given it supports more than one in ten jobs in the sub-sector, nationally.

46%

THE WIND INDUSTRY CONTRIBUTES NEARLY HALF OF ALL RENEWABLE ENERGY MARKET VALUE IN THE EAST MIDLANDS

1. Derby University Low Carbon Rail HYDEX – Fuels for Rail
2. Loughborough University, Nat Centre for Combustion & Aerothermal Tech, Rolls Royce UTC, Aviation fuels, Hydrogen vehicles, ViVID, Caterpillar Innovation & Research Centre
3. Leicester and De Montfort Universities, REEMAIN
4. Northampton University
5. Lincoln University, National Grid, Crop research, Scawby Brigg Battery Storage
6. Nottingham and Nottingham Trent Universities, Hydrogen Systems Test Bed, RAD Building, Integrated Water, Energy & Food Centre, District Heat Network, EMERGE (EFW), Trent Basin (ERA – battery storage)
7. Dudgeon East, Race Bank, Lynn, Inner Dowsing
8. Sleaford RE Plant Methering Heath AD



East Midlands						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	777	1175	51.22	117	261	123.08
Biomass	2433	2922	20.10	410	599	46.10
Bioenergy (inc EfW)	1674	2345	40.08	302	693	129.47
Hydro	622	707	13.67	66	84	27.27
Combined Solar	1015	990	-2.46	103	117	13.59
Wind Energy	4845	6682	37.92	894	1729	93.40
Wave and Tidal	52	73	40.38	8	15	87.50
Energy Storage	240	1961	717.08	35	262	648.57
Total	**11658**	**16855**	**44.58**	**1935**	**3760**	**94.32**

EAST OF ENGLAND 2035

Despite hosting a significant number of offshore wind sites, the East of England is the only region in the UK where wind energy is not the largest employer. Indeed, by more than 3,600 people, biomass accounts for nearly a third of all renewable jobs in the region. This equates to more than one in ten biomass jobs nationally.

However, in terms of overall market value, wind remains the largest sector, with a value of more than £570 million in 2021. The region also supports a nationally significant number of wave and tidal jobs too, employing more than one in ten people in this sub-sector, jointly the largest sub-sector employer.

3,600

JOBS SUPPORTED BY BIOMASS - THE ONLY REGION WITH A SUB-SECTOR THAT EMPLOYS MORE PEOPLE THAN IN OFFSHORE AND ONSHORE WIND COMBINED

1. Peterborough Energy Park
2. Cambridge University Energy Sector Partnerships, Energy Institute, Ireton Way AD/CHP
3. Cranfield University. Millbrook Test Centre, Rookery South (EFW)
4. Hertfordshire University, ENESD
5. East Anglia & Anglia Ruskin Universities, Norwich Research Park, John Innes Centre, Lotus (EVs), IRENES
6. East of England Energy Group, Snetterton Park Biomass
7. Gunfleet Sands, Greater Gabbard, Galloper, East Anglia Array 1-3, Scroby Sands
8. University of Essex & Writtle University Crops, Agriculture and Bioeconomy, Ford Research Centre, Dollymans Battery Storage

East of England						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	853	1290	51.23	115	257	123.48
Biomass	3610	4396	21.77	559	839	50.09
Bioenergy (inc EfW)	2462	3416	38.75	392	877	123.72
Hydro	581	660	13.60	73	94	28.77
Combined Solar	925	771	-16.65	93	91	-2.15
Wind Energy	2852	3929	37.76	571	1103	93.17
Wave and Tidal	108	152	40.74	15	30	100.00
Energy Storage	229	1874	718.34	33	243	636.36
Total	**11620**	**16488**	**41.89**	**1851**	**3534**	**90.92**

GREATER LONDON 2035

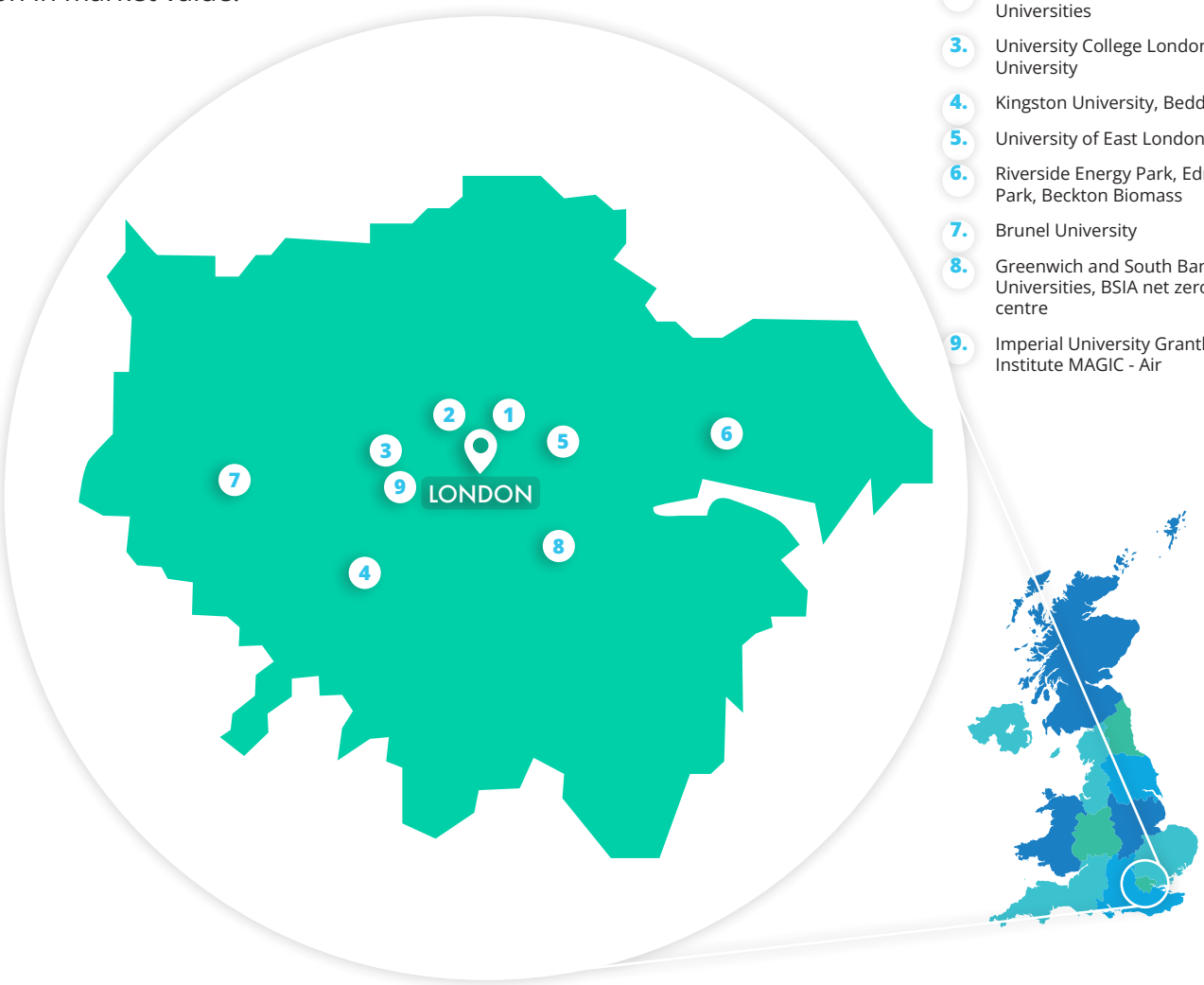
Greater London continues to dominate the economic landscape when it comes to renewable energy. The city now supports more than 25,000 jobs and nearly £4 billion in market value, and this is predicted to increase to 35,000 and £7.3 billion, respectively, by 2035. This equates to around 17% of the UK's renewable economic activity.

The wind industry is particularly well-served, with more than 8,000 jobs and £1.5 billion worth of market value. The sub-sectors that make up the broader bioenergy and biomass grouping are also significant, with a combined 8,500 jobs and £1.3 billion in market value.

17%

GREATER LONDON SUPPORTS 17% OF THE UK'S RENEWABLE ENERGY JOBS AND MARKET VALUE

1. Kings College, Queen Mary's. Royal Holloway, Net Zero Centre
2. London Metropolitan & Middlesex Universities
3. University College London City University
4. Kingston University, Beddington EFW
5. University of East London
6. Riverside Energy Park, Edmonton Eco Park, Beckton Biomass
7. Brunel University
8. Greenwich and South Bank Universities, BSIA net zero building centre
9. Imperial University Grantham Institute MAGIC - Air



Greater London						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	3061	4631	51.29	494	1105	123.68
Biomass	4501	5261	16.89	648	936	44.44
Bioenergy (inc EfW)	4043	5471	35.32	606	1217	100.83
Hydro	1068	1215	13.76	146	187	28.08
Combined Solar	3819	2893	-24.25	378	351	-7.14
Wind Energy	8043	11091	37.90	1556	3006	93.19
Wave and Tidal	108	152	40.74	20	39	95.00
Energy Storage	523	4276	717.59	72	531	637.50
Total	**25166**	**34990**	**39.04**	**3920**	**7372**	**88.06**

NORTH EAST 2035

While job and investment figures are proportionally low in a national context, in contrast to just about every other region, the largest sub-sector in the North East is biofuels.

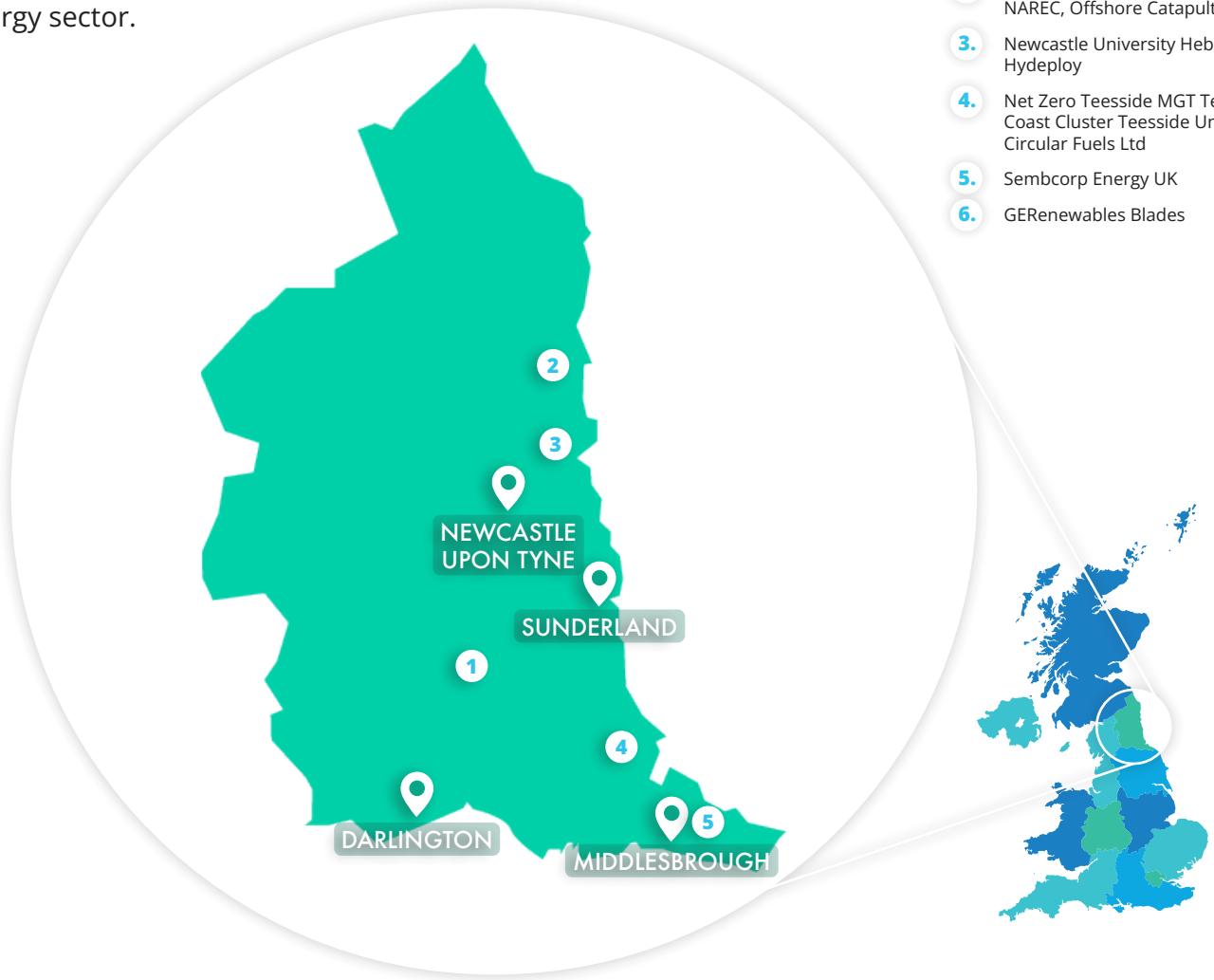
Despite having one of the smaller populations of the UK, the North East has a number of high intensity clusters of renewable energy activity, especially around the Teesside and Port Blyth areas where historically there have been large chemicals, refinery and power generation activity.

The North East has the ports and space for larger industrial facilities and onshore deployment that supports further expansion in the renewable energy sector.

1,200

JOBS SUPPORTED BY BIOFUELS - THE LARGEST RENEWABLE SUB-SECTOR IN THE NORTH EAST

1. Durham University Lightrock Solar Banks Renewables
2. Britishvolt Port Blyth, Energi Coast NAREC, Offshore Catapult
3. Newcastle University Hebburn GSHP Hydeploy
4. Net Zero Teesside MGT Teesside East Coast Cluster Teesside University Circular Fuels Ltd
5. Sembcorp Energy UK
6. GERenewables Blades



North East						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	403	609	51.12	59	132	123.73
Biomass	1009	1199	18.83	161	236	46.58
Bioenergy (inc EfW)	1492	2223	48.99	236	608	157.63
Hydro	229	261	13.97	22	28	27.27
Combined Solar	515	478	-7.18	54	59	9.26
Wind Energy	1946	2680	37.72	304	586	92.76
Wave and Tidal	45	64	42.22	7	14	100.00
Energy Storage	119	973	717.65	16	122	662.50
Total	**5758**	**8487**	**47.39**	**859**	**1785**	**107.80**

NORTH WEST 2035

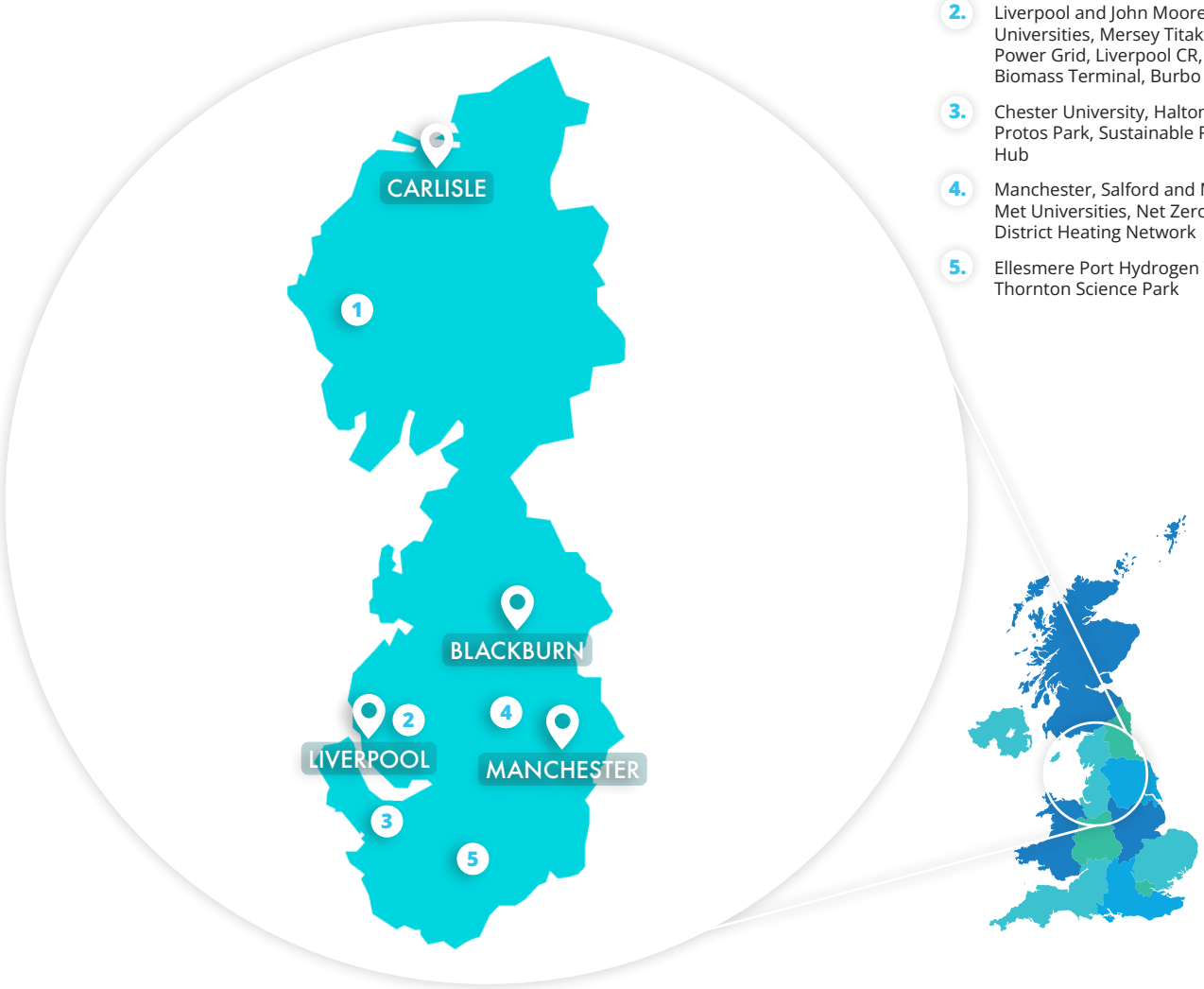
The North West has a balanced set of sub-sectors, with only biofuels well above the national average, and just anaerobic digestion and energy from waste well below. The region also has the highest level of market value in air and ground source heat pumps of any region or nation outside London.

The region is forecast to benefit from the expected growth of applied renewable energy technologies in urban areas, as well as the supply chain for wind energy, air and ground source heat pumps, and biofuels.

£140M

THE NORTH WEST HAS THE HIGHEST LEVEL OF MARKET VALUE IN AIR AND GROUND SOURCE HEAT PUMPS OF ANY REGION OR NATION OUTSIDE LONDON

1. Walney, Barrow, Duddon Sands 330MW onshore wind and biomass
2. Liverpool and John Moore Universities, Mersey Titak, Green Power Grid, Liverpool CR, Peel Ports Biomass Terminal, Burbo Bank
3. Chester University, Halton W2E, Protos Park, Sustainable Refuelling Hub
4. Manchester, Salford and Manchester Met Universities, Net Zero NW, District Heating Network
5. Ellesmere Port Hydrogen Village Thornton Science Park



North West						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	1050	1587	51.14	140	313	123.57
Biomass	2748	3301	20.12	435	640	47.13
Bioenergy (inc EfW)	2510	3688	46.93	429	1063	147.79
Hydro	446	507	13.68	56	71	26.79
Combined Solar	1144	1079	-5.68	121	128	5.79
Wind Energy	5974	8237	37.88	1058	2046	93.38
Wave and Tidal	96	136	41.67	16	31	93.75
Energy Storage	294	2402	717.01	43	316	634.88
Total	**14262**	**20937**	**46.80**	**2298**	**4608**	**100.52**

SOUTH EAST 2035

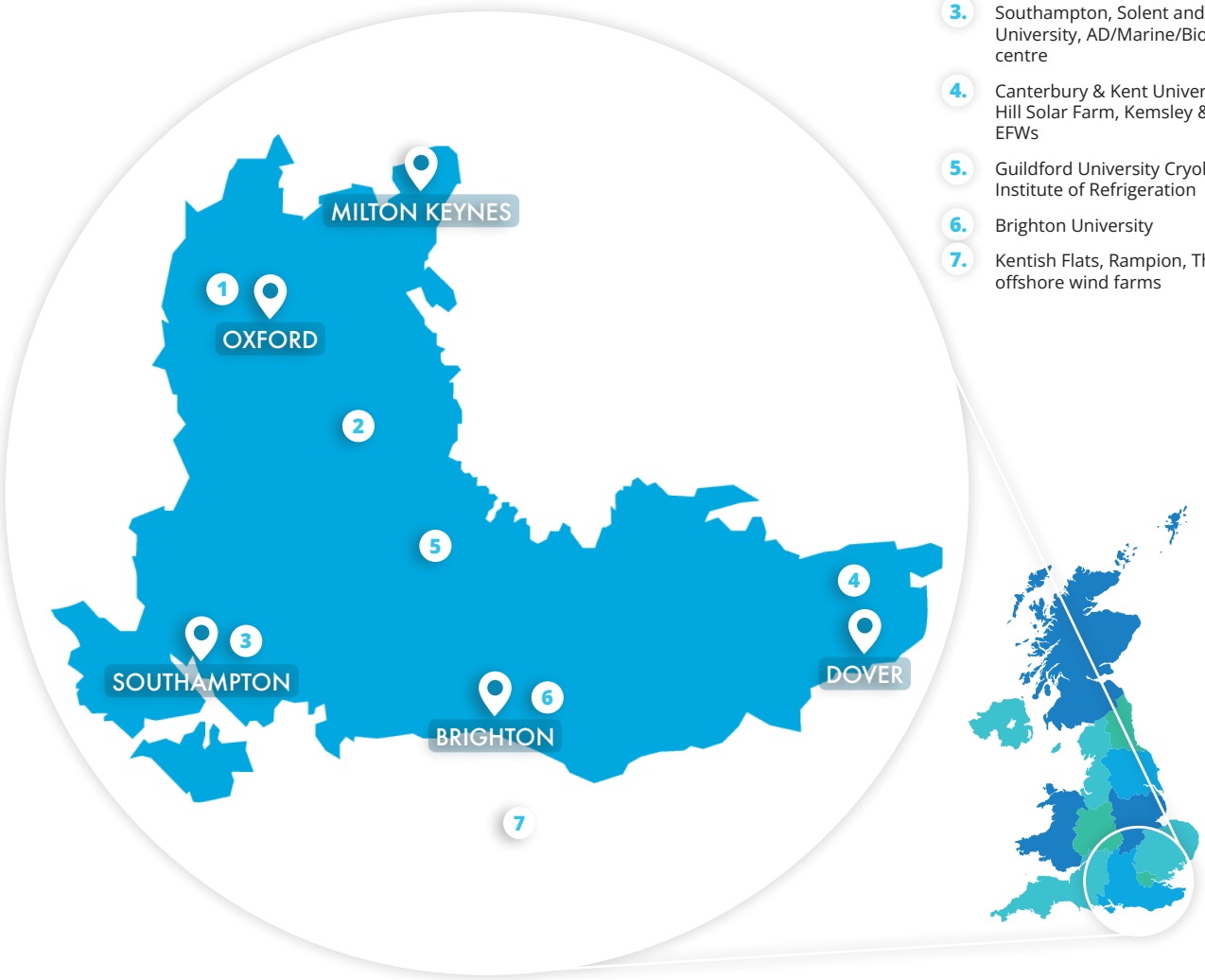
The South East remains the largest region in terms of overall jobs and market value outside of Greater London. Indeed, when it comes to employment in wind and bioenergy, the region matches Greater London, supporting around 8,000 and 4,000 jobs, respectively.

This comparison is reflected in the market value too. Wind contributes £1.3 billion in value out of a total £2.9 billion, whereas bioenergy's value of £608 million is greater than every other region in the UK, including Greater London.

£5.5BN

THE SOUTH EAST'S PROJECTED MARKET VALUE IN 2035

1. Oxford University, RELCON, JET Fusion Flywheel
2. Reading University
3. Southampton, Solent and Portsmouth University, AD/Marine/Biofuels test centre
4. Canterbury & Kent Universities Cleve Hill Solar Farm, Kemsley & Allington EFWs
5. Guildford University Cryohub - Institute of Refrigeration
6. Brighton University
7. Kentish Flats, Rampion, Thanet offshore wind farms



South East						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	854	1292	51.29	123	276	124.39
Biomass	3410	4066	19.24	502	734	46.22
Bioenergy (inc EfW)	3960	5391	36.14	608	1294	112.83
Hydro	765	870	13.73	105	134	27.62
Combined Solar	1546	1225	-20.76	142	134	-5.63
Wind Energy	7929	10931	37.86	1331	2574	93.39
Wave and Tidal	97	137	41.24	16	32	100.00
Energy Storage	391	3192	716.37	53	391	637.74
Total	**18952**	**27104**	**43.01**	**2880**	**5569**	**93.37**

SOUTH WEST 2035

Although employment and market value is, overall, more modest than some other regions in the UK, the South West does have some sub-sectors of note.

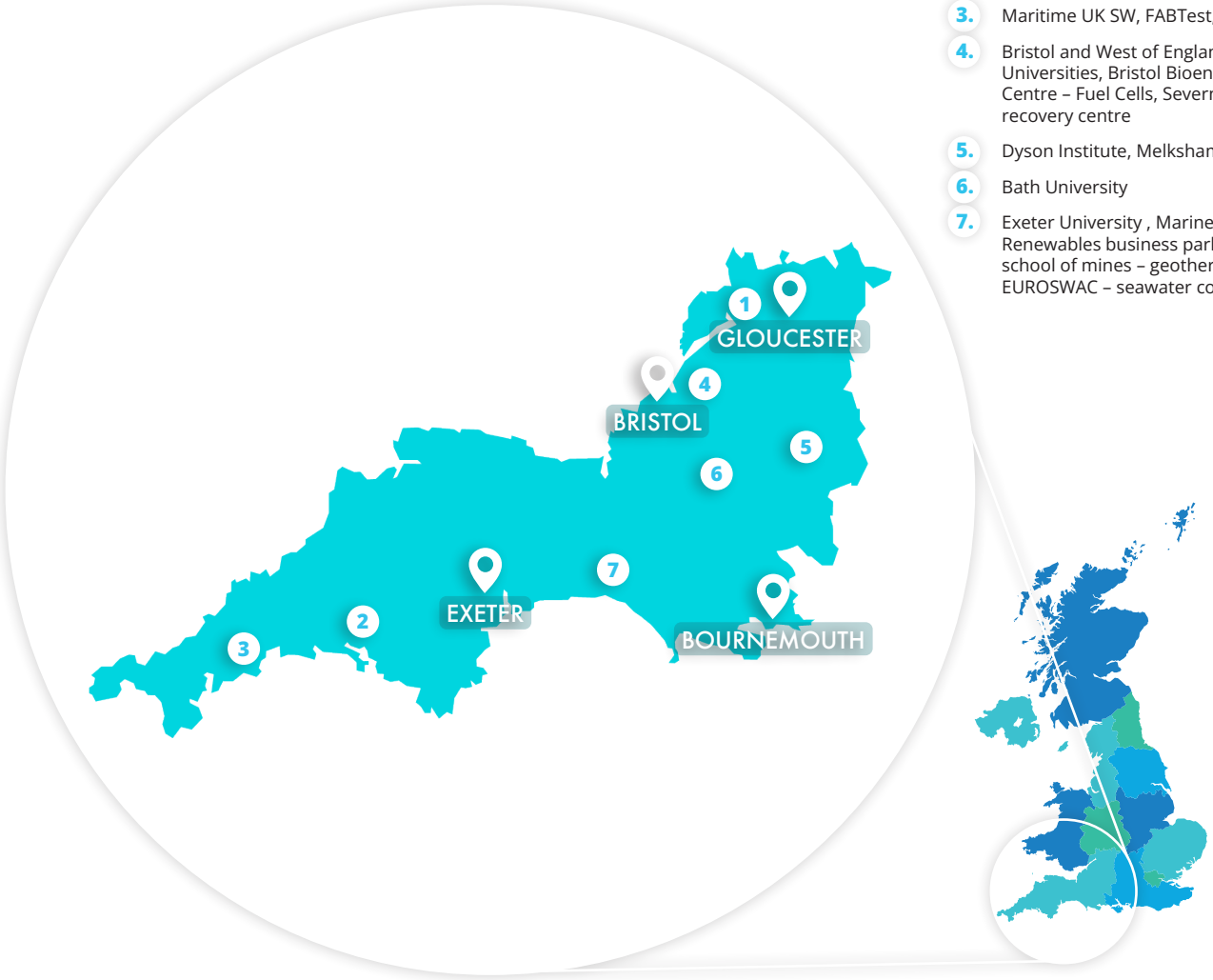
In particular, the production of biomass, energy from waste and anaerobic digestion, all contribute more than one in ten jobs for their sub-sectors, nationally.

The wind industry remains crucial to the region, however, with around a third of renewable energy jobs and market value in the south west supported by the sector.

10,000

NUMBER OF RENEWABLE ENERGY AND CLEAN TECHNOLOGY JOBS IN IN SOUTH WEST

1. Gloucestershire and Hartpury Universities
2. Plymouth University, Supergen, COAST. St Denis Battery Storage
3. Maritime UK SW, FABTest, Wave Hub
4. Bristol and West of England Universities, Bristol Bioenergy Centre – Fuel Cells, Severnside energy recovery centre
5. Dyson Institute, Melksham Solar Farm
6. Bath University
7. Exeter University , Marine Renewables business park, Camborne school of mines – geothermal, EUROSWAC – seawater cooling



South West						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	732	1108	51.37	115	257	123.48
Biomass	2450	2920	19.18	425	622	46.35
Bioenergy (inc EfW)	2178	2991	37.33	335	692	106.57
Hydro	407	463	13.76	46	58	26.09
Combined Solar	652	617	-5.37	74	79	6.76
Wind Energy	3312	4569	37.95	621	1199	93.08
Wave and Tidal	85	119	40.00	14	28	100.00
Energy Storage	207	1687	714.98	30	225	650.00
Total	**10023**	**14474**	**44.41**	**1660**	**3160**	**90.36**

WEST MIDLANDS 2035

The West Midlands has a balanced mix of sub-sectors with comparative strengths in hydro, solar PV and biomass production. This reflects the region's manufacturing and engineering strengths and large areas of rural land in counties such as Herefordshire, Shropshire and Worcestershire.

There are projects around hydrogen with Cadent and Northern Gas Networks working with Keele University to inject up to 20% hydrogen into the closed gas network at the university. At 132%, the West Midland's predicted increase in market value between now and 2035 is the largest of any region or nation in the UK.

132%

INCREASE IN THE WEST MIDLAND'S RENEWABLE ENERGY AND CLEAN TECHNOLOGY MARKET VALUE BY 2035

1. Keele University, Hydeploy – Hydrogen, SIMULATE
2. Harper Adams University, Bioeconomy
3. Wolverhampton University, Sandwell Energy Storage, Energy Superhub, Kelvin Energy
4. Rugeley Zero Carbon, Canal heat pumps, Poplars AD
5. Birmingham, Aston & Birmingham City Universities, Tyseley Energy Park ATETA, Sustainability West Midlands
6. University of Warwick, Energy Superhub

West Midlands						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	704	1066	51.42	120	313	160.83
Biomass	2741	3263	19.04	398	640	60.80
Bioenergy (inc EfW)	2142	3017	40.85	316	1063	236.39
Hydro	683	777	13.76	88	71	-19.32
Combined Solar	1466	1448	-1.23	141	128	-9.22
Wind Energy	4374	6029	37.84	873	2046	134.36
Wave and Tidal	78	110	41.03	13	31	138.46
Energy Storage	257	2097	715.95	36	316	777.78
Total	**12445**	**17807**	**43.09**	**1985**	**4608**	**132.14**

YORKSHIRE & THE HUMBER 2035

Yorkshire and the Humber has long been at the centre of fossil fuel power generation and the supply of natural gas for the UK.

Yet, when it comes to jobs and market value in renewables, Yorkshire and the Humber is slightly behind most other regions and nations in the UK, supporting just under 9,000 jobs and £1.5 billion in market value. Proportionally, this equates to around 6%. A number of potential projects could change this picture dramatically, however. Hydrogen, for example, could add thousands of jobs and provide hundreds of millions in new investment.

£3BN

LEVEL OF MARKET VALUE BY THE RENEWABLE ENERGY AND CLEAN TECHNOLOGY SECTOR BY 2035 IN YORKSHIRE AND HUMBER

1. Bradford University Yorkshire Water
2. Leeds University, Leeds Beckett Uni, UTC Hydrogen, district heating
3. Huddersfield University, 3M centre
4. Sheffield and Sheffield Hallam Universities AMRC, ITM Power
5. BioYorkshire, York University, Askham Bryan College NNFCC, Fera Science,
6. Energy Estuary, Hull University, ERGO and Aura Centres, HOTA, Siemens Gamesa, Boston Energy, Equinor H2H
7. Drax – 3.9GW Biomass, BECCs
8. Green Hydrogen, Orsted, Phillips66

Yorkshire and the Humber						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	745	1127	51.28	105	235	123.81
Biomass	1486	1749	17.70	250	359	43.60
Bioenergy (inc EfW)	1530	2177	42.29	250	569	127.60
Hydro	358	407	13.69	45	58	28.89
Combined Solar	739	690	-6.63	68	76	11.76
Wind Energy	3656	5041	37.88	783	1512	93.10
Wave and Tidal	78	111	42.31	14	28	100.00
Energy Storage	181	1479	717.13	28	208	642.86
Total	**8773**	**12781**	**45.69**	**1543**	**3045**	**97.34**

NORTHERN IRELAND 2035

Northern Ireland has the smallest level of renewable jobs and market value out of any region or nation in the UK - proportionally, just 4%.

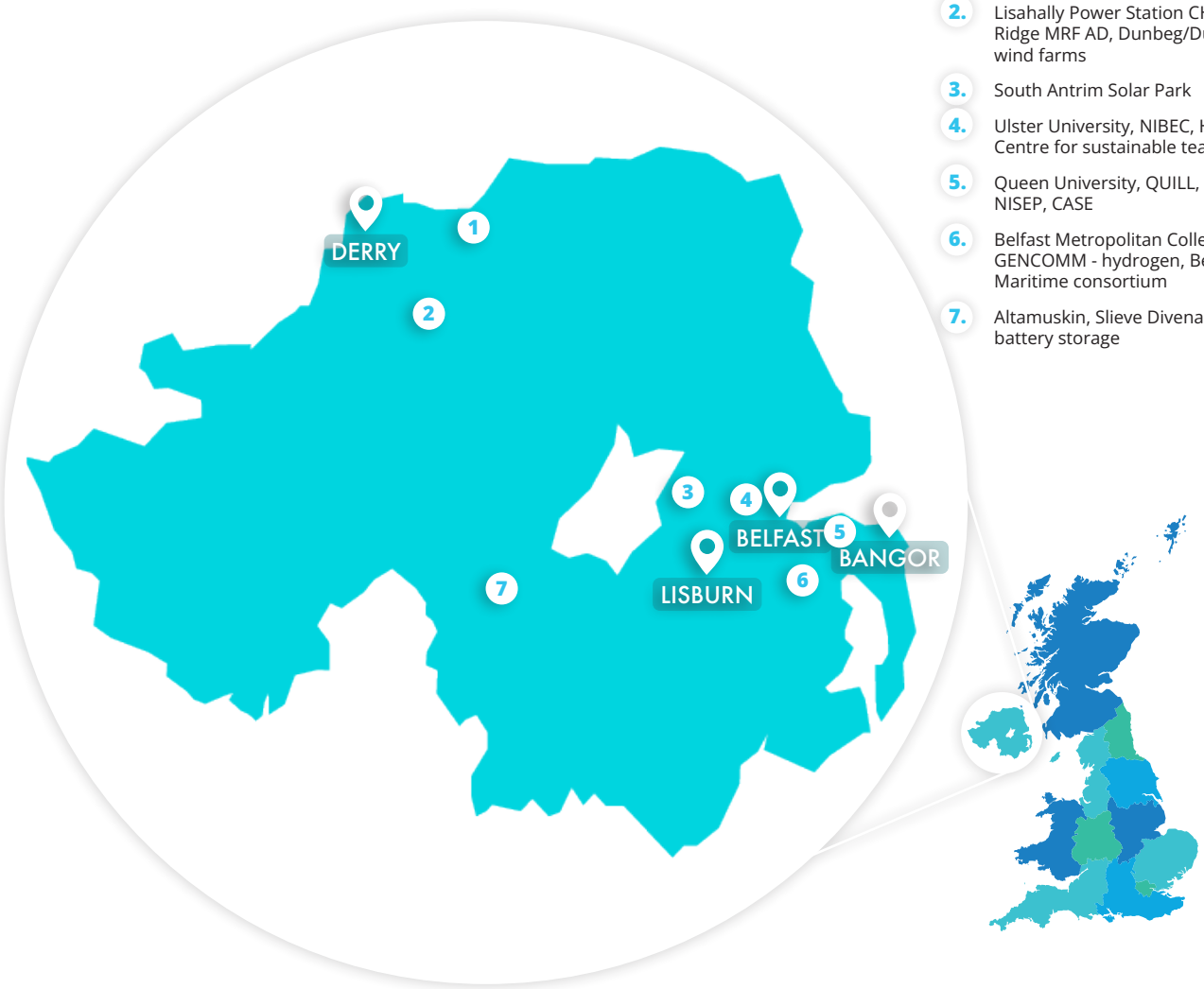
The wind industry and anaerobic digestion are relatively well-performing sectors, with wind making up half of Northern Ireland's total renewable energy market value.

However, with the right support, the rate of increase in Northern Ireland could be greater than other areas, and there could be a near doubling of total investment by 2035.

£423M

WIND ENERGY CONTRIBUTES HALF OF THE RENEWABLE ENERGY MARKET VALUE IN NORTHERN IRELAND

1. Nomadic Offshore Wind - Floating wind turbines
2. Lisahally Power Station CHP, River Ridge MRF AD, Dunbeg/Dunmore wind farms
3. South Antrim Solar Park
4. Ulster University, NIBEC, Hydrogen, Centre for sustainable teachnologies
5. Queen University, QUILL, ISOALKYL, NISEP, CASE
6. Belfast Metropolitan College GENCOMM - hydrogen, Belfest Maritime consortium
7. Altamuskin, Slieve Divena - Wind and battery storage



Northern Ireland						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	420	635	51.19	61	137	124.59
Biomass	866	1018	17.55	120	176	46.67
Bioenergy (inc EfW)	970	1359	40.10	152	340	123.68
Hydro	340	386	13.53	30	38	26.67
Combined Solar	431	434	0.70	42	47	11.90
Wind Energy	2678	3690	37.79	423	819	93.62
Wave and Tidal	31	43	38.71	5	9	80.00
Energy Storage	120	983	719.17	16	115	618.75
Total	**5856**	**8548**	**45.97**	**849**	**1681**	**98.00**

SCOTLAND 2035

The renewable energy industry's market value in Scotland is significant, and is one of only four regions and nations in the UK where it is greater than £2 billion.

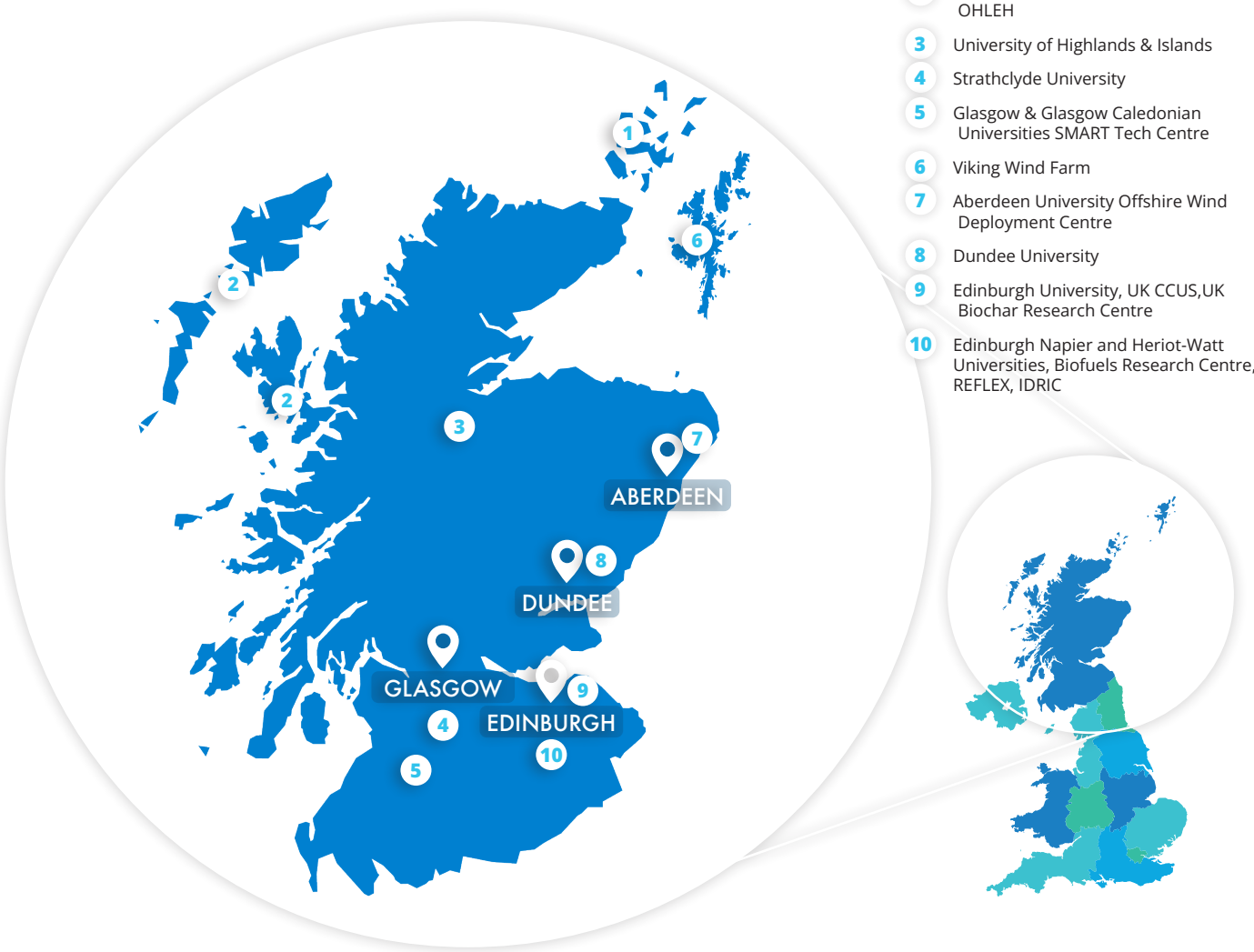
The wind industry is a prominent driver, supporting nearly 5,000 jobs and over £900 million in market value.

Biomass, wave and tidal are other sectors of real note, proportionally providing more than 10% of the UK's employment and market value in these areas.

£2BN

THE MARKET VALUE OF THE RENEWABLE ENERGY INDUSTRY IN SCOTLAND.

1. European Marine Energy Centre green hydrogen, Community Energy Scotland
2. Western Isles Micro-turbines CREEL, OHLEH
3. University of Highlands & Islands
4. Strathclyde University
5. Glasgow & Glasgow Caledonian Universities SMART Tech Centre
6. Viking Wind Farm
7. Aberdeen University Offshire Wind Deployment Centre
8. Dundee University
9. Edinburgh University, UK CCUS,UK Biochar Research Centre
10. Edinburgh Napier and Heriot-Watt Universities, Biofuels Research Centre, REFLEX, IDRIC



Scotland						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	512	775	51.37	88	197	123.86
Biomass	3136	3716	18.49	504	726	44.05
Bioenergy (inc EfW)	1805	2500	38.50	310	711	129.35
Hydro	373	424	13.67	42	54	28.57
Combined Solar	806	743	-7.82	86	100	16.28
Wind Energy	4942	6813	37.86	918	1774	93.25
Wave and Tidal	93	132	41.94	17	33	94.12
Energy Storage	245	2004	717.96	37	270	629.73
Total	**11912**	**17107**	**43.61**	**2002**	**3865**	**93.06**

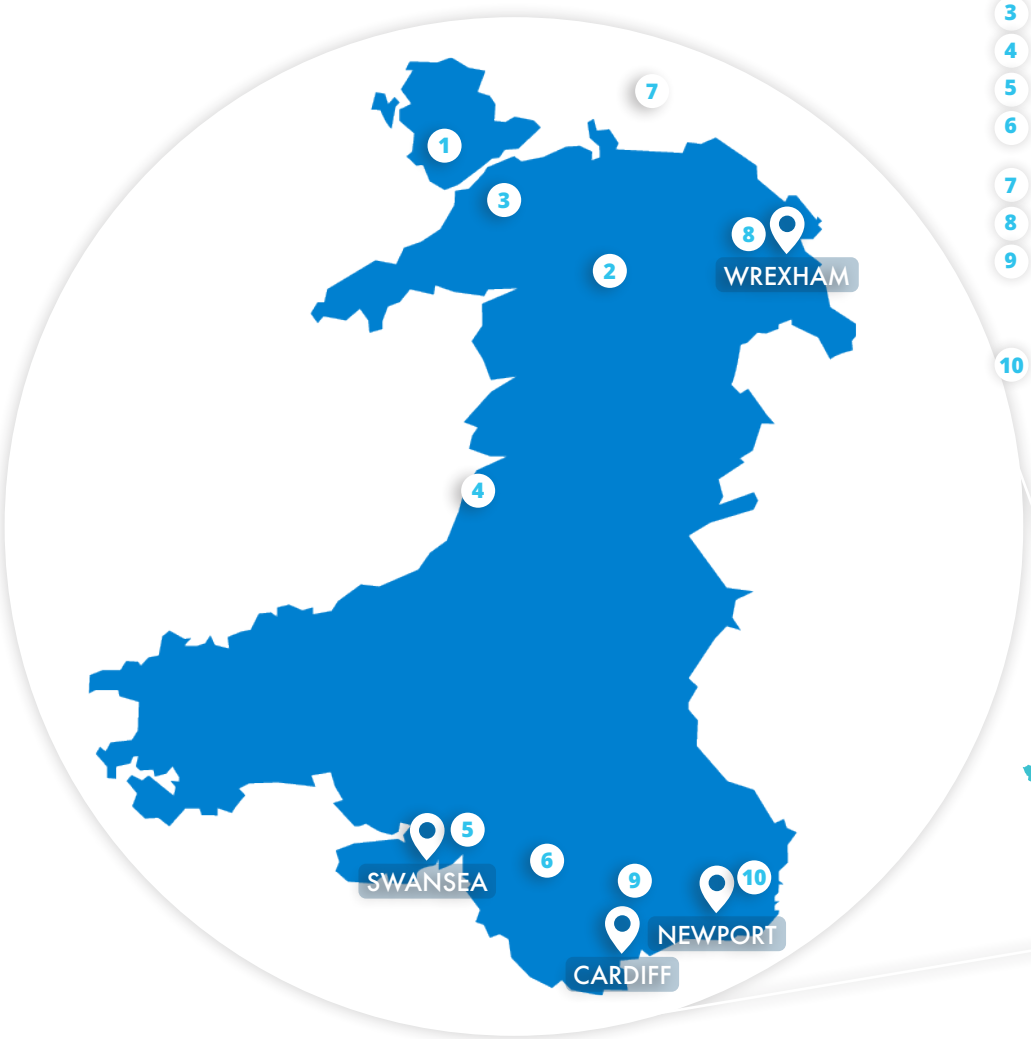
WALES 2035

Similarly to Northern Ireland, Wales' renewable energy employment numbers and market value compares unfavourably to other parts of the UK.

Indeed, the future market value in Wales is of particular concern. Although the current £911m figure is set to rise to £1.7bn by 2035, the rate of increase will be smaller than every other region and nation outside Greater London. That means, proportionally, Wales' renewable energy market value national share will drop below 4%.

1,045

WALES WILL SUPPORT MORE THAN 1,000 JOBS IN ENERGY STORAGE BY 2035.



1. Anglesey Biomass Power Station
2. Llyn Celyn hydro
3. Bangor University
4. Aberystwyth University IBERS
5. Swansea University SPECIFIC
6. Margam biomass, Hirwaun, Trident Park EFW
7. Rhyl Flats, Gwynt y Mor - ofshore wind
8. Wrexham Glyndwr University
9. Cardiff and Cardiff Metropolitan University Turnbine testing and lightning labs BRE Centre for Sustainable Construction
10. Llyanwern Solar / Battery Storage

Wales						
Renewable Energy sector	**FTE 2021**	**FTE 2035**	**Increase (%)**	**Market Value 2021**	**Market Value 2035**	**Increase (%)**
Heat pumps (Air and Ground Source)	563	853	51.51	88	197	123.86
Biomass	1358	1583	16.57	204	293	43.63
Bioenergy (inc EfW)	823	1175	42.77	113	270	138.94
Hydro	245	279	13.88	24	31	29.17
Combined Solar	879	832	-5.35	95	95	0.00
Wind Energy	2130	2934	37.75	360	696	93.33
Wave and Tidal	57	81	42.11	10	20	100.00
Energy Storage	128	1045	716.41	17	124	629.41
Total	**6183**	**8782**	**42.03**	**911**	**1726**	**89.46**

Energy Transition Readiness Index 2022

Introduction

In November 2019, the Association for Renewable Energy & Clean Technology (REA) published the first Energy Transition Readiness Index (ETRI), and the second report in 2021, showing the market progression under the effect of the Covid-19 pandemic.

Both reports assessed the readiness of selected European electricity markets for the energy transition, from the perspective of investors in flexibility services that support the deployment of renewable power and decarbonisation.

The reports were based on analysis of published flexibility data supported by a survey of relevant industry stakeholders for the three areas listed below:

- Socio-political support for the energy transition;
- Ability to exploit new technologies and business models;
- Open market access for flexibility services.

The ETRI 2022 study will build on the first two versions of ETRI with the following key updates:

1. Expanding to 13 European countries: Netherlands, Finland, Sweden, Denmark, Ireland, Norway, Germany, UK (GB), France, Ireland, Italy, Spain and Poland.
2. Improved quantitative data where available including demand-side data on EV and data centres, and flexibility market data.
3. A deep dive example for the UK to demonstrate flexibility market growth. The deep dive will be an individual annex which can be used with or without the report. A further deep dive into another country is expected to be included once identified during the course of the analysis.
4. The survey questions will mostly stay the same, however we will be seeking further information in the policy section to address the energy crisis.
5. A comparison with prior years will be provided, showing for example how ambition has changed over the years, or if there is any change because due to the current energy crisis.
6. Where possible, we will seek to identify monetary benefits from flexibility market developments.

As for the past reports, the assessment and scoring will be based on a survey of relevant stakeholders across the different countries/regions selected, followed up by one-to-one interviews to understand the underlying reasons for responses. The study will include identifying examples of best practices across the three scoring categories.

Without 'naming and shaming', the report will clearly compare and contrast examples of regulations and policies that appear to be curtailing the private investment needed to develop smart and flexible energy systems.

The resulting paper is targeted at regulators and policymakers in the countries and regions covered by the report and will again be written from the perspective of current and prospective private investors in grid stabilisation and flexibility services that supports the further deployment of renewable power and clean technology systems - both at large and small scale.

The overall goal will be to provide perspectives (from around the world) and guidance to help shape smart regulation and policy to match best practices, thus supporting the development of deep and vibrant flexibility markets in as many countries as possible.

ETRI 2022 ranks the following countries:

DENMARK, FINLAND, FRANCE, GERMANY, ITALY, IRELAND, NETHERLANDS, NORWAY, POLAND, SPAIN, SWEDEN, SWITZERLAND, AND THE UK

Methodology

Deployment (Data & Growth Projections)

The intention of this report is to present the latest data from authoritative sources on renewable energy generation, renewable transport usage, and organic waste recycling, accompanied by qualitative analysis of trends, driving market and policy factors, and progress against targets for the UK renewable energy and clean technology as set out in the REA Strategy.

The Deployment section is divided into five sections: a summary section which tracks overall sectoral progress, and considers the UK's failures and successes in meeting Renewable Energy Directive (RED) targets, set in 2009 by the UK and the European Commission, for the UK market in 2020.

Four further sections which explore deployment data for each constituent technology of the four REA pillars (Power & Flexibility, Heat & Cooling, Transport, and Circular Bioresources). Unless otherwise stated, all data is annual and at the UK level.

Summary

The summary section measures progress against the REA Strategy targets. A detailed description of the targets, and a brief description of the methodology by which they are calculated and justified, can be found in the REA Strategy Executive Summary document.

All summary data is sourced from the Digest of UK Energy Statistics, chapter 6, subsection 5. Power & Flexibility progress is based on the percentage of electricity generated from renewable energy sources. Heat & Cooling progress is based on the percentage of heat generated from renewable energy sources.

Transport progress is based on the percentage of energy consumed for transport usage sources from renewable energy.

This year, to mark the final year of the RED targets, a small summary of the REA's final progress was included.

Figures cited are sourced from the Digest of UK Energy Statistics report 2021, chapter 6, and from data published by Eurostat, the European Office of Statistics, part of the European Commission.

Power & Flexibility

Power & Flexibility data focuses on renewable electricity generation, and is sourced from Energy Trends (ET), chapter 6, subsection 1. ET is a quarterly report on the supply and demand of all major energy sources in the UK, published by the Department for Business, Energy, and Industrial Strategy (BEIS).

Heat & Cooling

Heat & Cooling data focuses on renewable fuel used to generate heat, and is sourced primarily from the Digest of UK Energy Statistics (DUKES), chapter 6, subsection 5, published by BEIS. Most of the data is self-explanatory.

The exception concerns grid-injected gasses, specifically biogas from anaerobic digestion and sewage gas. Once these biogases are injected into the grid, they are blended with other gases, including conventional natural gas.

As a result, it is impossible to accurately confirm the proportion of grid-injected biogas used for heat generation as opposed to electricity generation.

This figure is significant, as the only heat generation from biogas otherwise included in DUKES would be on-site generation.

REview uses annual factors from DUKES chapter 4, subsection 2, on the fraction of the gas grid used for heating, thereby assuming that biogas is evenly mixed across the entirety of the gas grid, and sums the product of grid-injected biogas and the annual gas grid heating factors to the biogas heat generation figures.

Transport

The transport section covers three considerably different technologies: zero-emission vehicles (ZEVs), Electric Vehicle (EV) chargepoints, and renewable transport fuels (RTFs).

ZEV data considers the number of new registrations per year of Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FECV, Hydrogen). Market shares are the sum of new registrations as a percentage of total new road vehicle registrations. Data is sourced from VEH 1153, a vehicle registration dataset published by the Department for Transport (DfT).

EV chargepoint data considers the total number of devices active in the UK, and the total number of rapid devices active in the UK. Data is sourced from

EV charging device statistics, recompiled quarterly by DfT, in turn sourced from Zap-Map. The overall trends are based on summed totals from all local authorities, on the last publication of each calendar year (October). The heat map of chargepoints in the UK is broken down geographically by local authority for the latest month of data.

RTF data comes from two sources. The first, covering just the two largest biofuels by volume (bioethanol and biodiesel), is sourced from ET chapter 6, subsection 2, published by DfT, and covers the annual consumption of biofuels in million litres.

The second is data published under the Renewable Transport Fuels Obligation (RTFO). RTFO data is published in five provisional reports and one final report over the course of the calendar year.

This means that in the latest data published, the fourth provisional report, in this case for 2021, the total volume of fuels certified under the RTFO have not been reported.

This is why REview looks at all RTFs as a percentage of total RTF volumes certified under the RTFO each year. By assuming that there is no bias between fuel types for when in the calendar year they report their volumes, the latest data (2021) can be considered in the report. RTFs considered individually are those which constitute at least 1% of total certified RTFs; the remaining RTFs are grouped together.

Circular Bioresources

Data on Circular Bioresources comes from a number of sources: ENV23, a dataset published annually by the Department for Environment, Food, and Rural Affairs (DEFRA); publicly available data published in the Compost Certification Scheme (CCS) and Biofertiliser Certification Scheme (BCS) annual report, published by Renewable Energy Assurance Ltd. (REAL); and the Waste Data Interrogator (WDI), published by the Environment Agency (EA).
Figures from ENV23 are unchanged.

Figures from the CCS & BCS Annual Report are aggregated across the four regions of the UK. It is assumed, based on a figure from a BCS report, that the volume of digestate output by certified anaerobic digestate sites is equal to 85% of the volume of throughput processed by sites.

Figures from the WDI are for England only. The REA has summed volumes of wastes received by specified permitted sites, grouped according to either composting or anaerobic digestion, and by the type of wastes received. The same process is repeated for wastes removed from the list of permitted sites, focusing on identifying the volumes of off-specification compost and digestate removed, and the volumes of contaminants removed. Contamination rates are measured as the volume of contaminants for each technology divided by the total feedstocks received.

The different groupings of wastes received and wastes removed are groups of European Waste Catalogue (EWC) codes, the groups being defined by the REA.

While a full table of EWC codes under each grouping can be provided upon request, it is worth noting that “other” wastes are defined as all waste codes not otherwise included in another group; and that contaminants includes wastes other than plastic, such as certain types of glass, metals, hazardous substances, oils, and healthcare waste.

Innovas Solutions Ltd – Methodology for Forecasting and Renewable Energy Soft Market Intelligence

Forecasting - The standard forecasting is based on a combination of:

- Historical trend analysis of actual figures with previous forecasts to assess accuracy from the data sources;
- Confirmed planned deployments of renewable energy technologies;
- Planned and speculative deployments of renewable energy technologies;
- Government policies and environmental targets;
- Analysis of future global markets based on environmental targets;
- Technology assessment i.e. solar thermal being partially replaced by heat pump technology.

Forecasting against Bloomsberg's scenarios is easier as there are historical figures and case studies for the construction, manufacturing, installation, servicing and maintenance of the various technology areas.

This is augmented by sense checking with current specialists in the various technology areas. These can be used to accurately forecast the cost and employment levels of specific technologies against specific deployment levels with a high degree of accuracy. Employment forecasts don't take into account displacement from other industry sectors.

The list of planned and potential renewable energy deployments and research/academic strengths in a region was augmented from various sources including trade associations, UK government/ regional strategy documents, regional net zero carbon support programmes, online renewable energy focused websites that collate information, UK government and general internet searches.

With our partners Innovas, we have highlighted some of the key projects and centres of excellence that are in the pipeline in every nation and region of the UK.

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Abbreviations

AD	Anaerobic Digestion
B7	7% Biodiesel blend
BEIS	Department for Business, Energy and Industrial Strategy
BEV	Battery Electric Vehicle
CBR	Circular Bioresources
CCC	Climate Change Committee
CfD	Contract for Difference
COP26	The 2021 United National Climate Change Conference, and the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change
DECC	Department for Energy and Climate Change (now Department for Business, Energy and Industrial Strategy)
E5 / E10	5%/10% Bioethanol blend in standard petrol supplies
ECO	Energy Company Obligations
EfW	Energy from Waste, such plants generate energy using waste as a feedstock
EIS	Enterprise Investment Scheme
ETRI	The Energy Transition Readiness Index
EU	European Union
EV	Electric Vehicle, being an electric rather than Internal Combustion Engine, powered vehicle
EWP	Energy White Paper
FTE	Full Time Equivalent (numbers of people employed)
GHG	Green Homes Grant
GWh	Gigawatt Hour
HBS	Heat and Buildings Strategy
HGV	Heavy Goods Vehicle
IBA metals	Incinerator Bottom Ash metals
KPI	Key Performance Indicator
LCF	Levy Control Framework
MBT	Mechanical Biological Treatment
MWh	Megawatt Hour
NHS	National Health Service
NREAP	National Renewable Energy Action Plan: a series of projections from the mid 2010s
Ofgem	Office of Gas and Electricity Markets
R&D	Research and Development
REA	Association for Renewable Energy and Clean Technology
RED	EU Renewable Energy Directive, forming the UK's historic 2020 renewable energy targets when part of the EU
RHI	Renewable Heat Incentive
RO	Renewables Obligation
Solar PV	Solar Photovoltaic
UEP	Updated Energy Projections (published by the then Department for Energy and Climate Change)
ULEV	Ultra Low Emission Vehicle
VAT	Value Added Tax
WFD	Waste Framework Directive
WRAP	Waste & Resources Action Programme

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Acknowledgements

Special thanks are due to those who lead on the delivery of REview22.

These include:

Jack Abbott
PR and Commuications Manager

Stan Fielding
Policy Analyst

Frank Gordon
Director of Policy

Mark Sommerfeld
Head of Power and Flexibility

Dr Nina Skorupska CBE
Chief Executive

Thank you to all members of the REA team who also contributed to REview22, in particular Jenny Grant, Jacob Roberts, Dr Kiara Zennaro. Thank you also to our partners Drax, EY and Eden Geothermal to contributed significantly to the report.

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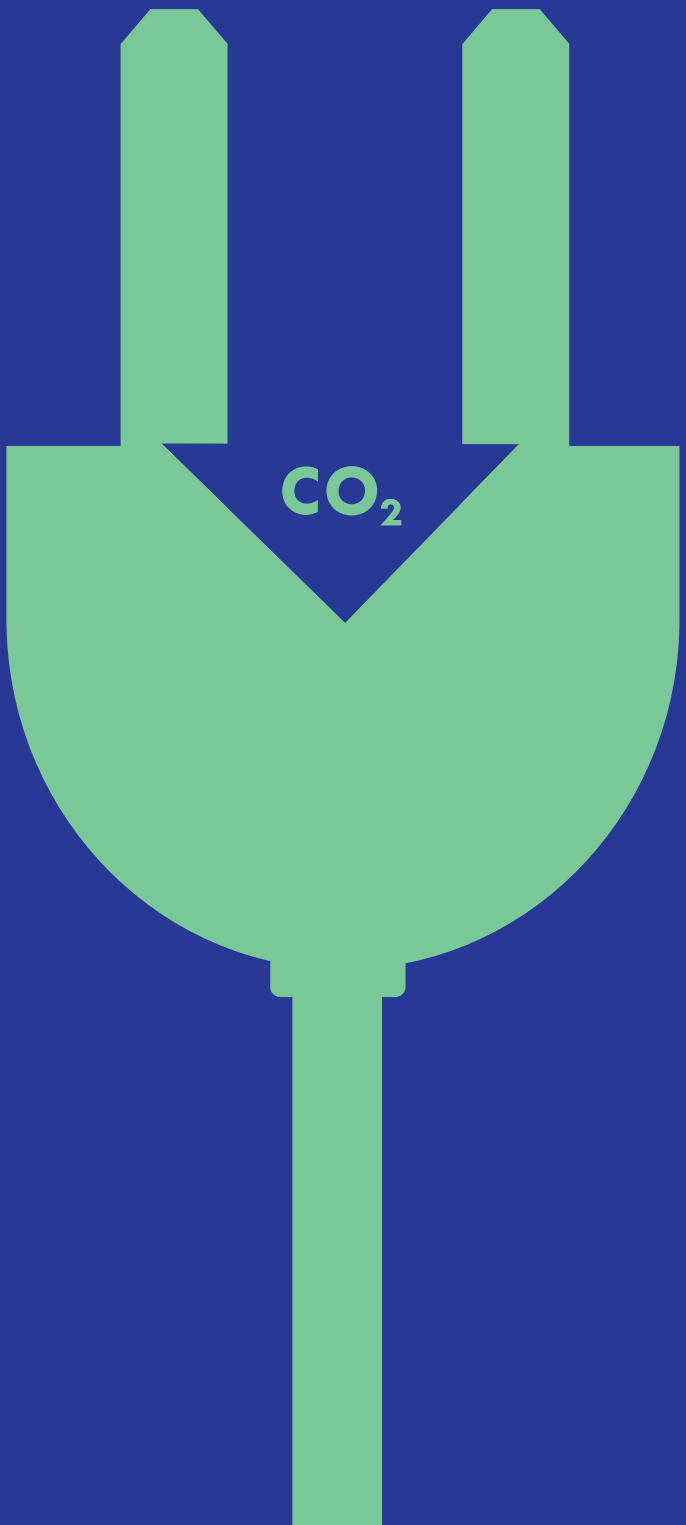

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