NORFOLK AND SUFFOLK WIDER GREEN SKILLS ANALYSIS

JULY 2023

WRITTEN BY GEMSERV

TABLE OF CONTENTS

AUTHORS

JON REGNART-RUSSELL

Senior Consultant

jon.regnart-russell@gemserv.com

MEGAN HULME

Policy and Insight Analyst

megan.hulme@gemserv.com

ANNA QUINCEY

Economic Analyst

anna.quincey@gemserv.com

MATT RUDD

Policy and Insight Analyst

matthew.rudd@gemserv.com

JASMINE CROAD

Policy and Insight Analyst

jasmine.croad@gemserv.com

ACKNOWLEDGEMENTS

With thanks to the businesses, training providers and local authority representatives who offered their time and expertise to support us with our research. Without your insight, this report would not have been possible.

EXECUTIVE SUMMARY

Ensuring the UK's energy system transitions smoothly to a net zero compliant system is one of the highest priorities for both national and local governments. Despite energy generation technologies such as wind turbines, solar arrays and energy storage being national assets, a local skills base is needed to deliver these vital pieces of infrastructure. Therefore, local councils such as Norfolk and Suffolk are in a prime position to help national government achieve long term decarbonisation goals by cultivating the next generation of workers.

In fact, given their unique insight, councils are well placed to grow the green skills their communities need. The *Independent Review of Net Zero* led by Chris Skidmore MP reinforced this view, urging the UK government to publish an action plan for Net Zero skills that includes a comprehensive roadmap of when, where, and in which sectors there will be skills needs specific to net zero. To achieve this, this report underlined the need to swiftly develop robust regional green jobs statistics.

This report comprises of a detailed forecast of future green job across Norfolk and Suffolk alongside a local skills gap assessment and review of local training provision. The report concludes with a set of tangible recommendations grouped into five broad themes that provide a steer on how Norfolk and Suffolk can facilitate the growth of green skills in the area. Aimed at the wider green skills base, this Phase two report complements the previous Phase One retrofit report and comprehensively analyses the green skills requirement across energy generation, hydrogen, EV charging and energy storage.

For each section, a forecast of generation capacity by local authority is provided to underscore the scale of deployment needed to achieve net zero across Norfolk and Suffolk. The total number of jobs needed to achieve these deployment figures are then modelled using two net zero scenarios for 2030 and a business-as-usual net zero to 2050. The analysis then quantifies the types of green jobs based on the three stages of the project life cycle: construction and installation, maintenance and operations and decommissioning. A high-level overview of the results of the analysis are discussed below.

As **Figure 1** and **Figure 2** show, the current installed capacity of low carbon technologies is well below what's needed for a net zero compliant economy. It is however worth highlighting that Norfolk and Suffolk's current offshore wind capacity is just under 3GW, which makes the region one of the largest contributors to the UK's offshore wind generation capacity.

Figure 1 - Norfolk assumed capacity changes from the baseline to net zero[1]

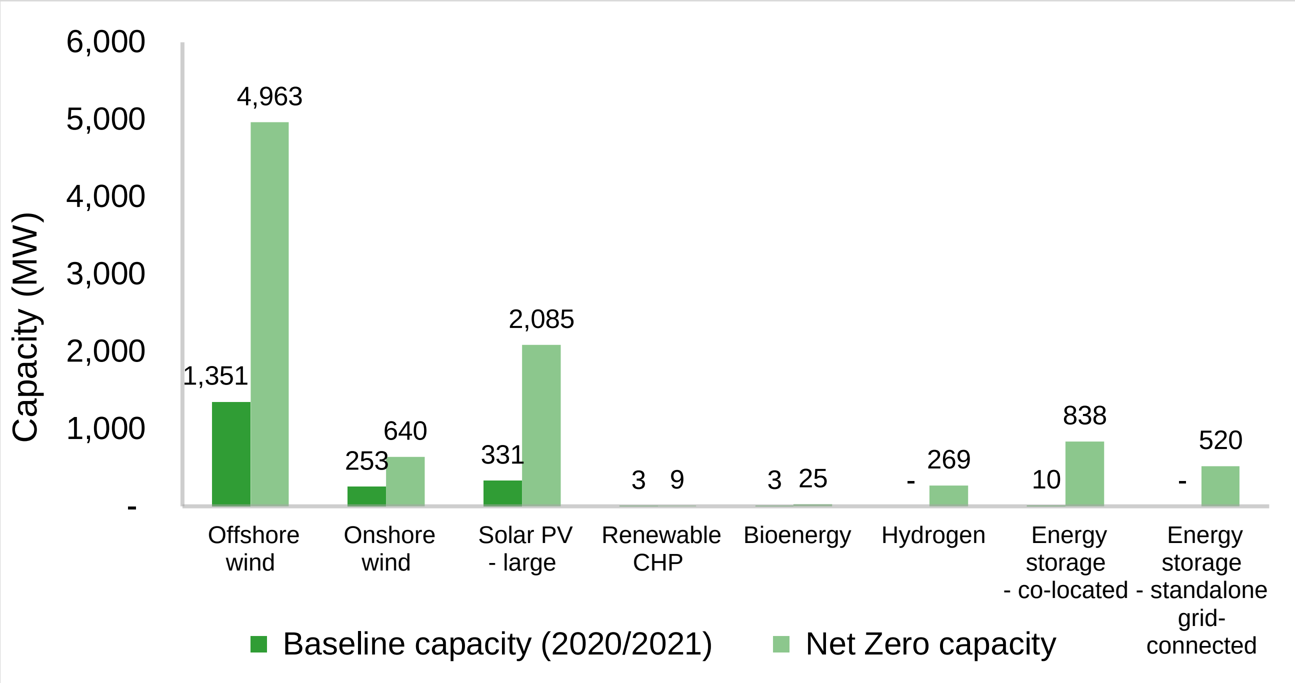
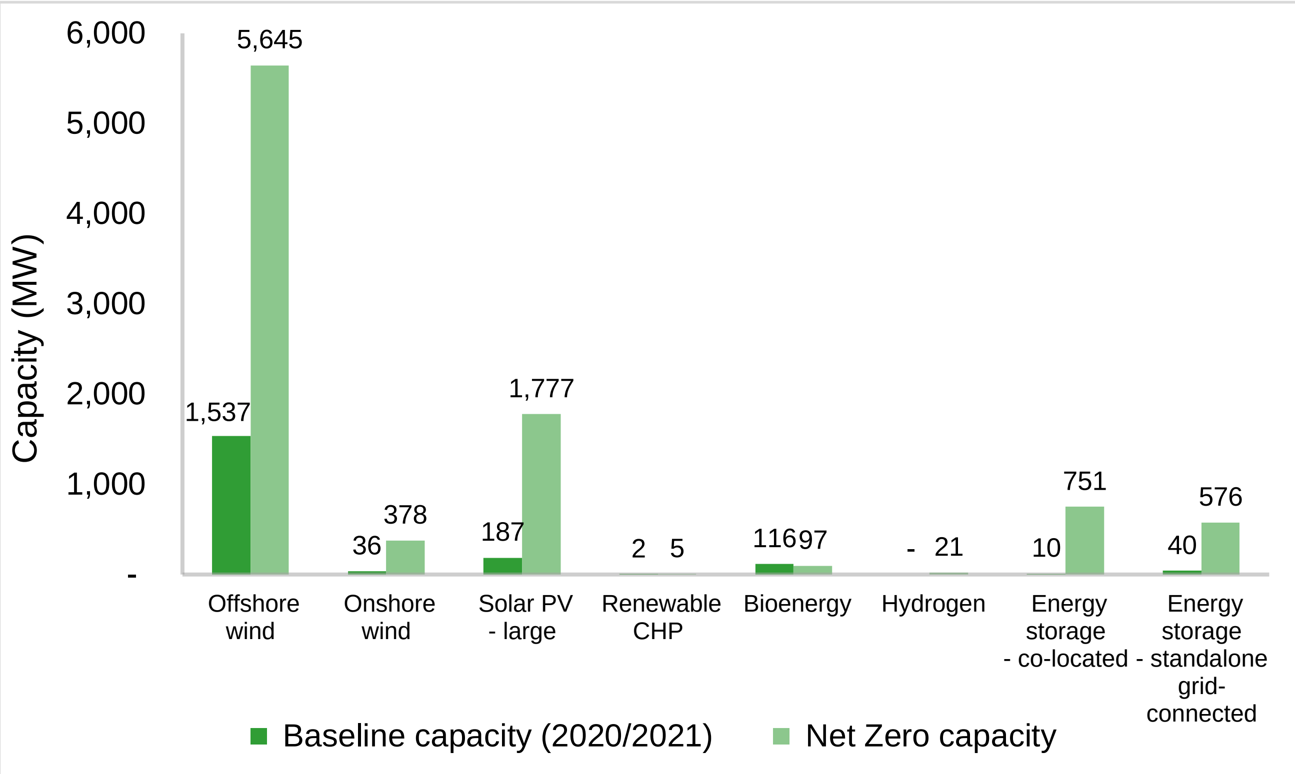


Figure 2: Suffolk assumed capacity changes from the baseline to net zero[2]



---

[1] Estimated using National Grid Future Energy Scenarios, Distribution Future Energy Scenarios, government data for renewables generation, projected CCC Balanced Pathway capacities and ONS Low Carbon and Renewable Energy Economy regional employment estimates.

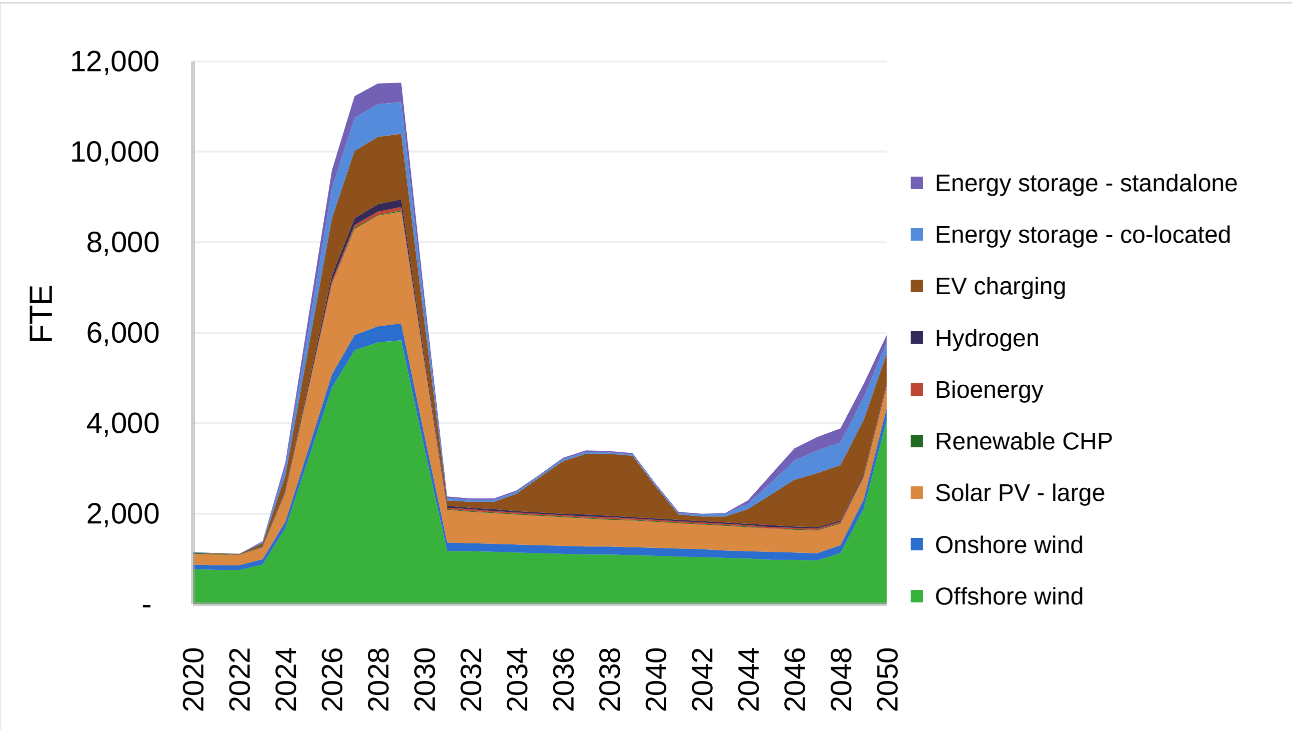
[2] Estimated using National Grid Future Energy Scenarios, Distribution Future Energy Scenarios, government data for renewables generation, projected CCC Balanced Pathway capacities and ONS Low Carbon and Renewable Energy Economy regional employment estimates.

Looking at future projections of other technologies, the picture for Norfolk and Suffolk looks rather similar. For example, both regions are expected to require massive increases in large solar installations (above 150kW), with Norfolk needing 2.1GW and Suffolk needing 1.8GW. Another similarity is the prominent role of both co-located and stand-alone grid connected energy storage. Norfolk is expected to need around 1.4GW of energy storage capacity and Suffolk slightly less at 1.3GW of capacity. A notable difference between the regions is the more pronounced role for hydrogen in Norfolk, with almost 13 times more energy generated from hydrogen in Norfolk compared to Suffolk. There's also a reduced role for bioenergy in Suffolk's energy mix for Suffolk which is the only declining low carbon generation across both regions.

Based on these projected capacities and equivalent estimates for electric vehicle (EV) charging, Figure 3 and

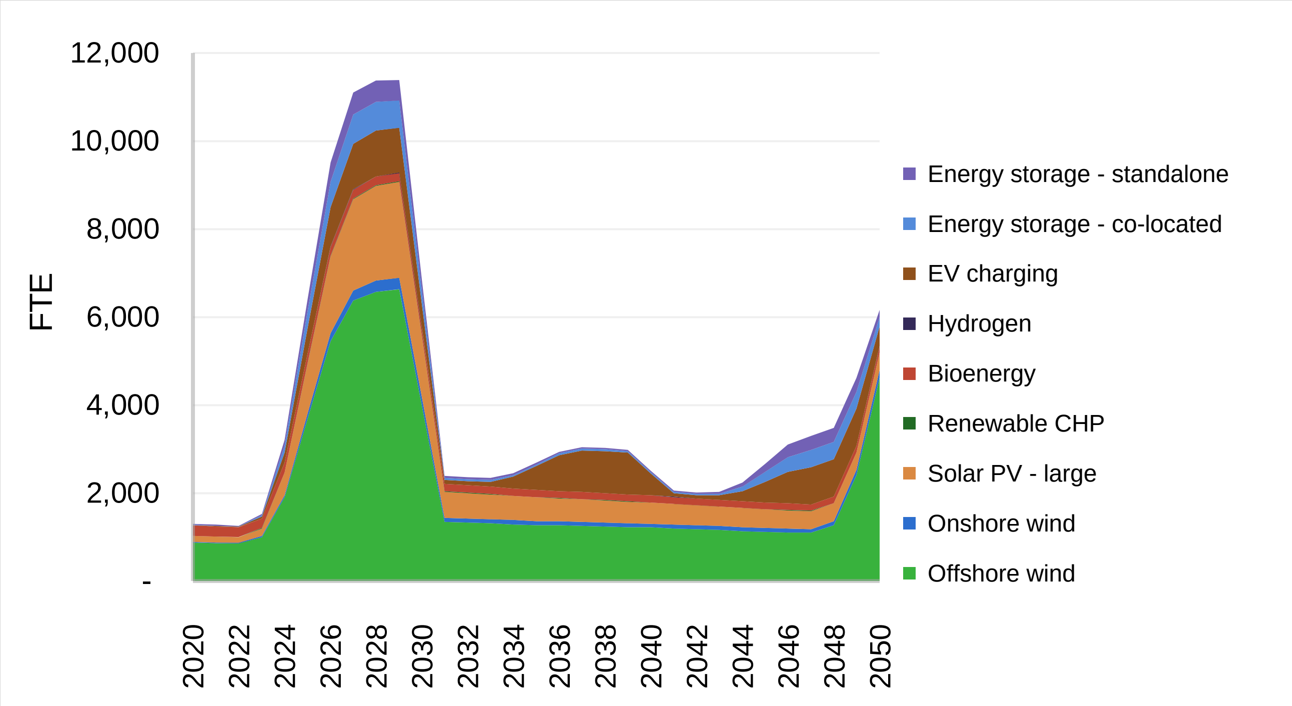
Figure 4 illustrate how this considerable ramp up in technology deployment translates into total jobs. The bulk of the jobs in Norfolk and Suffolk are projected to occur in offshore wind, with solar generation, EV charging and energy storage taking up the next most significant portions. Job creation requirements across other sectors are modest in comparison.

Figure 3: Total projections for green jobs in Norfolk under Net Zero 2030 gradual ramp up scenario[3]



[3] See Appendix 2 for the labour intensity data sources used.

Figure 4: Total projections for green jobs in Suffolk under Net Zero 2030 gradual ramp up scenario[4]



To give a deeper insight into the types of job activities that will occur across the project life cycle, Gemserv has segmented the job creation into three distinct categories: construction and installation, operation and maintenance and decommissioning (Figure 5 and **Figure 6**). In the gradual ramp up scenario, construction and installation jobs dominate from around 2023 to 2030 in both Norfolk and Suffolk with green jobs peaking at around 11,500 by 2029.

After the initial ramp up phase, there is a significant decline in the number of jobs required after 2030 as the jobs associated with operation and maintenance of assets are less labour intensive. In the mid-2030s there's a pronounced peak of jobs associated with the earlier installations of EV charging assets come to the end of their life and need replacing. This peak becomes more pronounced in the mid to late 2040s as offshore wind and energy storage assets need decommissioning and replacing. These peaks are less pronounced than in the ramp up phase due to assumed improvements in productivity and higher efficiency and power technologies reducing the number of installations.

[4] See Appendix 2 for the labour intensity data sources used.

Figure 5: Future job projections by job type in Norfolk under Net Zero 2030 gradual ramp up scenario[5]

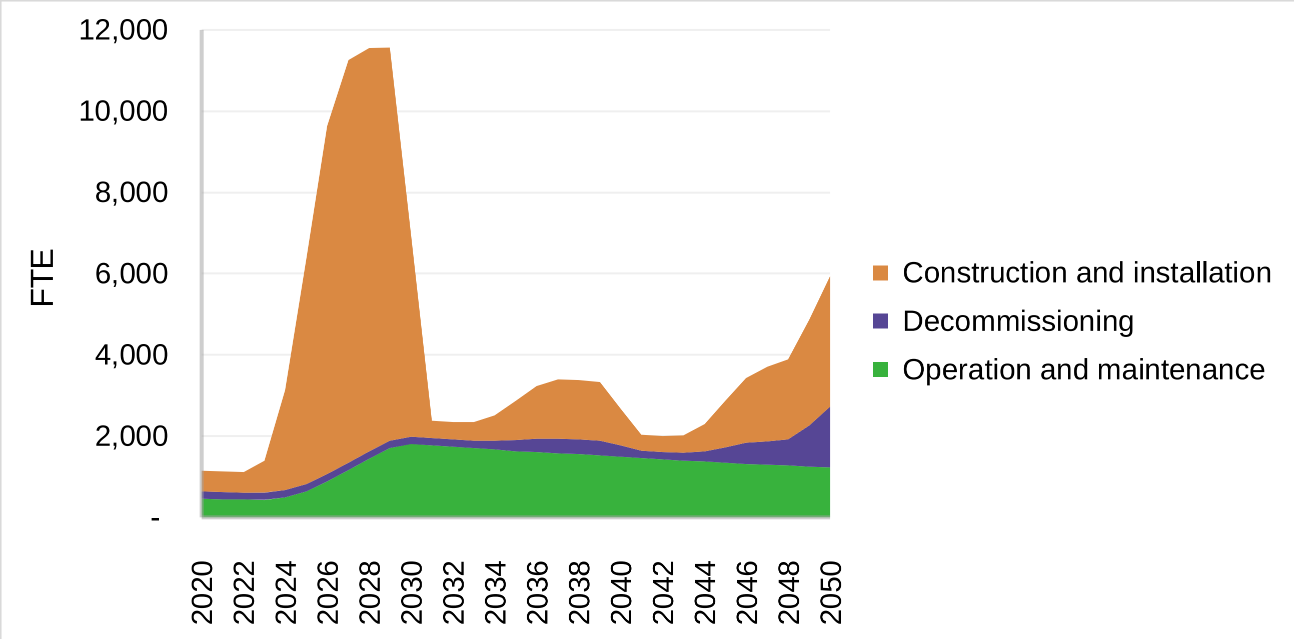
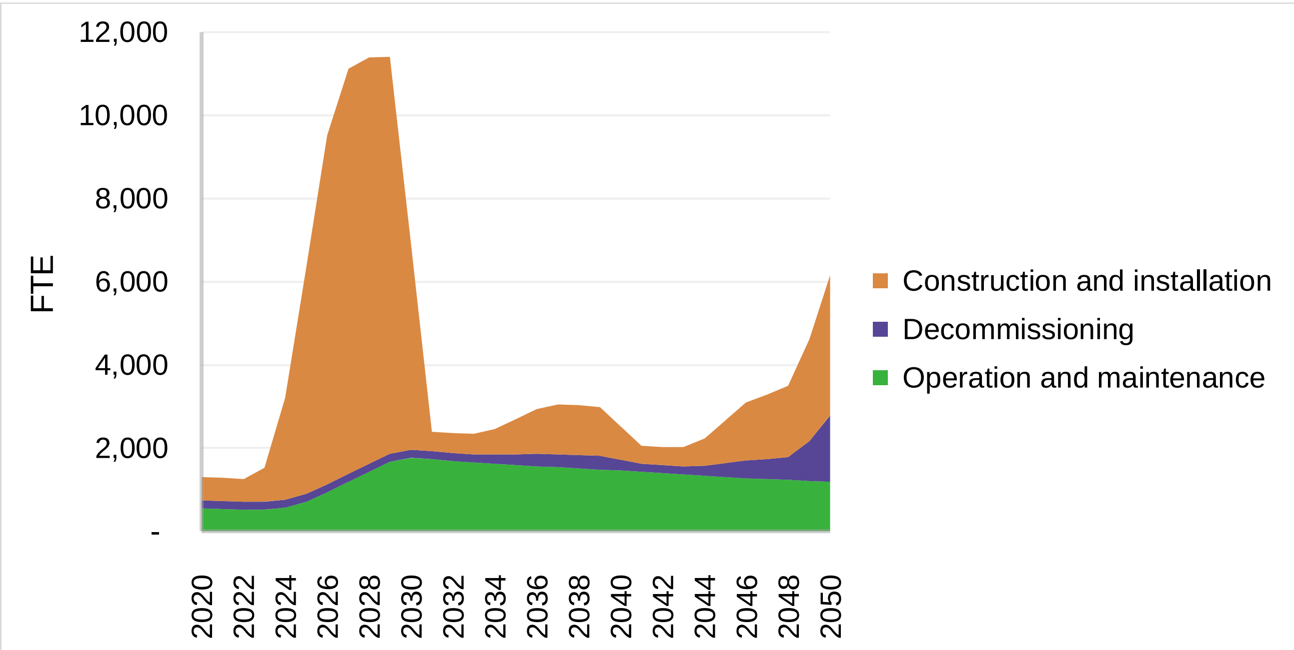


Figure 6: Future job projections by job type in Suffolk under Net Zero 2030 gradual ramp up scenario[6]



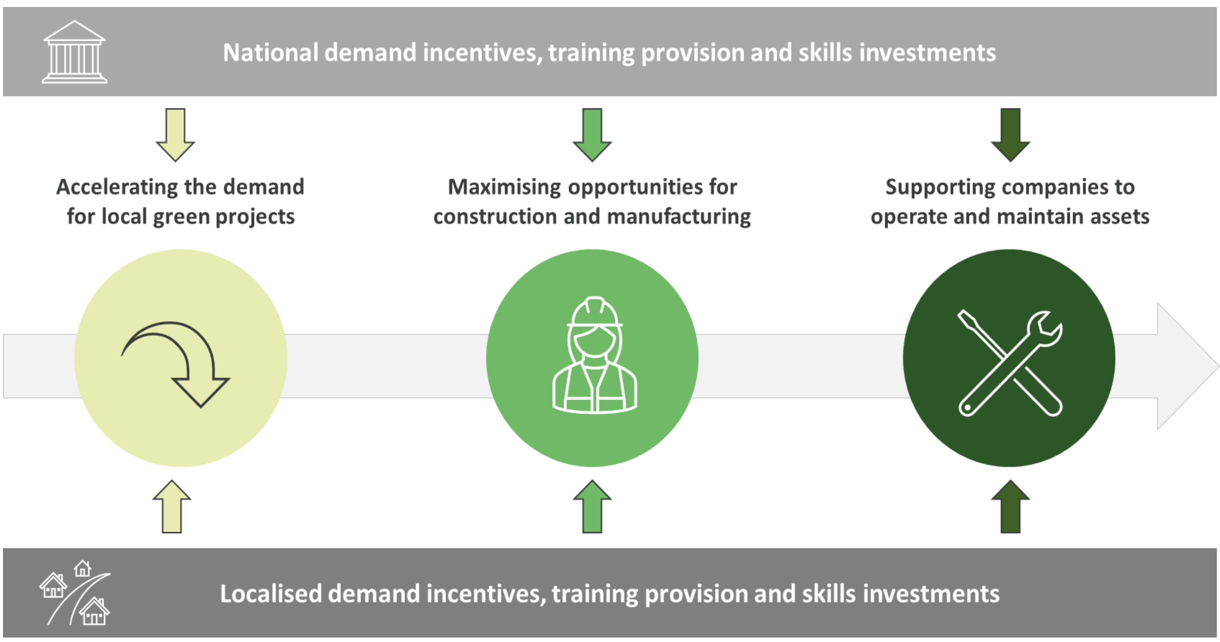
From the economic analysis a few salient points emerge:

[5] See Appendix 2 for the methodology different job types creation.
[6] See Appendix 2 for the methodology different job types creation.

- Offshore wind, Solar PV, EV charging and energy storage make up the majority of job creation potential across both Norfolk and Suffolk and are areas where both councils should work together to avoid competing for talent.
- There are slight differences between the types of jobs needed based on energy generation mix. Norfolk will utilise more hydrogen energy generation than Suffolk. It therefore makes sense for both councils to specialise training provision given these local nuances.
- Under a net zero by 2030 scenario, both Norfolk and Suffolk will experience intense demand for construction workers so addressing this gap immediately will be crucial in realising a net zero ambition. This is not taking into consideration the construction of Sizewell C which will create additional demands on the workforce and increase local competition.
- In the medium term, there will also be significant demand for maintenance and operation staff. While the labour intensity is lower for this activity, the number of sites and assets needing maintenance could become a challenge later.

Using the economic analysis and stakeholder interviews and surveys, a set of recommendations have been developed. **Figure 7** shows how the recommendations are cateogrised into five distinct areas, starting with incentivising demand, then maximising the opportunity for construction and manufacturing opportunities and moving to supporting the creation of local operation and maintenance roles. Influencing these key themes are top down national policies, created to stimulate demand and skills provision as well as local policies tailored to the specific requirements of Norfolk and Suffolk. A more detailed breakdown of the recommendations is provided in the tables below.

Figure 7: Schematic showing how the recommendations support the project life cycle.



Accelerating Green Projects

Activity Type: A = Local policy intervention; B =National policy delivered locally; C = brokering relationships; D = Encouraging others

Timeline: Short Term = 1 year; Medium term – 1-3 years; Long term 3 years +

RECOMMENDATIONS	POTENTIAL ACTIONS	TIMELINE	PARTNERS	ACTIVITY TYPE
Providing access to demand and supply side subsidies for local businesses to adopt green technologies.	Introduce council-administered subsidies that are consistent across local authorities to create a level playing field.	Medium	Local authorities	A
	Signposting local companies to bid in for national subsidies, actively encouraging bids from local companies and supporting their ambitions to national government.	Short	Local businesses, DESNZ, local Chamber of Commerce	A, B and D
Helping businesses understand local planning and consenting frameworks to accelerate the deployment of low carbon technologies	Retain robust planning and consenting processes but support businesses to navigate through and meet requirements for solar, wind, hydrogen and energy storage projects.	Short	Local authorities, DEFRA, DESNZ	A
	Establish a regular dialogue between local authority consenting officers and local industry to provide an open forum for discussing issues.	Short	Local authorities, local businesses	C
	Feed into the National Policy Frameworks to help guide national policy makers on development and planning requirements for green projects, advocating for greater local powers over planning and consenting.	Medium / Long	DESNZ, Treasury, DLUHC	B and D
Norfolk and Suffolk Council taking an active lead in creating demand for local green projects.	Seed early demand by Norfolk and Suffolk Council co-investing in green projects with the private sector in areas such as energy storage, onshore wind development and solar farms.	Medium	Investors, community banks, local businesses	A and D
	Create a specific, green industries pitch deck for Norfolk and Suffolk that can be used to increase UK and foreign direct investment into the Norfolk and Suffolk region.	Short	Local authorities, DBT	B and D

Maximising Construction & Manufacturing

Activity Type: A = Local policy intervention; B =National policy delivered locally; C = brokering relationships; D = Encouraging others

Timeline: Short Term = 1 year; Medium term – 1-3 years; Long term 3 years +

RECOMMENDATIONS	POTENTIAL ACTIONS	TIMELINE	PARTNERS	ACTIVITY TYPE
Enabling a higher proportion of the local workforce help build and deliver local green projects	Enable large infrastructure project developers (wind, hydrogen, large scale solar) to feel comfortable in sharing job projections. This is to enable local demand for construction roles to be aggregated and communicated to local training providers.	Medium	Local businesses, training providers, local authorities	C
	Work with a cross section of stakeholders in the construction sector to understand the specific construction roles and skills needed across offshore wind, solar, hydrogen and energy storage. Understand the overlaps in timing, skill sets and job roles at a local level to see potential pinch points.	Short	ECITB / CITB, industry, DfE, training providers	C
	When awarding council infrastructure contracts, score more favourably those tenders that commit to hiring and developing the local skills base in construction skills that could benefit green projects.	Medium	Local businesses, training providers, local authorities	A
Incentivising local manufacturing based on regional strengths and opportunities provided by the creation of green projects	Provide a "transition advisory service" for local manufacturing businesses to understand how they can support the local green projects, understand their skills gaps, and hire / retrain accordingly.	Short	Local businesses, NAAME, East of England Energy Group, local authorities	A, C and D
	Establish a Norfolk and Suffolk supply chain portal where local manufacturers can promote their capabilities and project developers can request regional suppliers to drive up local content in projects.	Short	DESNZ, local authorities, local businesses	A
	Leverage the large demand from energy storage and local, high value vehicle production to position the region for a local battery mega-factory.	Medium	DESNZ, local businesses, NAAME	B and D

Support To Operate & Maintain Assets

Activity Type: A = Local policy intervention; B =National policy delivered locally; C = brokering relationships; D = Encouraging others

Timeline: Short Term = 1 year; Medium term – 1-3 years; Long term 3 years +

RECOMMENDATIONS	POTENTIAL ACTIONS	TIMELINE	PARTNERS	ACTIVITY TYPE
Encourage maintenance and operation staff to come from the local area	Encourage local green industries to form closer relationships with local training providers or link their national training facilities with a Norfolk or Suffolk college, university or private provider.	Medium	Training providers, local authorities	A, C and D
	Enable large infrastructure project developers (wind, hydrogen, large scale solar) to feel comfortable in sharing job projections. This is to enable local demand for skills to be aggregated and communicated to training providers.	Medium	Local businesses, training providers, local authorities	C
	Provide easier routes for those working in the oil and gas sector to transition into operation and maintenance roles for green industries.	Medium	Training providers, DfE,	A, B and D
	Stipulate that a % of the Community Fund spending for large green projects is invested into operator and maintenance training.	Short	Local businesses	D

National based intervention mechanisms

Activity Type: A = Local policy intervention; B =National policy delivered locally; C = brokering relationships; D = Encouraging others

Timeline: Short Term = 1 year; Medium term – 1-3 years; Long term 3 years +

RECOMMENDATIONS	POTENTIAL ACTIONS	TIMELINE	PARTNERS	ACTIVITY TYPE
Leveraging national training centres and development of courses to locally develop skills	Facilitate local training providers to establish closer ties to national centres of excellence (like UKBIC and WMG for energy storage or the BRE National Solar Centre)	Medium	Training providers (local and national)	C, D
	Monitor the national landscape on courses and occupational standards for emerging technology areas like batteries, alternative fuels, hydrogen and CCUS and incentivise local training providers to introduce the courses.	Long	Local authorities, training providers	D
Utilise national skills programmes and funding to enhance local skills provision	Prioritise green skills provision in bids for innovation and levelling up funding such as the UK Shared Prosperity Fund (UKSPF), Skills Bootcamps and the Strategic Development Fund.	Short	DLUHC, DESNZ, DfE, training providers	B
	To help skills development in the immediate term, apply for additional national skills funding to set up dedicated Solar Installation and Energy Storage Skills Bootcamps across Norfolk and Suffolk to increase the installer base.	Short	DLUHC, DESNZ, DfE, training providers	B

Local based intervention mechanisms

Activity Type: A = Local policy intervention; B =National policy delivered locally; C = brokering relationships; D = Encouraging others

Timeline: Short Term = 1 year; Medium term – 1-3 years; Long term 3 years +

RECOMMENDATIONS	POTENTIAL ACTIONS	TIMELINE	PARTNERS	ACTIVITY TYPE
Prioritise bringing through the next generation of green skilled workers, leveraging Norfolk's & Suffolk's network of colleges and universities	Promote a local "pool" of lecturers and teachers all training providers can access to help stagger training to ensure enough people are trained across multiple areas.	Medium	Council, colleges, local authorities	A
	Stipulate that companies awarded large council contracts for green projects must dedicate a certain amount of staff time to give training to local colleges and universities.	Medium	Training providers, local businesses	A
	Actively encourage more electrical engineers into local universities and identify, create, and promote more flexible electrical based apprenticeship that are relevant for solar, energy storage and the wind industry.	Medium	Universities, training providers	C & D
	More local provision of Level 2 and 3 courses for the manufacturing sector that directly supports the EV sector and the supply chains for wind, hydrogen, and other sectors.	Medium	Training providers	A & C
	Develop a low-carbon careers campaign to inspire and motivate people into low-carbon qualifications & training pathways. This can include marketing, information sharing, and careers guidance.	Short	Local authorities, schools, career charities	A or B
	Bringing industry and local colleges together to understand whether existing engineering, construction, and maintenance courses and apprenticeships suit the local industry needs. Regularly review these courses to ensure they align to local demand.	Short	Industry	C & D

Local based intervention mechanisms

Activity Type: A = Local policy intervention; B =National policy delivered locally; C = brokering relationships; D = Encouraging others

Timeline: Short Term = 1 year; Medium term – 1-3 years; Long term 3 years +

RECOMMENDATIONS	POTENTIAL ACTIONS	TIMELINE	PARTNERS	ACTIVITY TYPE
Using local powers and funding mechanisms to reskill the oil and gas workforce into green jobs	Ringfence a portion of Suffolk's Adult Education Budget to retrain the existing oil and gas workforce into offshore wind, given the large job creation potential in the region. Ensure a clear qualification route and interview opportunity with industry is made available on completion.	Medium	DfE, training providers, Council, local authorities	A
	Ringfence a portion of Norfolk's Adult Education Budget to retrain the existing oil and gas workforce into hydrogen and offshore wind, given the large job creation potential in the region. Ensure a clear qualification route and interview opportunity with industry is made available on completion.	Medium	DfE, training providers, Council, local authorities	A
Strengthen partnerships between local businesses and training providers to promote the creation of business led training provision.	Broker partnerships between large solar PV installers and operators and training providers to establish technology specific courses to upskill installers to improve installation quality.	Medium	Solar PV installer / operators, training providers	C & D
	Facilitate collaboration with EV charging point operators / manufacturers and local training centres to upskill local workforce and provide an accreditation pathway to being OZEV approved.	Medium	EV charge point manufacturers / installers, training providers, OZEV	C & D
	Encourage local onshore and offshore wind developers to strengthen ties with more local training providers. This can take the form of increasing the number of places at existing centres, building dedicated training facilities to train local operators and host more short courses for oil and gas workers to transition.	Short	Wind developers, training providers	C & D
	Encourage national energy storage companies to set up regional maintenance centres and training facilities the Norfolk and Suffolk area. Use these centres as a springboard to locally train energy storage installers.	Medium	Energy storage companies, training providers	C & D
	Norfolk and Suffolk Council should convene a quarterly "Energy Generation", "Mobility", "Alternative Fuels & Hydrogen" & "Energy Storage" action groups. These should include training providers, local authorities and industry.	Short	Training providers, industry, local authorities	A

Local based intervention mechanisms

Activity Type: A = Local policy intervention; B =National policy delivered locally; C = brokering relationships; D = Encouraging others

Timeline: Short Term = 1 year; Medium term – 1-3 years; Long term 3 years +

RECOMMENDATIONS	POTENTIAL ACTIONS	TIMELINE	PARTNERS	ACTIVITY TYPE
Incentivise innovative models of training either through hybrid online courses, shorter and part time courses or training provision via trade associations.	Increase the amount of dedicated short courses specifically focused at upskilling the oil and gas sector to transition to the offshore wind, hydrogen and CCS.	Medium	Training providers, local authorities, Council, installers	A or B
	Work with colleges and other training providers to accelerate the use of AI and online learning to maximise the use of face-to-face learning.	Long	Colleges, training providers, industry	D
	Increase the amount of alternative training provision either through a relevant trade association or local industry body.	Medium	Trade associations, industry bodies	D

OVERVIEW OF LOCAL GREEN SKILLS FUNDING AND POLICY INTERVENTIONS

Norfolk County Council and Suffolk County Council provide funding support for low carbon initiatives which protect, enhance and provide access to the natural environment and reduce carbon consumption for individual businesses in the area. The investments summarised in this section cover the wider green policy environment and associated skills. A full summary of the investments available in Norfolk and Suffolk can be found in Appendix 3.

LOCAL DEPLOYMENT INVESTMENTS

The New Anglia Local Enterprise Partnership (LEP) provided key funding programmes to support low carbon initiatives in Norfolk and Suffolk. The Business Transition to Net Zero Grant created by the New Anglia LEP was aimed at businesses with ambitions to reduce their carbon footprint and increase productivity[7]. Grants were available for businesses between £25k and £100k for projects that cost at least £125k, funding capital developments that improve business productivity, use clean/renewable energy and recycle goods/materials. The LEP also ran a Road to Net Zero Business Support Programme – a pilot project funded by the UK Community Renewal Fund, to provide businesses with support and grants on achieving net zero[8]. The LEP's Net Zero Demonstrator funded new local technologies and innovative ideas to solve public sector net zero challenges[9].

KEY FUNDING PROGRAMMES IN NORFOLK

Norfolk County Council was awarded funding as part of the Supply Chain Innovation for Offshore Renewable Energy (SCORE) as part of the South East LEP[10]. The funding programme is aimed at supporting Small to Medium Enterprises (SMEs) developing innovative technologies and processes in offshore renewable energy. Grants of £2,500 up to £50,000 were available to develop new products, processes and ideas for businesses who can demonstrate an economic benefit within Norfolk.

[7] New Anglia LEP. (N.D.). Business transition to net zero grant.
[8] New Anglia LEP. (N.D.). Road to net zero grants.
[9] Ibid.
[10] South East LEP. (2018). Supply chain innovation for offshore renewable energy (SCORE).

KEY FUNDING PROGRAMMES IN SUFFOLK

Suffolk County Council have a wide range of local key funding programmes that are aimed at funding green investments. These programmes include:

- West Suffolk Greener Business Grant – helping businesses reduce their energy use and save money through £1,000 grants to fund capital works[11].
- West Suffolk Solar – plans, fully funds, installs, manages and monitors solar installations for businesses through the Council[12].
- Suffolk Carbon Reduction Loan Scheme – loans are availale for SMEs up to £5,000 for work that demostrates carbon savings[13].
- Plug In Suffolk Scheme – fully funds the installation of electric vehicle chargers for businesses, or a daily fee of £1.99 (not funding the installation) with businesses keeping 90% of the charging revenue[14].
- Suffolk Climate Action Comminuty Match Fund – assists a wide range of groups to deliver community-based carbon reduction projects with 50% of the costs being funded[15].
- Suffolk Greener Homes 0% Loan Scheme – short and long-term loans of up to £5,000 to help homes install energy saving measures through accredited installers[16].
- Warm Homes Suffolk – homeowners, renters and landlords can apply for grants to fund energy efficiency measures to aid in reducing energy usage and bills[17].
- Solar Together Suffolk – homeowners and SMEs can register for this group-buying scheme for solar PV and battery systems to aid in carbon savings[18].

LOCAL SKILLS INVESTMENTS

Funding and support is available in Norfolk and Suffolk to assist in improving the local workforce in green skills. The New Anglia LEP provided support for green jobs and skills in Norfolk and Suffolk. As a Green Economy Pathfinder, the LEP utilised and invested in green economy expertise, taking what the LEP learnt and recommending to Government and national business how they can benefit from the approach[19]. An

[11] Carbon Charter. (2022). Greener business grant.
[12] Carbon Charter. (2022). Greener Suffolk business service.
[13] Carbon Charter. (2022). Suffolk carbon reduction loan scheme.
[14] Green Suffolk. (2021). Plug in Suffolk.
[15] Green Suffolk. (2021). Suffolk Climate Action Community Match Funder.
[16] Eastern Savings & Loans. (N.D.). Suffolk green loans.
[17] Warm Homes Suffolk. (N.D.) Warm Homes Suffolk.
[18] Solar Together. (N.D.) Solar Together.
[19] New Anglia LEP (N.D.). Green Economy Pathfinder.

example of this work is the Fabric First Institute, funded by the New Anglia Skills Deal Programme, provided by Norfolk County Council, Suffolk local authorities and the Skills Funding Agency[20]. The Institute trained tradespeople in specific energy efficiency construction skills, creating new green skills opportunities around local projects.

The New Anglia LEP provided a wide range of general skills funding that was available to both Norfolk and Suffolk. These include funding for skills bootcamps, apprenticeships, youth pledges, working with university graduates and through specific partners. A full detailed list of these funding programmes can be found in Appendix 3. The New Anglia LEP also had specific funding available for green skills, that included:

- Skills Bootcamps for Green Skills – part of the Government's Lifetime Skills Guarantee for adults aged 19 or over to develop green qualifications at Level 3 standard or above. Qualifications are available in retrofitting and coordination, plus fast-tracking to arboriculture and agriculture[21].
- Skills Sector Plans (Energy & Clean Energy) – the LEP and sector partners work to develop skills plans to increase growth and employment within specific sectors locally, to agree the actions needed to meet the needs of each sector in terms of skills[22].

KEY SKILLS INVESTMENT IN NORFOLK

In 2021, the New Anglia Skills Board produced the Norfolk & Suffolk Cross-Cutting Skills report, which set out the major skills challenges across Norfolk & Suffolk and the LEP's proposed solutions[23]. Many of the 'Cross-Cutting' issues related to each sector were centred around the lack of motivated people who are 'work-ready' as most new roles require technical knowledge. The LEP set out seven key priorities for addressing the 'Cross-Cutting' issues, from training pipelines, local sector partnerships, building local skills capacity and in-career development. A full list of these priorities can be found in Appendix 3.

The Council has also committed to fund a number of programmes to aid training and re-training for adults as well as supporting the Princes Trust programme, which aims to help young people who are not in full-time work and a training for work programme for pre-16 and 16-19 year olds.

The range of skills programmes to drive action at the local level the key schemes are outlined below:

[20] Ibid.
[21] New Anglia LEP (N.D.). Skills bootcamps.
[22] New Anglia LEP (2019). Sector skills plans.
[23] Skills Reach. (2018). Norfolk and Suffolk cross-cutting skills for LEP officers.

- Training for Work – Find training opportunities in Norfolk for 16-19-year-olds on through the Help You Choose website.
- Fast Lane Training Services – FLTS provides a training and assessment service for highways and construction contractors.
- Princes Trust Team Programme – The Princes Trust Team Programme aims to help young people get back into education programmes or work. It also provides young people with an opportunity to build confidence and self-esteem, as well as gain new skills and meet new people.
- Norfolk Community Directory – A directory of organisations in Norfolk offering training courses.
- Adult Learning – A wide variety of courses including, apprenticeships and online learning support.
- NCC Apprenticeship Strategy – The Norfolk Apprenticeship Strategy 2020-2023 sets out a strategic vision and operational action plan for apprenticeships in Norfolk across all areas of Norfolk County Council.

KEY SKILLS INVESTMENT IN SUFFOLK

Whilst Suffolk County Council is yet to create a dedicated Green Skills function, the Norfolk & Suffolk 'Cross-Cutting' Skills report discussed above will aid Suffolk in shaping its green skills strategy. More broadly, Suffolk County Council supports several initiatives to augment jobs and skills in the county.

To supplement Suffolk County Council's work on jobs and skills the Council has a dedicated Skills Team, which seeks to promote businesses, inspire young people and invest in skills in the county. As of October 2022, the Skills Team published a bulletin displaying achievements to date:

- Adult Learning and Careers Advice – Adults can find out about opportunities to improve skills and confidence or learn something new with a range of courses. Courses are available for all ages, from 19 years and above.
- Work Well Suffolk - Work Well Suffolk was a three-year project (2020-2022) managed by Suffolk County Council. Its aim was to help more than 2,000 young people into employment by tackling barriers they may face. This included how young people can get work experience with us or start a career in the public sector through an apprenticeship, internship and graduate placement.
- Yojo Careers and Apprenticeships App - Young people can use the app to find apprenticeships and career advice.
- Apprenticeships Suffolk – This is a free advice service to increase the quality and quantity of apprenticeships within the county, thereby supporting business and economic growth.

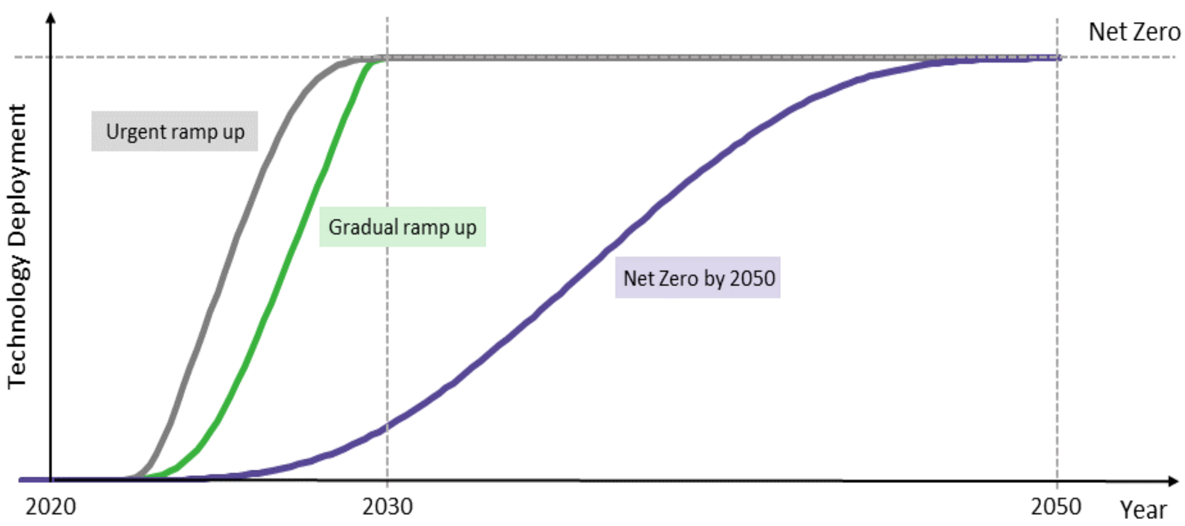
- Supply Chain Skills Development Fund and Pathways Training Fund – funded through the European Social Fund, these training subsidy programmes have provided employers across Norfolk and Suffolk with funds to remove financial barriers to developing the local workforce.

DEPLOYMENT SCENARIOS FOR GREEN TECHNOLOGIES

Figure 8 is an illustrative representation of all the scenarios used as part of the Norfolk & Suffolk green jobs analysis. It should however be noted that the exact shape of scenario curves is indicative. Slight differences will occur due to regional requirements, current skills provisions, and deployment optimisation. In general, the scenarios have been designed to minimise major short-term distortions to the labour market, although some degree of distortion is unavoidable with a cut-off in labour requirement once all technologies are deployed. The various skills deployment curves are shown in

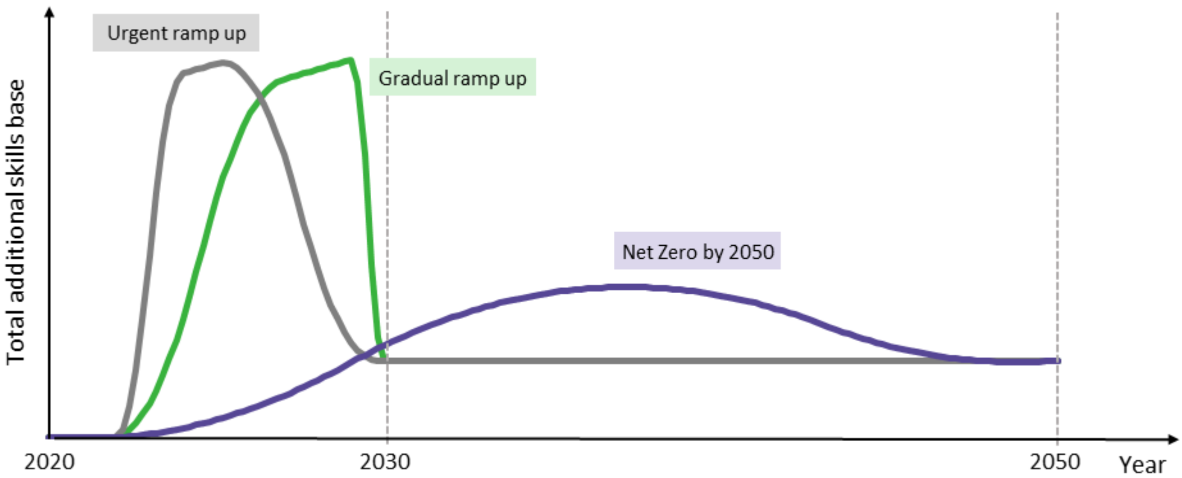
Figure 9. A skills bell curve is optimal as it gives time for the labour market to ramp up and down and minimises the potential for under or over training. Literature suggests that having a peak deployment rate (and hence skills base) roughly halfway between the start and end data is optimal[24].

Figure 8: The technology deployment scenarios used for the economic analysis



[24] Energy Systems Catapult. (2023). [Domestic Retrofit: Market Intelligence & Skills Assessment.]

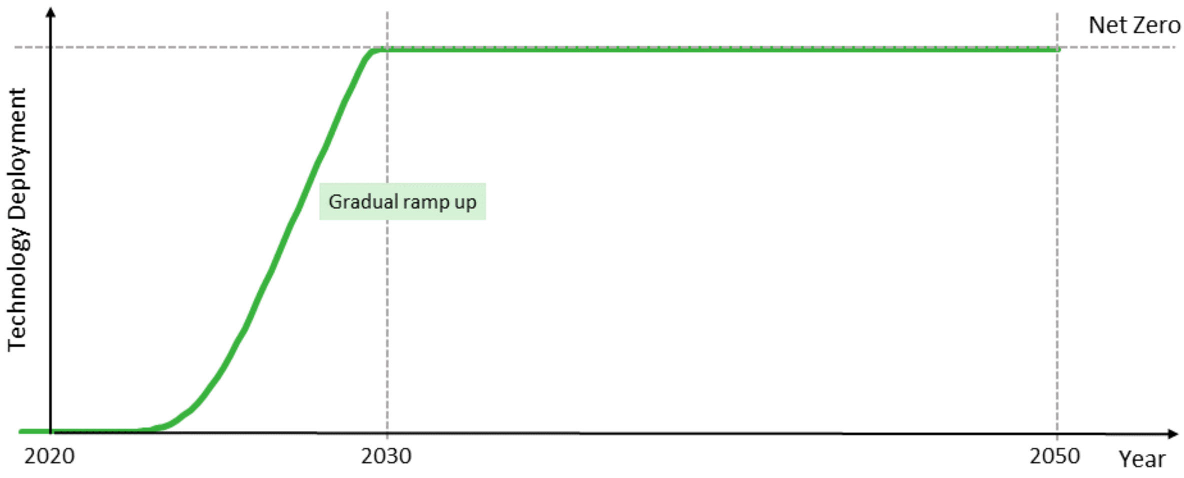
Figure 9: Skills deployment curve associated with technology deployment



SCENARIO 1 – GRADUAL RAMP UP

The gradual ramp up scenario assumes a balanced approach towards reaching net zero by 2030 with the deployment rate growing gradually as skills base increases. As the skills base develops, the deployment rate peaks around 2028 with a loss in employment after this point as the need for new generation capacity or EV charging installations drops and labour is mostly required to maintain, replace, and operate installed technology. The slower ramp up gives appropriate time for measures to be put in place to train new labour and the 2030 target is in line with both councils.

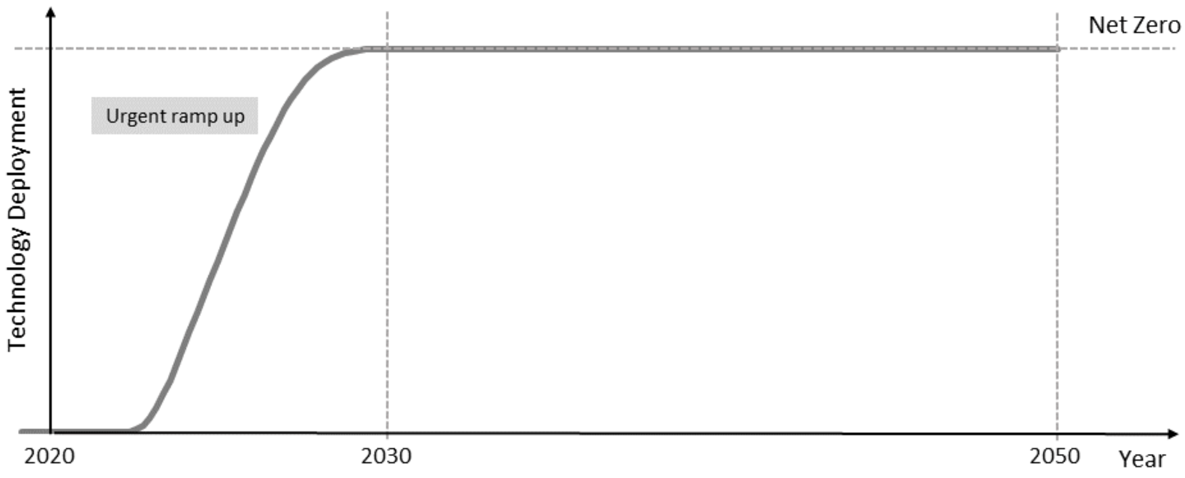
Figure 10: Scenario 1 - Gradual ramp up



SCENARIO 2 – URGENT RAMP UP

The urgent ramp up scenario assumes major short-term action is made to rapidly expand the skills base in the region and stimulate demand. The second scenario is like the first with net zero reached in 2030 and deployment following an "S" shape to give a skills bell curve. The key difference is that the initial ramp up in deployment is faster than the first scenario, with the deployment rate peaking around 2026. This scenario would require significant short-term action to develop the skills base required to deploy the technology at the required rate. This scenario has been included to demonstrate the impact a greater urgency would have on the relative carbon savings, job creation and economic indicators relevant to transitioning to a net zero compliant economy faster. Additionally, the inclusion of this scenario allows potential distortive employment requirements to be compared.

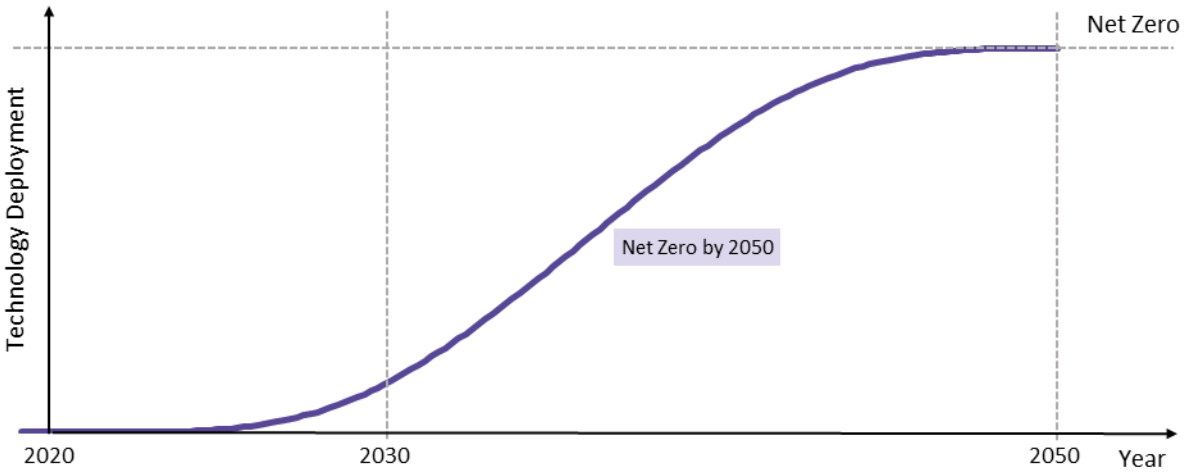
Figure 11: Scenario 2 - Urgent ramp up



SCENARIO 3 – NET ZERO BY 2050

The net zero by 2050 scenario assumes that all local authorities reach net zero by 2050, in line with UK wide targets, through a balanced approach with deployment rates peaking around 2035. As this target is consistent with national targets, the results will be comparable with other commonly used scenarios such as those produced by the Climate Change Committee or by National Grid ESO. Additionally, the greater time for deployment to take place means a less severe skills cut off, avoiding over training, and minimising the requirement to significantly reskill labour once net zero is reached. The greater time frame also makes this scenario more achievable and allows additional room for optimisation.

Figure 12: Scenario 3 - Net zero by 2050

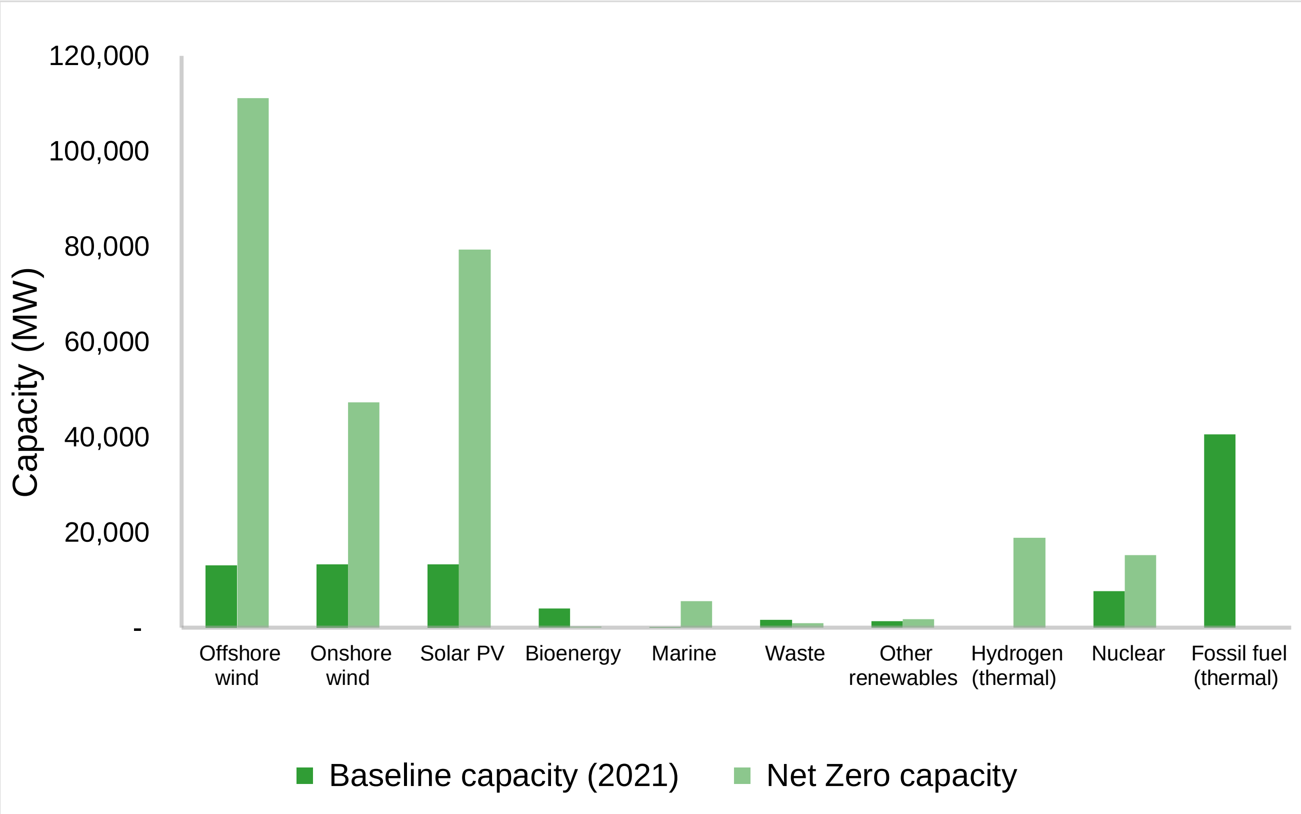


ENERGY GENERATION

This section outlines the number of jobs required in energy generation across Norfolk and Suffolk. Energy generation for the purposes of this report includes offshore and onshore wind, solar, renewable combined heat and power (CHP) and bioenergy[25].

To put the Norfolk and Suffolk generation capacities in a wider context, **Figure 13** shows the forecasted generation capacity for the UK that aligns with the projections used in our energy modelling – the National Grid's Consumer Transformation Future Energy Scenario. The analysis bases most of the projected capacity values for Norfolk and Suffolk on this data, or data from the equivalent scenario from the local Distribution Network Operator for Norfolk and Suffolk, UK Power Networks. It is important to note the inclusion of nuclear in these projections – since nuclear jobs are out of scope for our analysis but are likely to play a role in Norfolk and Suffolk.

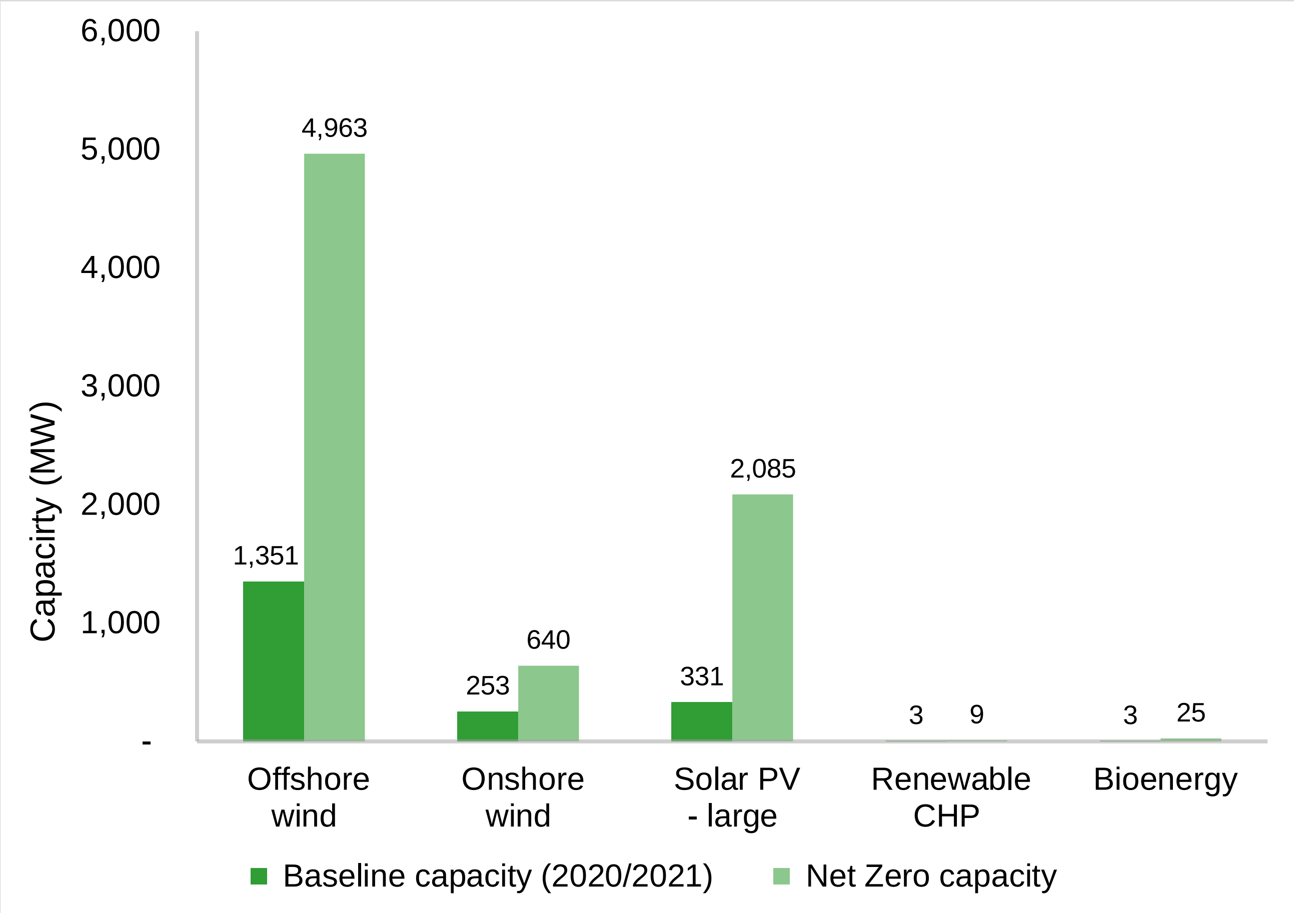
Figure 13: UK assumed capacity changes from baseline to Net Zero[26]



[25] These definitions are in line with the LCREE definition set out by the Office for National Statistics (ONS). Hydropower was excluded given the negligible generation capacity in Norfolk and Suffolk. Solar for the purposes of this study represent large scale installations over 150kW.
[26] National Grid ESO. (2020). [Future Energy Scenarios – Electricity Supply Data Table (ES1).]

For each of the energy generation technologies we consider in this report, **Figure 14** and **Figure 15** show the relative contributions towards Norfolk and Suffolk's total generation capacity, at baseline and future values.

Figure 14: Norfolk assumed energy generation capacity changes from baseline to Net Zero[27]



Based on the values in **Figure 14**, Norfolk's current largest renewable energy source is offshore wind, which continues to dominate the future balance, followed by solar PV and onshore wind. Renewable CHP and bioenergy play a much more minor role in providing the energy generation capacity required to meet Net Zero.

[27] Estimated using National Grid Future Energy Scenarios, Distribution Future Energy Scenarios, government data for renewables generation and projected CCC Balanced Pathway capacities.

Figure 15: Suffolk assumed energy generation capacity changes from baseline to Net Zero[28]

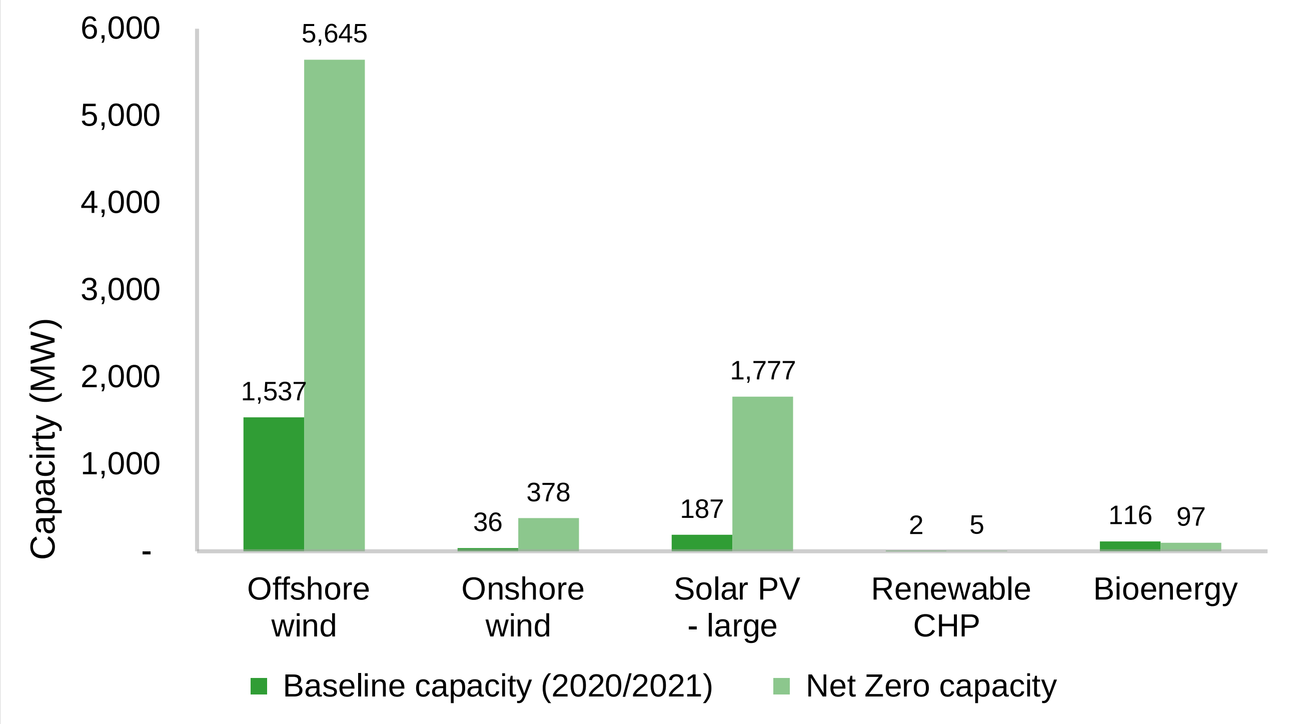


Figure 15 shows a similar picture for Suffolk as seen for Norfolk, with offshore wind contributing the most to energy generation in the future, followed by solar PV and onshore wind. For Suffolk it is interesting to note the small decrease in the expected contribution of bioenergy, which is the third largest contributor to the baseline capacity. It's important to note that nuclear was not included in this analysis. For reference, nuclear contributes ~1.2GW of generation capacity in Suffolk via Sizewell B which first opened in 1995[29]. Taking into account the planned Sizewell C nuclear facility, this will generate an additional 3.2GW of electricity to the grid making nuclear one of the largest energy sources in the county, underpinning it's local and national importance.

OFFSHORE AND ONSHORE WIND

Overview of the wind sector in Norfolk & Suffolk

The UK's ambitious growth plans for the offshore wind industry have been outlined by the Department for Energy Security and Net Zero *'Seizing our opportunities: Independent report of the Offshore Wind Champion*.' The report rightly mentions the urgent need to update our national grid and accelerate the

---

[28] Estimated using National Grid Future Energy Scenarios, Distribution Future Energy Scenarios, government data for renewables generation and projected CCC Balanced Pathway capacities.
[29] BEIS. (2018). Special feature – Nuclear electricity in the UK

estimated £54 billion rollout of the Holistic Network Design[30]. The report also acknowledged that the East is home to more than 52% of the UK's operating fleet and has one of the UK's largest pipelines for new projects, forecasting £30 billion investment by 2040[31]. **Figure 16** draws upon data from the Renewable Energy Planning Database (REPD) and maps the various wind projects at various stages across Norfolk and Suffolk[32].

Figure 16: Operational and planned wind energy developments in Norfolk and Suffolk

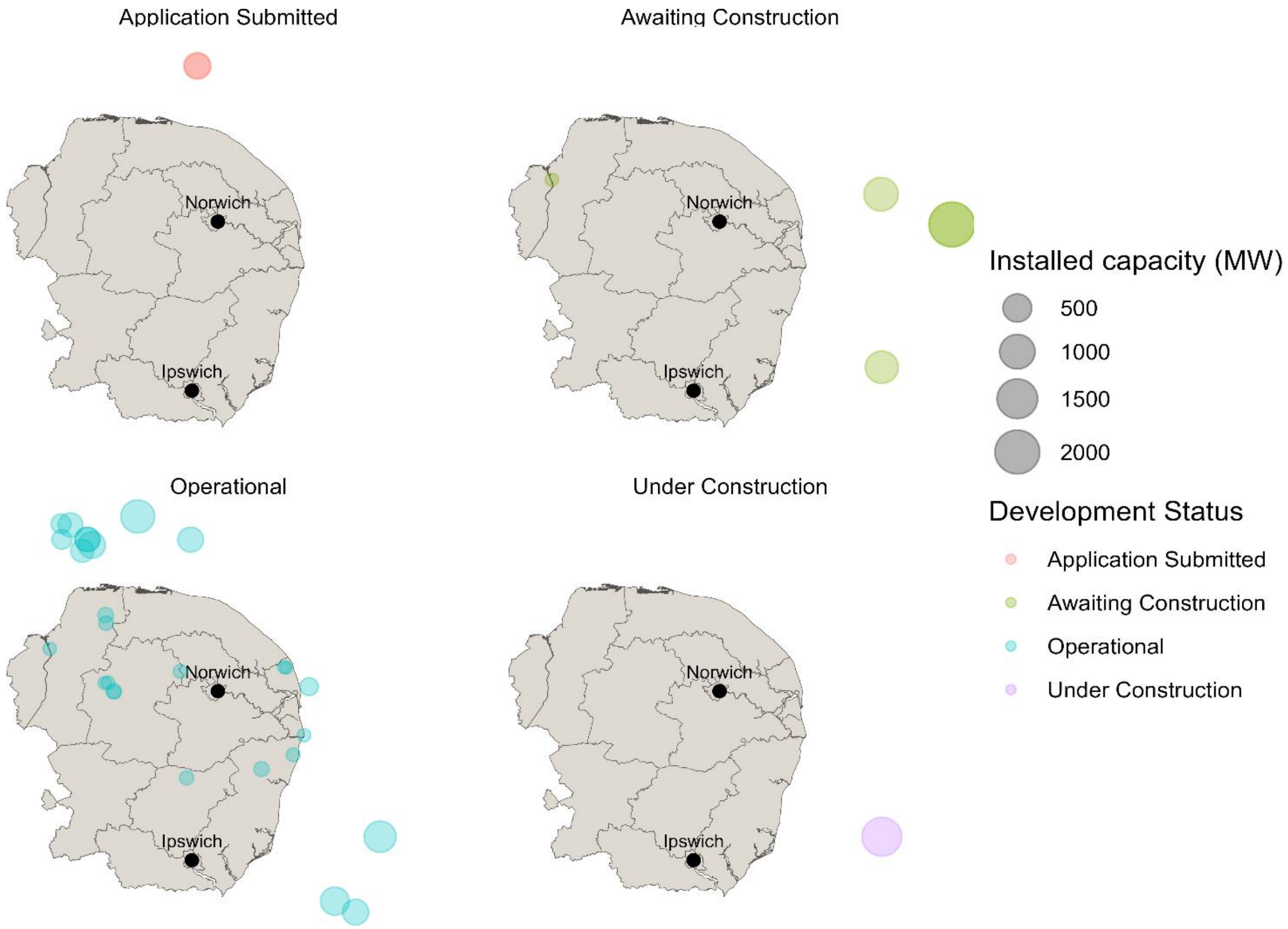


Figure 16 reinforces the strength of offshore wind in the region and highlights the limited number of operational and planned onshore wind farms. However, despite the lack of onshore wind, the region is strategically important for the UK energy system and has attracted significant investment and facilitated the growth of a local workforce that will continue to grow. Error! Reference source not found. expands on **Figure 16** and provides a non-exhaustive list of the major offshore wind projects that are either operational or are in the process of being constructed.

[30] Department for Energy Security and Net Zero. (2023). Seizing our Opportunities: Independent report of the Offshore Wind Champion.
[31] Offshore Wind Growth Partnership. (2020). Offshore Wind in East Anglia.
[32] DESNZ, (2023). Renewable Energy Planning Database: quarterly extract

Table 1: Notable offshore wind projects across Norfolk and Suffolk

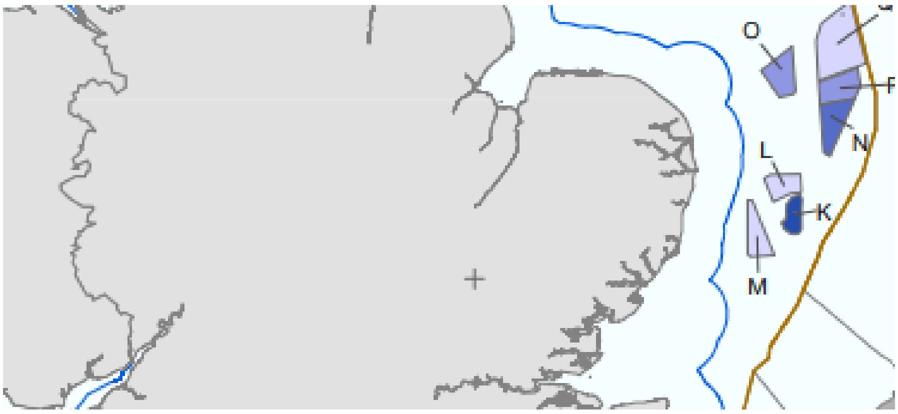
Name	Operator	Installed Capacity (MW)	Location	Planning stage
Hornsea Project 3	Orsted	2,400	Norfolk Coast	DCO Consented
***Norfolk Boreas*[33]**	*Vattenfall*	*1,400*	*Norfolk Coast*	*Application Approved*
Norfolk Vanguard	Vattenfall	2,800	Norfolk Coast	Application Approved
East Anglia Three	ScottishPower Renewables	1,400	Suffolk Coast (Lowestoft)	Under Construction
East Anglia Two	ScottishPower Renewables	900	Suffolk Coast (Lowestoft)	DCO Consented
East Anglia One North	ScottishPower Renewables	600	Suffolk Coast (Lowestoft)	DCO Consented
Sheringham Shoal Extension & Dudgeon Extension Projects	Equinor	720	Norfolk Coast	Application in Progress
East Anglia One	ScottishPower Renewables	714	Suffolk Coast (Lowestoft)	Operational
North Falls	RWE / SSE	At least 504	Suffolk Coast (Lowestoft)	Application in Progress
Greater Gabbard	RWE / SSE	504	Suffolk Coast (Lowestoft)	Operational
Dudgeon Offshore Wind Farm	Equinor	400	Norfolk Coast	Operational
Galloper Wind Farm	RWE Npower Renewables	353	Suffolk Coast (Harwich)	Operational
Sheringham Shoal	Equinor	317	Norfolk Coast (North Norfolk)	Operational

East Anglia ONE is the first of four offshore wind farms in the Suffolk area. Iberdrola's (ScottishPower Renewables) completed the installation and commissioning of its 714MW East Anglia ONE offshore wind farm in July 2020. All wind turbines are now fully operational, and this development has already boosted the

[33] In italics as at the time of writing the project is being stopped by Vattenfall

local economy, providing a regional jobs market. Almost 3,500 jobs were sustained during the construction phase, which began in 2017 and 100 long-term skilled jobs have been created at the operations and maintenance base in Lowestoft[34]. The Crown Estate's active role in offshore energy has resulted in planned development for offshore wind farms off the coast of Suffolk. During the Round 3 allocations, the Crown Estate awarded seabed rights for Iberdrola's (Scottish Renewables Power) East Anglia ONE North and East Anglia TWO projects. East Anglia ONE North is part of the East Anglia Hub and was granted consent in March 2022 jointly with East Anglia TWO. East Anglia ONE North will comprise of an 800MW windfarm with up to 67 turbines, over a 208km^2 area, powering up to 659,922 homes. The windfarm will be in the southern North Sea approximately 37.7km from the Suffolk coast at its nearest point to Lowestoft. The East Anglia TWO project will comprise a 900MW windfarm up to 75 turbines, over a 218km^2 area. East Anglia TWO will be in the southern North Sea approximately 32.6km from the Suffolk coast at its nearest point off Southwold and 37.5km to Lowestoft. Both projects have the potential to make a substantial contribution to UK net zero targets by meeting 5% of the UK offshore wind cumulative deployment target for 2030[35] However following the initial approval, East Anglia ONE North and East Anglia TWO are now under Judicial Review. The delays to these applications are resulting in deployment timelines being pushed back and preventing vital job creation opportunities in the region.

Figure 17: The Crown Estate Round 3 Offshore Wind Allocation showing East Anglia ONE North, East Anglia ONE and East Anglia TWO projects



Another significant development was the approved applications of Vattenfall's Norfolk Boreas and Norfolk Vanguard offshore wind farms. With Norfolk Vanguard and Boreas representing 2.8GW and 1.4GW respectively, Vattenfall's commitment increased the regions capacity significantly and represented a major boost to the local economy and contributed to national targets for offshore wind generation. However, in July 2023 Vattenfall announced they were "stopping the development of Norfolk Boreas in its current form"

[34] Scottish Power Renewables. (N.D.). [Offshore Wind. East Anglia One.]
[35] Scottish Power Renewables. (N.D.). [Offshore Wind. East Anglia One North.]

and "examining the best way forward for the entire Norfolk zone"[36]. Vattenfall have cited inflation and it's impact on the supply chain as the reason for revaluating its investment, claiming costs had rose 40%.

In addition to these pipeline projects, notable operational wind farms include the Galloper Offshore Wind Farm (353MW) operated by RWE, Sheringham Shoal (317MW) operated by Equinor and Greater Gabbard (504MW) operated jointly by RWE and SSE. All these sites are making significant contributions towards the region's net zero ambitions and building significant capability in Lowestoft's and Great Yarmouth's capability offshore wind operation and maintenance.

Onshore wind offers an effective choice for new electricity in the UK. Today there are more than 1,500 operational onshore wind farms across the UK, generating over 12 gigawatt hours (GW) of electricity for the national electricity system. In 2020, onshore wind contributed 11% of the UK's electricity needs, with a total of 34.7 terawatt hours (TWh) generated – more than enough to power 18.5 million UK homes for an entire year[37]. As shown in **Figure 16,** under the current planning system in England no onshore wind farm can go ahead unless the local authority has drawn up a detailed local plan which identifies all areas suitable for onshore wind development[38]. Norfolk County Council does not currently have a detailed local plan for onshore wind development. Strict approaches to onshore wind development within the National Planning Policy Framework result in a delayed onshore wind trajectory for the area, which should be addressed with vigour if the region is to contribute towards net zero goals. Due to limiting factors within the planning system, onshore wind generation capacity in King's Lynn and West Norfolk was at minimal levels of 180MW in 2020, according to UK Power Networks estimates[39]. The trajectory shown in **Figure 14** demonstrates that Norfolk will need to significantly develop onshore wind capacity to meet Net Zero targets by 2030.

East Suffolk Council's 'Suffolk Coastal Local Plan' states that it will encourage onshore wind within the generation mix of renewable energy, most notably to serve local communities and, although generally encouraged, proposals will need to ensure they do not adversely affect high quality landscape, natural beauty and the special qualities of the Suffolk Coast and Heaths AONB, wildlife populations or habitats and avoid noise pollution across the Suffolk Coastal District[40]. Commitment to the use of onshore wind for reaching net zero will require policy changes at a national level combined with increased local support. Without this, it will be challenging for Suffolk to reach net zero targets for onshore wind capacity. In 2020,

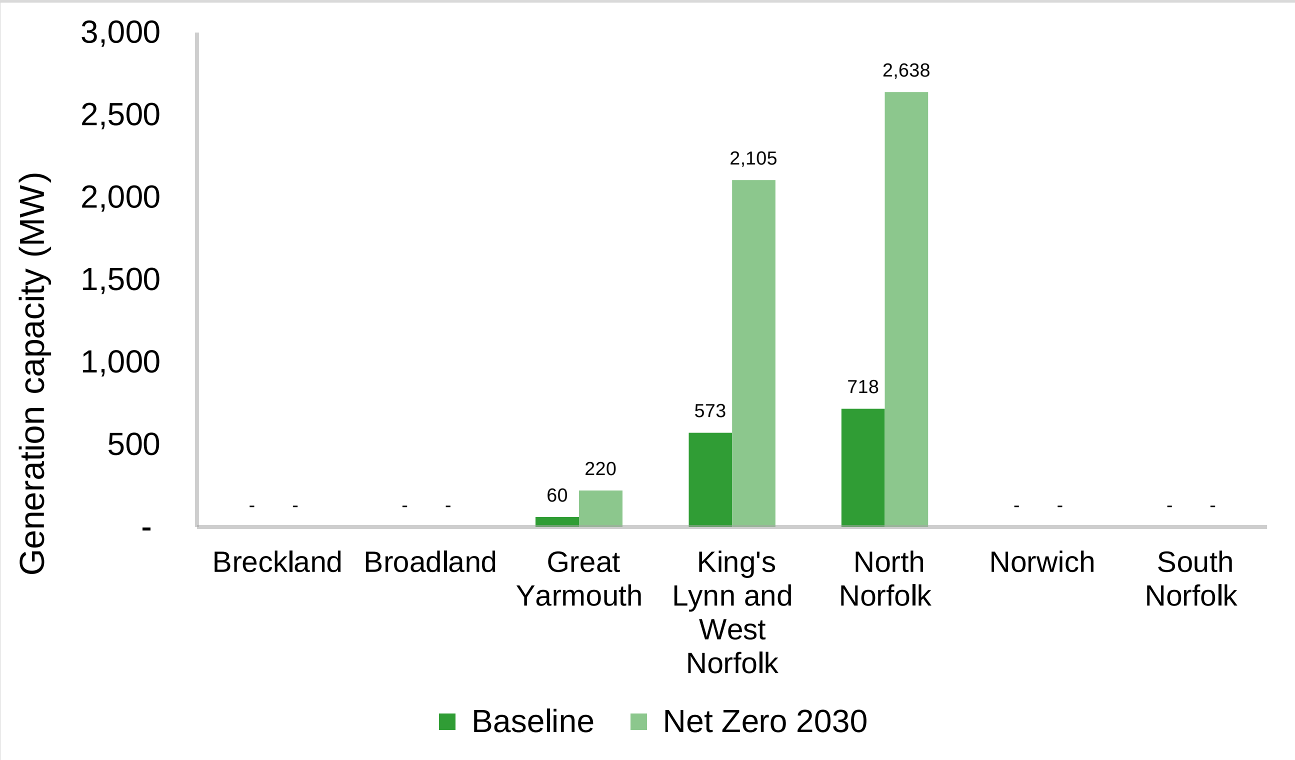
[36] Energy Voice. (2023). Vattenfall calls off Norfolk Boreas due to rising costs
[37] National Grid. (N.D.). Onshore vs Offshore Wind Energy: What's the difference?
[38] Renewable UK. (2023). Government's planning reforms fail to bring back onshore wind in England.
[39] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.
[40] East Suffolk Council. (2020). Suffolk Coastal Local Plan.

Suffolk's onshore wind generation capacity was 36 MW (see **Figure 15**). Onshore wind developments in Suffolk currently comprise of small-scale onshore wind turbines such as the 2.75 MW Ness Point Wind turbine located in Lowestoft. To reach net zero targets by 2030, Suffolk would need to also scale-up its onshore wind capacity subject to policy changes and the implementation of a local plan that would allow for onshore wind provisions.

Current and expected generation capacity in Norfolk

Government figures for generation capacity of offshore wind energy in Norfolk put the 2021 total at 1.4 GW, with most of this generation being in King's Lynn and West Norfolk, and North Norfolk[41]. National Grid energy scenario projections for offshore wind project very little increase in offshore wind generation capacity in the East of England to achieve Net Zero – however, this can be assumed to be due to much of the generation being classed as contributing to national targets rather than local, and as such isn't quantified in projections. We have instead used UK CCC Balanced Pathway capacity values to inform our estimates for Net Zero capacity of offshore wind in Norfolk (see **Figure 18**).

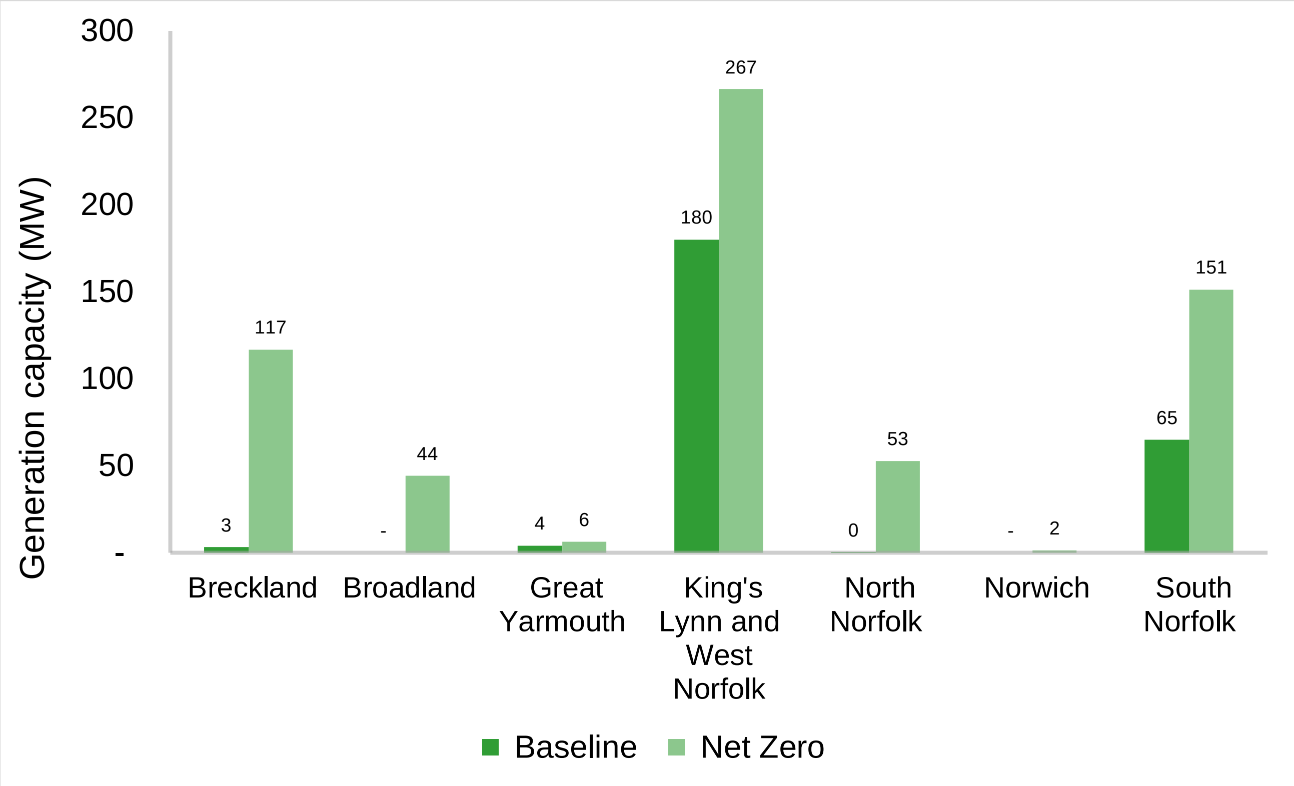
Figure 18: Norfolk offshore wind generation capacity values[42]



[41] BEIS. (2022). Regional Renewable Statistics.
[42] Baseline values and local authority percentages taken from government data for 2021 renewables generation, future values estimated from projected CCC Balanced Pathway capacity, scaled to East of England using ONS Low Carbon and Renewable Energy Economy regional employment estimates.

Onshore wind generation in Norfolk is currently estimated at around 250 MW, with King's Lynn and West Norfolk having the highest capacity, followed by South Norfolk.[43] UK Power Networks' Distributed Future Energy Scenarios project a 640 MW generation capacity for onshore wind in Norfolk to achieve Net Zero, with the same local authorities contributing the most. **Figure 19** shows the values we assume in our modelling, by local authority.

Figure 19: Norfolk onshore wind generation capacity values[44]



Job creation scenarios in Norfolk

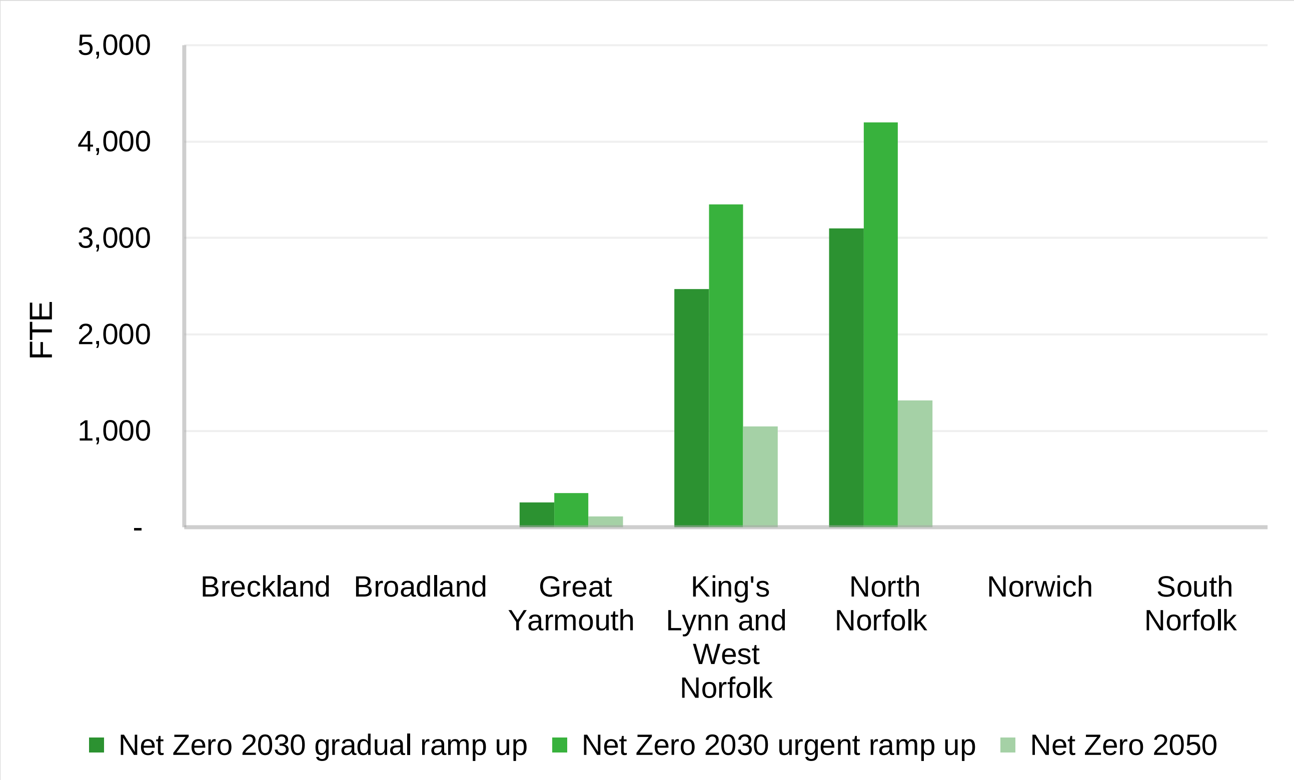
For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for offshore wind in different local authorities are in line with those that see the largest increases in generation capacity – North Norfolk, followed by King's Lynn and West Norfolk. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual

[43] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.
[44] Values from Distribution Future Energy Scenarios. (2020 and 2050). Distribution Future Energy Scenarios (DFES) 2022.

ramp up and Net Zero 2050 scenarios, as shown in **Figure 20**. Higher peak jobs for given scenarios are associated with faster increases in capacity. The methodology assumes that the jobs created correlate with where the generation capacity is. This is an accurate proxy for construction and decommissioning roles, but, may mask where jobs are created in "hubs" of activity such as operation and maintenance centres. For example, we'd expect more operation and maintenance roles to be created in Great Yarmouth given the region's current capabilities. This is a limitation of the model, but, is a good proxy for construction and decommissioning roles which make up the vast majority of jobs in the given peak years.

Figure 20: Norfolk offshore wind peak jobs across three scenarios



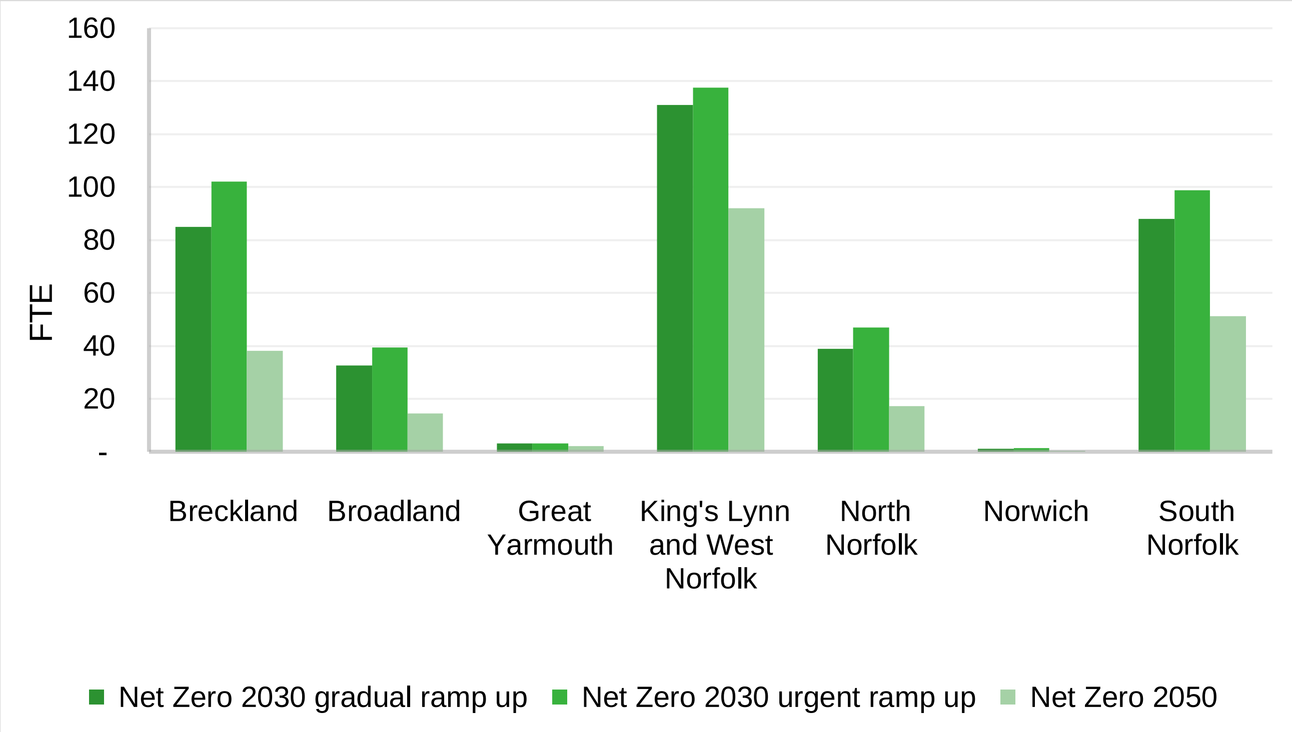
The years in which the peak jobs shown in **Figure 20** occur in each scenario are provided in **Table 2**. More insight into these values is provided by **Figure 22** later in this section, which depicts how the total number of jobs changes over time for each scenario.

Table** 2: **Year in which peak jobs occur for offshore wind in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2049	2036

For onshore wind, job creation hotspots in different local authorities are again in line with those that see the largest increases in generation capacity – King's Lynn and West Norfolk, followed by Breckland / South Norfolk. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario followed by the Net Zero 2030 gradual ramp up scenario, with the Net Zero 2050 scenario having a peak of less than half of that for the previous scenarios for most local authorities (see **Figure 21**).

Figure 21: Norfolk onshore wind peak jobs across three scenarios



The years in which the peak jobs occur for each scenario are provided in **Table 3**. More insight into these values is shown in **Figure 23** later in this section, which depicts how the total number of jobs changes over time for each scenario.

Table 3: Year in which peak jobs occur for onshore wind in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2049	2039

The development of offshore wind jobs over time for each of the three scenarios is shown in **Figure 222**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. Where there are repeated peaks in the number of jobs, this is due to decommissioning and replacement of previous concentrated capacity increases.

Figure 22: Norfolk offshore wind FTE over time

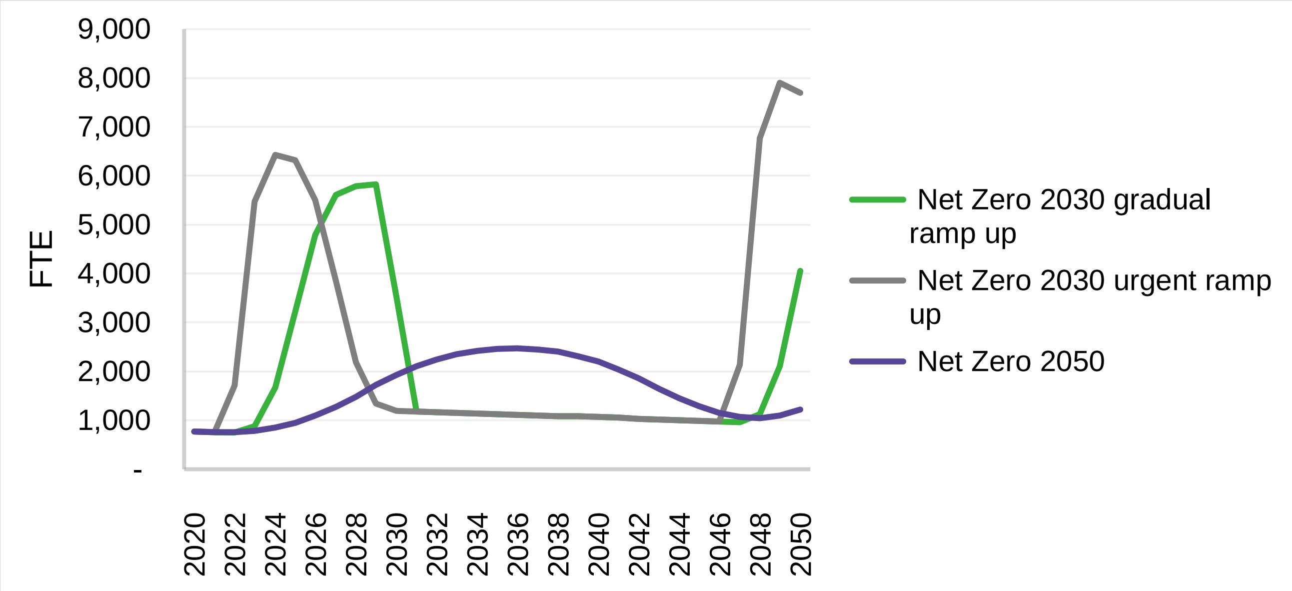
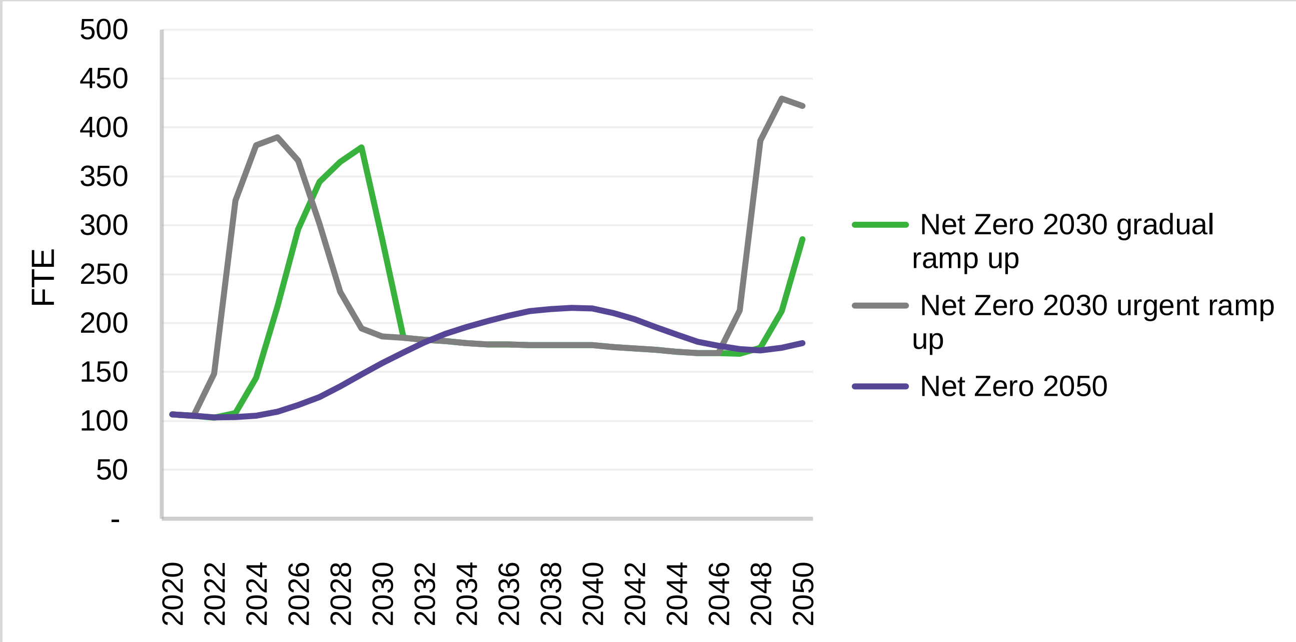


Figure 23 Error! Reference source not found. shows the equivalent results for onshore wind – with lower capacity than for offshore wind results in a lower amount of jobs but a similar curve. The Net Zero 2030 urgent ramp up scenario has a second peak that is higher than the first, as is also the case for offshore wind. This results from an increase in operation and maintenance jobs from cumulative capacity, and jobs associated with decommissioning end-of-life capacity. More detail on the breakdown of jobs is given in the figures later in this section.

Figure 23: Norfolk onshore wind FTE over time



Breakdown of job types in Norfolk

Three different types of jobs have been modelled as part of the economic analysis and include: the construction and installation of capacity, operation and maintenance of assets and decommissioning of end-of-life technologies. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity. **Figure 24**, **Figure 25** and

Figure 26 present the number of jobs in each type over time for offshore wind, for each scenario.

For both the Net Zero 2030 scenarios, we see the pattern of a second peak where the capacity increase associated with the previous peak comes to the end of its life, and therefore needs decommissioning and replacing. This is most pronounced under the urgent ramp up scenario.

Figure 24: Norfolk offshore wind FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

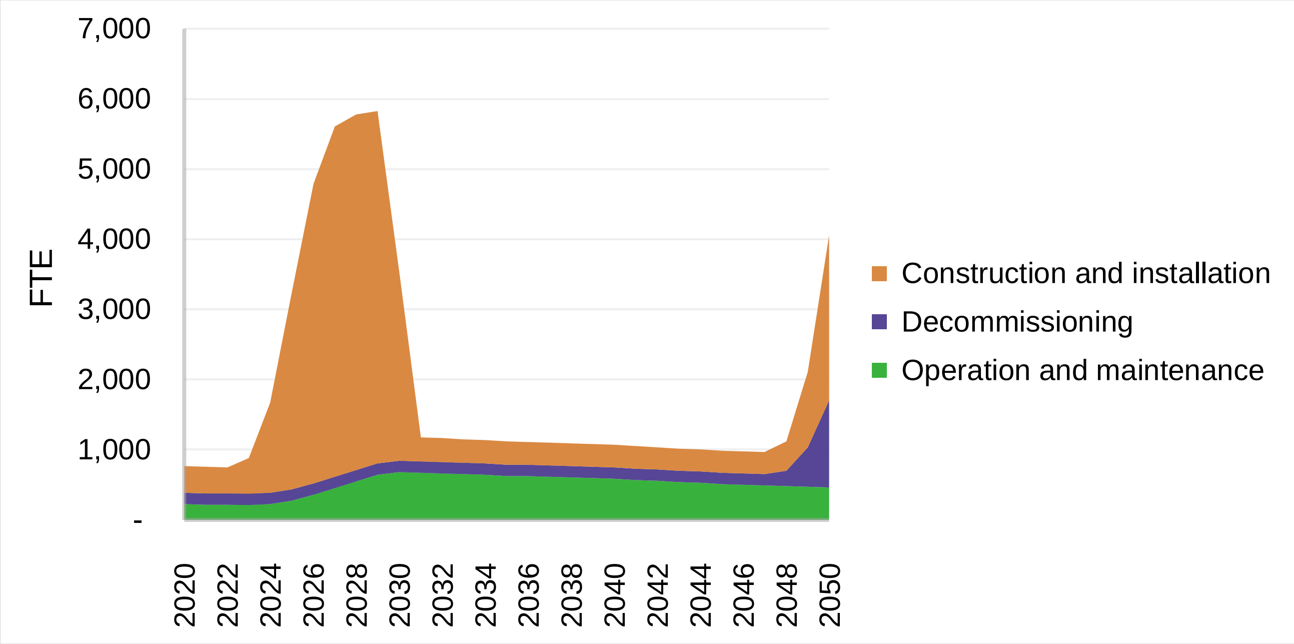


Figure 25: Norfolk offshore wind FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

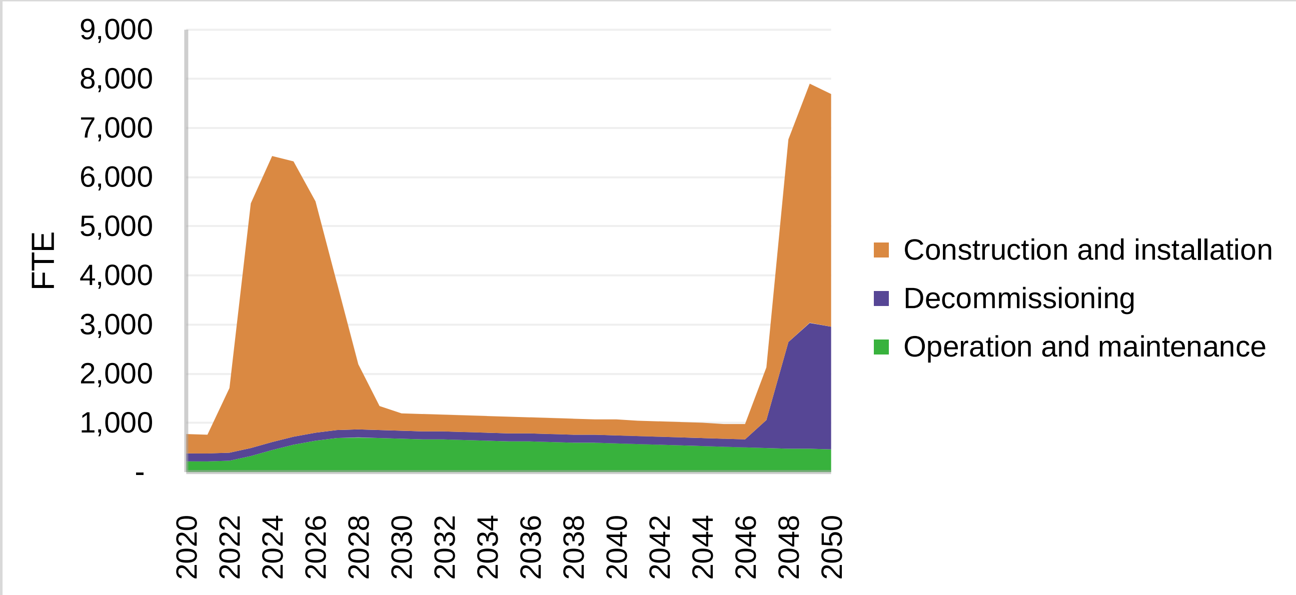


Figure 26: Norfolk offshore wind FTE by job type for the Net Zero 2050 Scenario

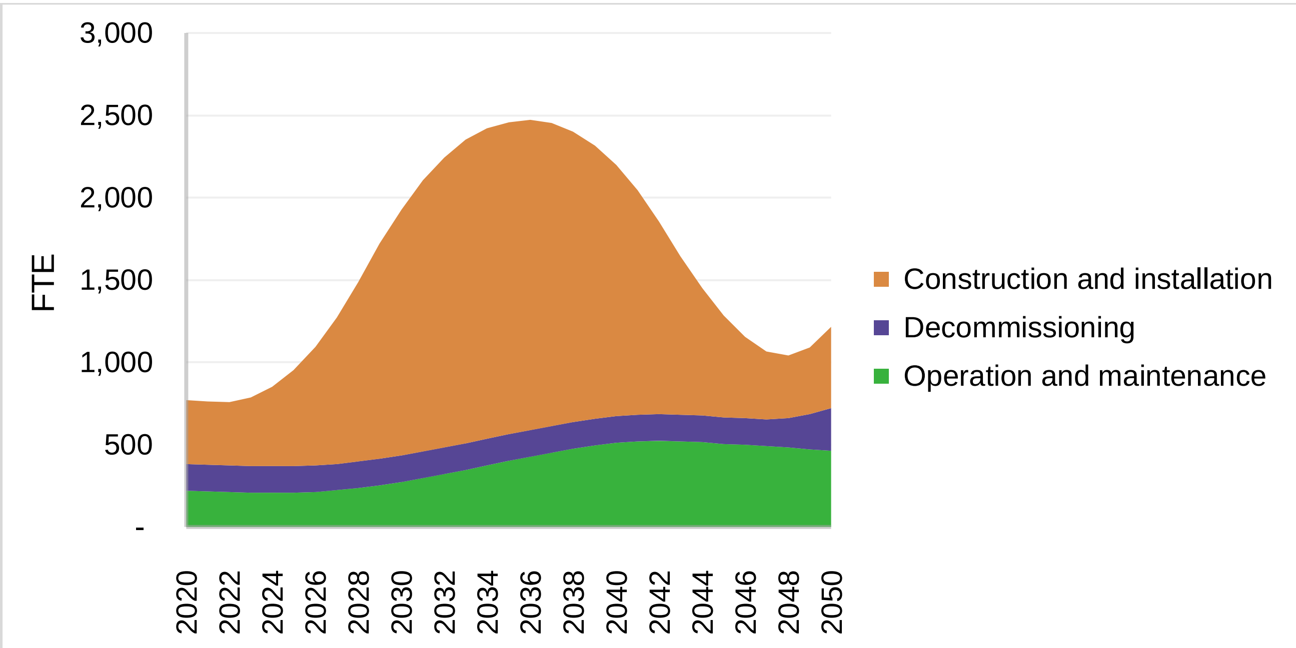


Figure 27, Figure 28**Figure 28** and **Figure 29** present the number of jobs in each type over time for onshore wind, for each scenario. Operation and maintenance jobs are seen to form a larger proportion of jobs than for offshore wind. This is due to the lower labour intensities associated with construction of onshore wind vs offshore wind.

Figure 27: Norfolk onshore wind FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

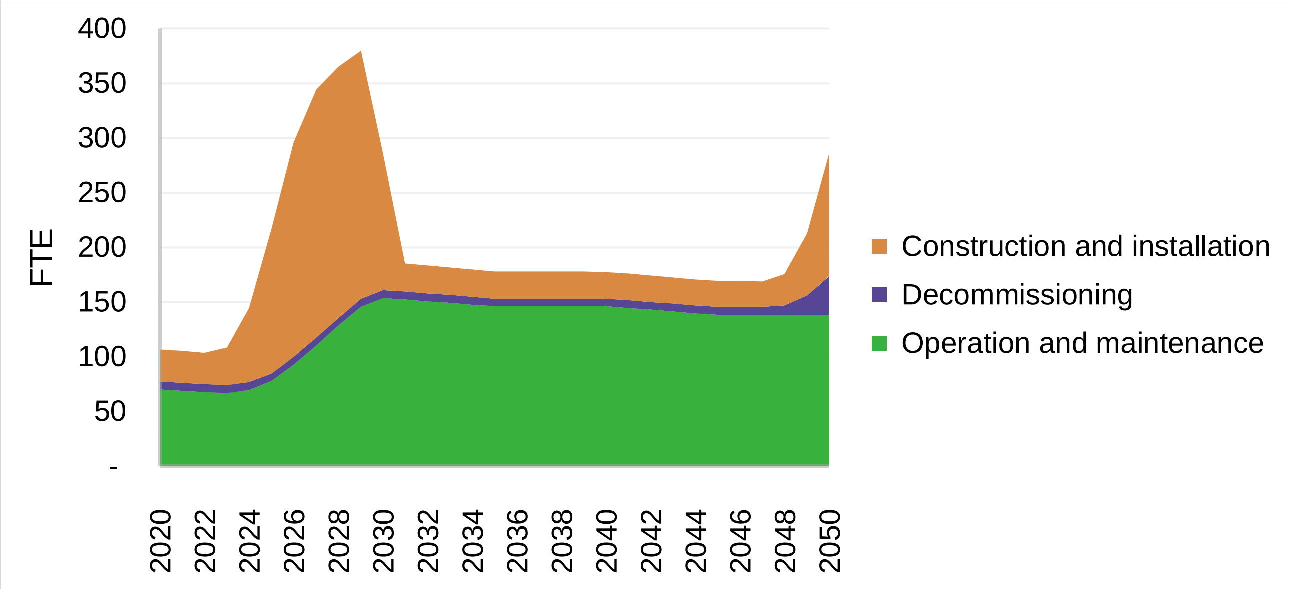


Figure 28: Norfolk onshore wind FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

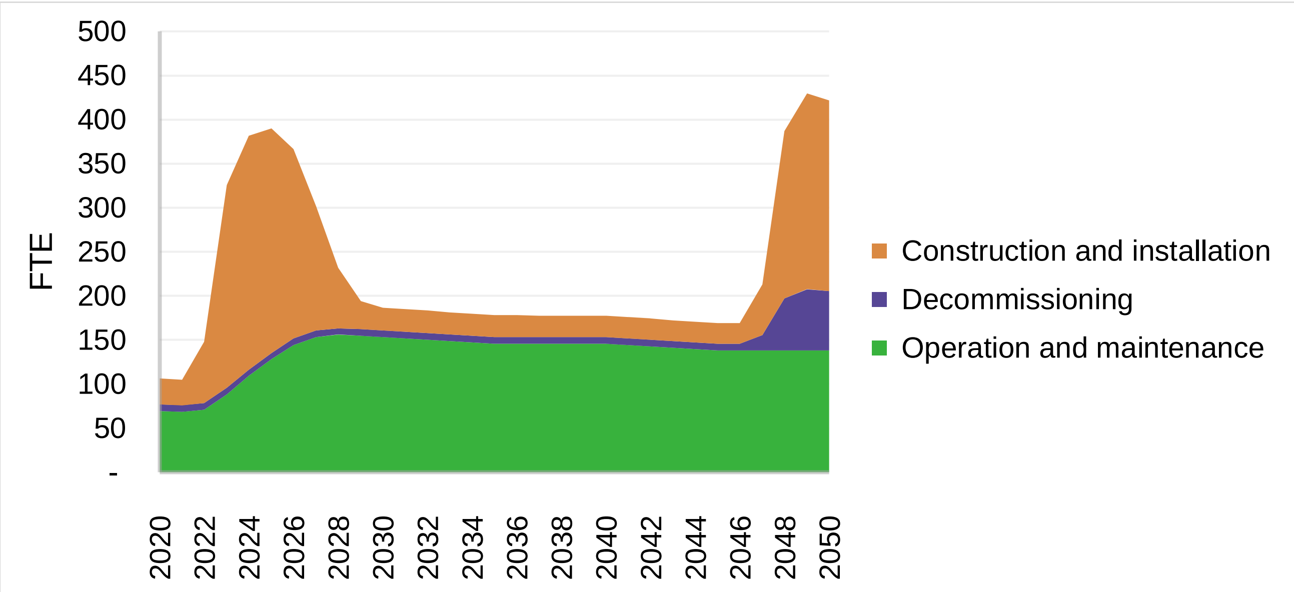
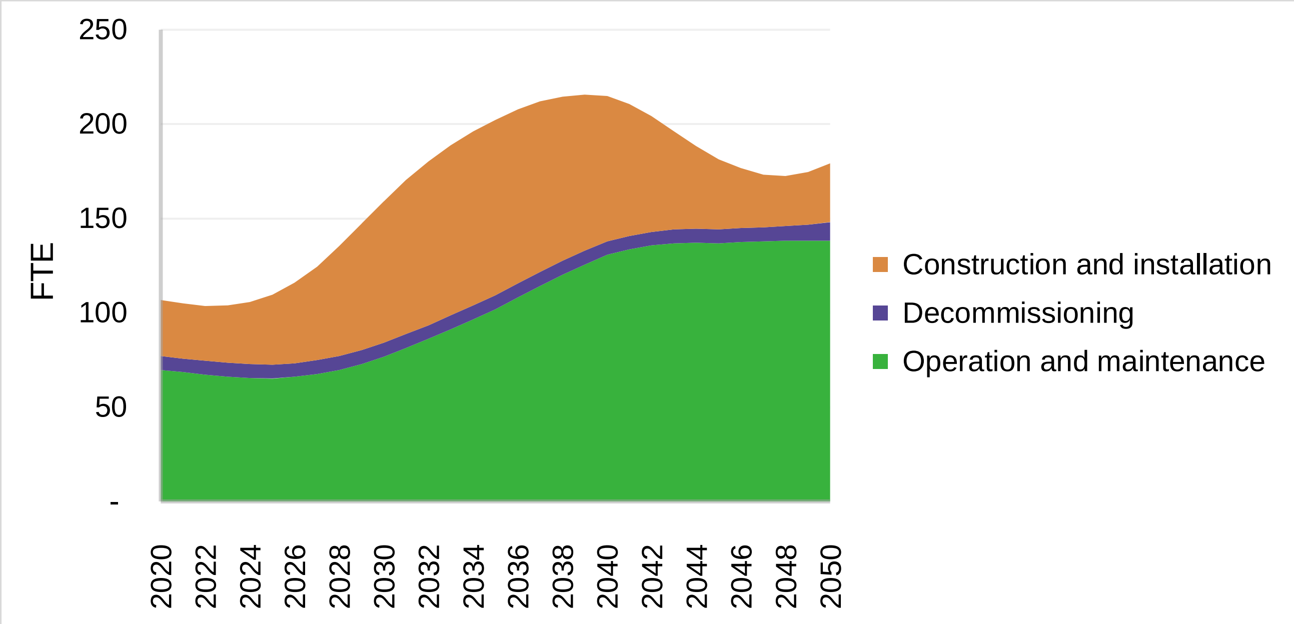


Figure 29: Norfolk onshore wind FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Norfolk

Estimated peak GVA that results from jobs in the categories used above are shown in

Table 4**4** and

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	26	2	16
Urgent ramp up	2049	26	5	19
Net zero 2050	2040	23	1	7

Table 5**5**, for offshore wind and onshore wind respectively. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios.

Table 4: Norfolk offshore wind peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	110	88	360
Urgent ramp up	2049	120	180	410
Net zero 2050	2037	88	18	130

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Table 5: Norfolk onshore wind peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	26	2	16
Urgent ramp up	2049	26	5	19
Net zero 2050	2040	23	1	7

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

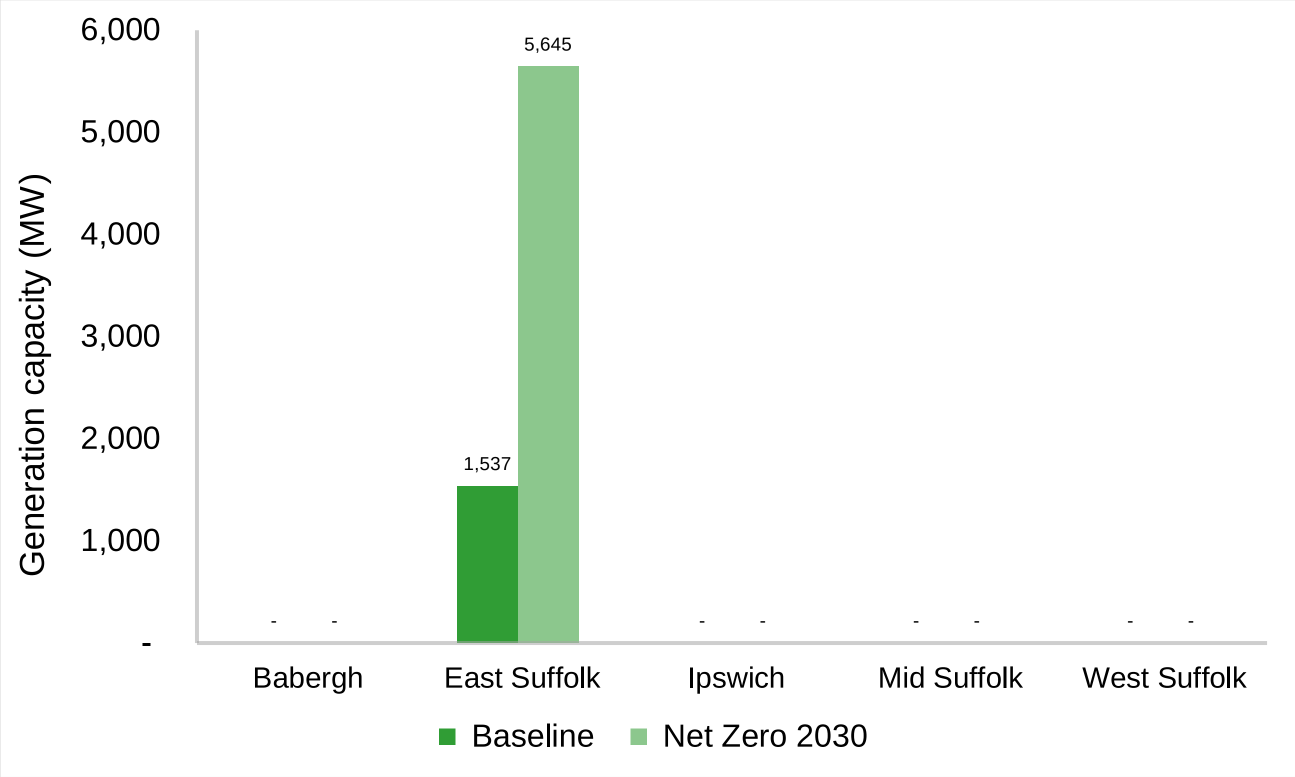
Current and expected generation capacity in Suffolk

Government figures for generation capacity of offshore wind energy in Suffolk put the 2021 total at 1.5 GW, with all the generation being in East Suffolk[45]. National Grid energy scenario projections for offshore wind forecast very little increase in offshore wind generation capacity in the East of England to achieve Net Zero – however, this is due to much of the generation being classed as contributing to national targets rather than local, and as such isn't quantified in projections. We have instead used UK CCC Balanced Pathway capacity values to inform our estimates for Net Zero capacity of offshore wind in Suffolk. The data points we assume in our modelling are presented in **Figure 30**.

Figure 30: Suffolk offshore wind generation capacity values[46]

[45] BEIS. (2022). Regional Renewable Statistics.

[46] Baseline values and local authority percentages taken from government data for 2021 renewables generation, future values estimated from projected CCC Balanced Pathway capacity, scaled to East of England using ONS Low Carbon and Renewable Energy Economy regional employment estimates.

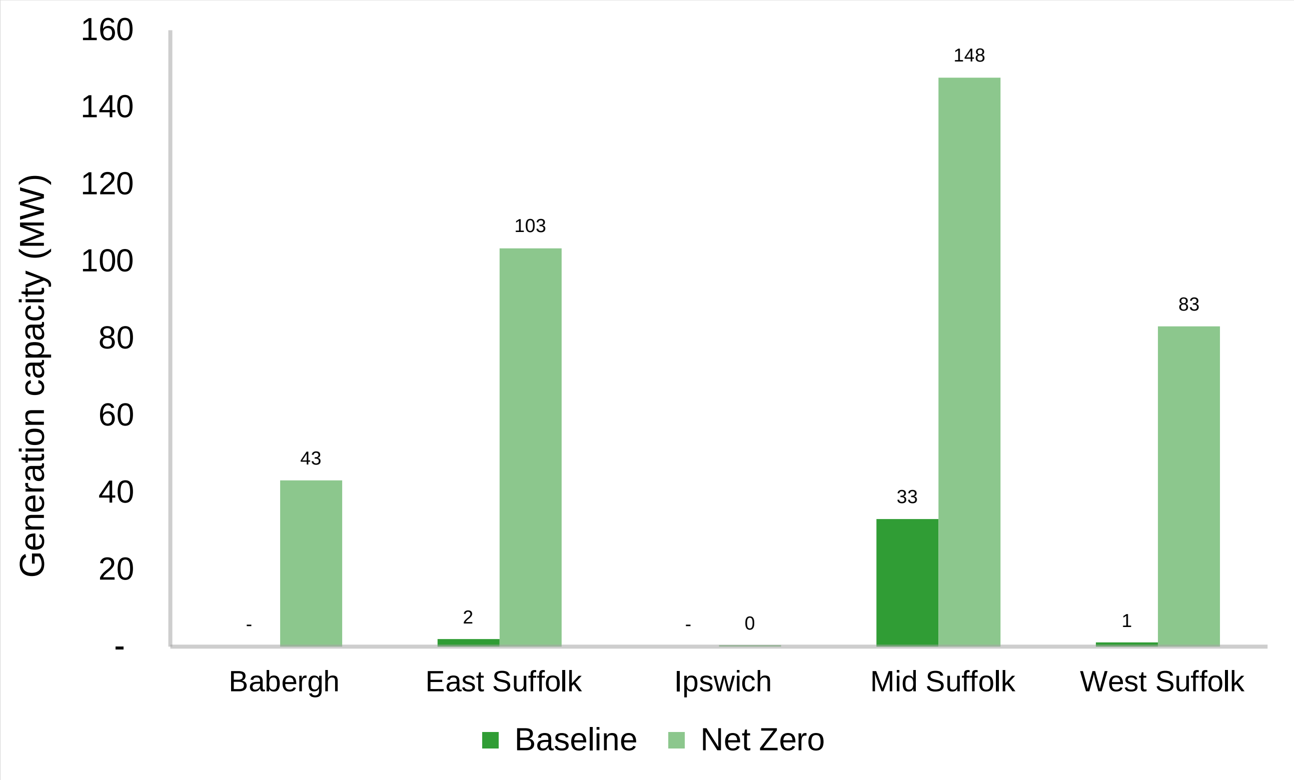


Onshore wind generation in Suffolk is currently estimated at 36 MW, with Mid Suffolk generating the most capacity[47]. UK Power Networks' Distributed Future Energy Scenarios project a 380 MW generation capacity for onshore wind in Suffolk to achieve Net Zero, with Mid Suffolk contributing the most, followed by East Suffolk, then West Suffolk and Barbergh. **Figure 31** shows the values we assume in our modelling, by local authority.

Figure 31: Suffolk onshore wind generation capacity values[48]

[47] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.

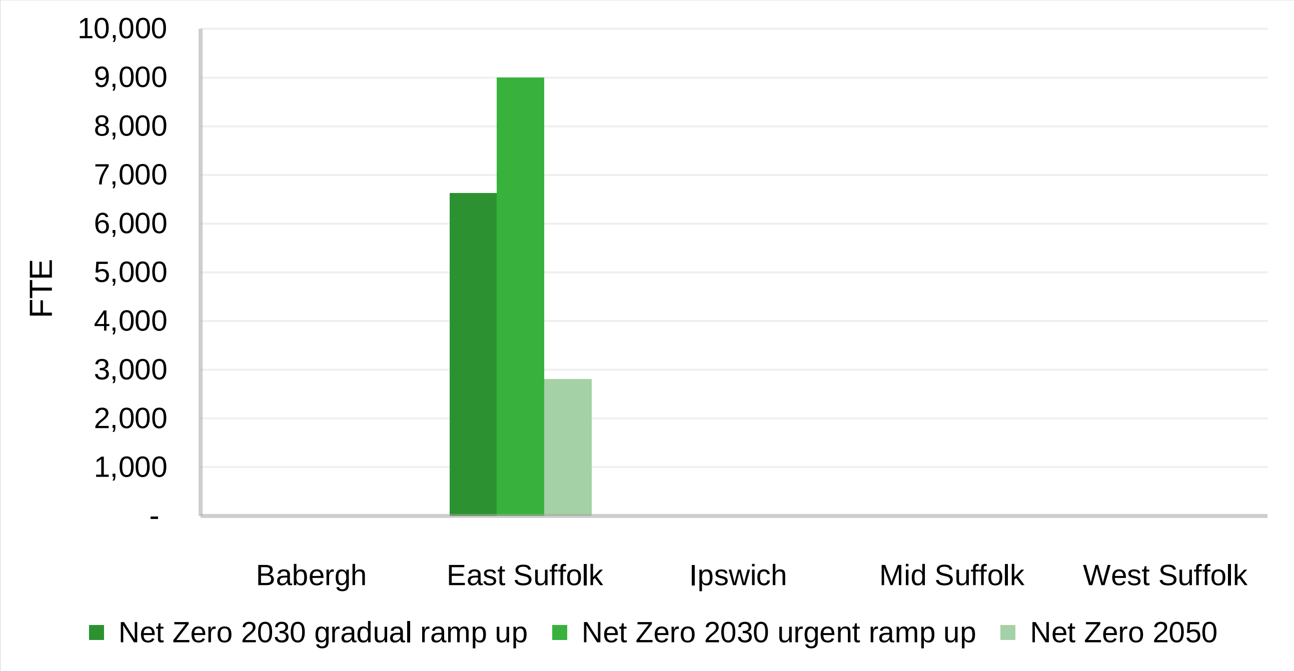
[48] Values from Distribution Future Energy Scenarios. (2020 and 2050). Distribution Future Energy Scenarios (DFES) 2022.



Job creation scenarios in Suffolk

For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**. The job creation hotspot for offshore wind in Suffolk is only generated in East Suffolk, due to this local authority being the region with assumed offshore wind capacity. The highest peak is seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in **Figure *3232***. Higher peak jobs for given scenarios are associated with faster increases in capacity.

Figure 32: Suffolk offshore wind peak jobs across the scenarios



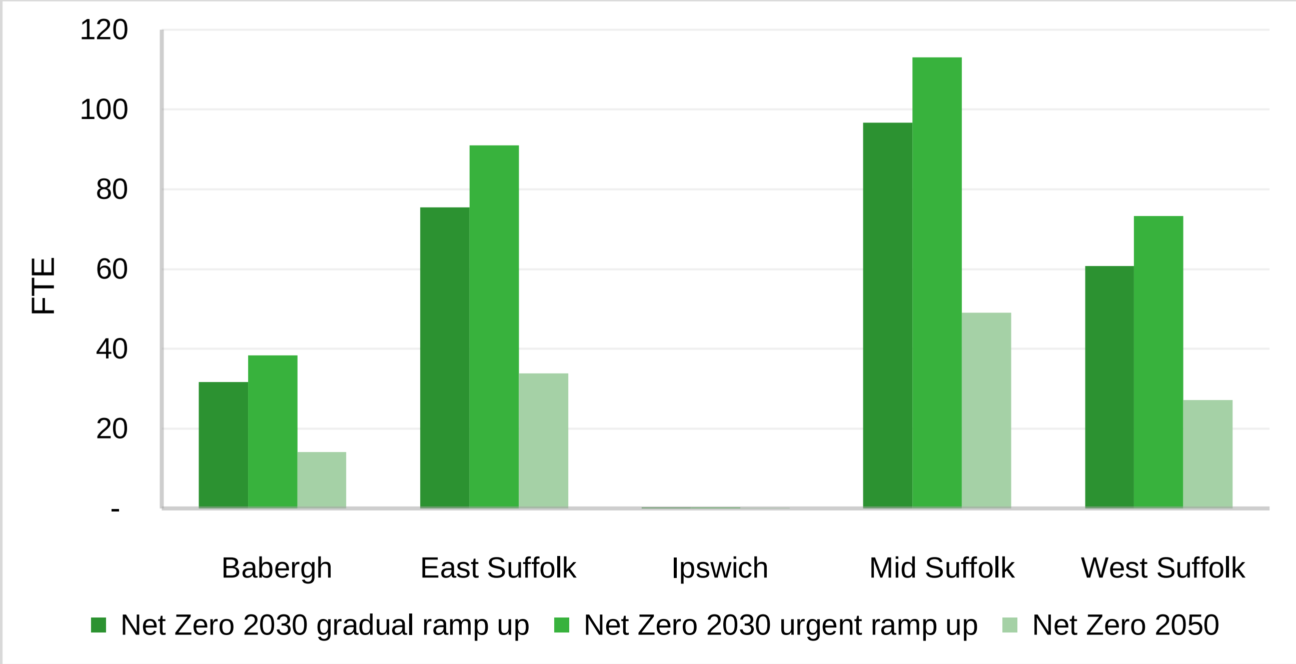
The years in which the peak jobs occur for each scenario are provided in **Table 6**. More insight into these values is provided by **Figure 34** later in this section, which depicts how the total number of jobs changes over time for each scenario.

Table 6: Year in which peak jobs occur for offshore wind in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2049	2036

Job creation hotspots for onshore wind mirror those that see the largest increases in generation capacity – Mid Suffolk followed by East Suffolk, West Suffolk and Barbergh. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario followed by the Net Zero 2030 gradual ramp up scenario, with the Net Zero 2050 scenario having a peak of less than half of that for the previous scenarios. **Figure *3333*** shows these values.

Figure 33: Suffolk onshore wind peak jobs across the scenarios



The years in which the peak jobs occur across each scenario are listed in **Table 7**. More insight into these values is provided by ***Figure 3535*** later in this section, which depicts how the total number of jobs changes over time for each scenario.

Table 7: Year in which peak jobs occur for onshore wind in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2049	2039

The development of offshore wind jobs over time for each of the three scenarios is shown in **Figure 344**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. The urgent ramp up scenario shows how the peak in the 2040's is more pronounced than in the 2020s. This is due to the sizeable baseline of operation and maintenance jobs, the additional decommissioning jobs and new construction roles being created simultaneously.

Figure 34: Suffolk offshore wind FTE over time

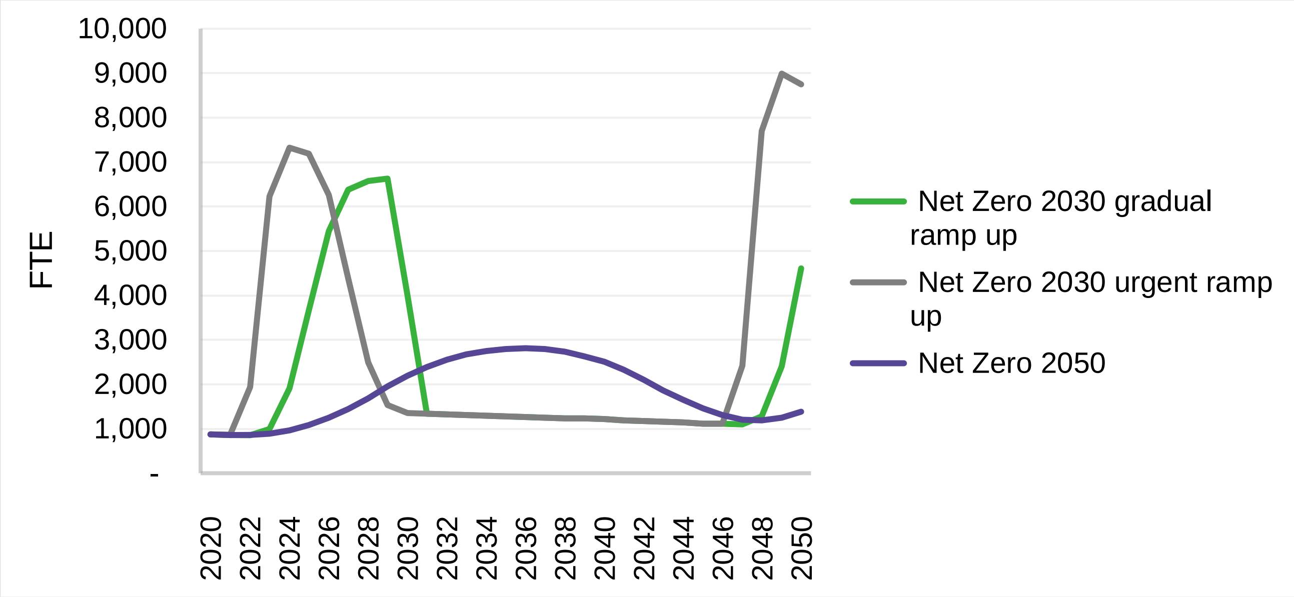
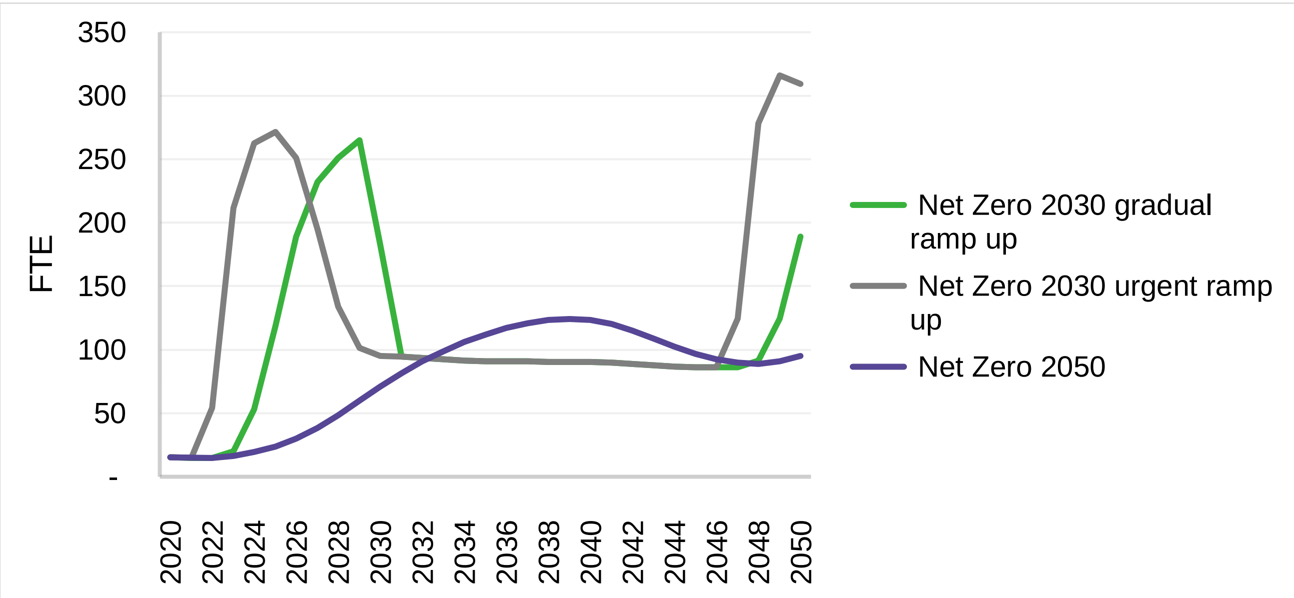


Figure 35 shows the equivalent results for onshore wind – note the smaller number of jobs for onshore wind than offshore wind, due to smaller increases in capacity. The Net Zero 2030 scenario has a second peak that is higher than the first, as is also the case for offshore wind. This results from an increase in operation and maintenance jobs from cumulative capacity, and jobs associated with decommissioning end-of-life capacity. More detail on the breakdown of jobs is given in the figures later in this section.

Figure 35: Suffolk onshore wind FTE



Breakdown of job types in Suffolk

As noted, different types of jobs have been modelled. These are associated with construction and installation of capacity, operation and maintenance of assets, and decommissioning of end-of-life technologies. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity. **Figure 36**, **Figure 37** and **Figure 38** present the number of jobs in each type over time for offshore wind, for each scenario.

For both the Net Zero 2030 scenarios, we see the pattern of a second peak where the capacity increase associated with the previous peak comes to the end of its life, and therefore needs decommissioning and replacing. This is most pronounced under the urgent ramp up scenario in the timeframe to 2050.

Figure 36: Suffolk offshore wind FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

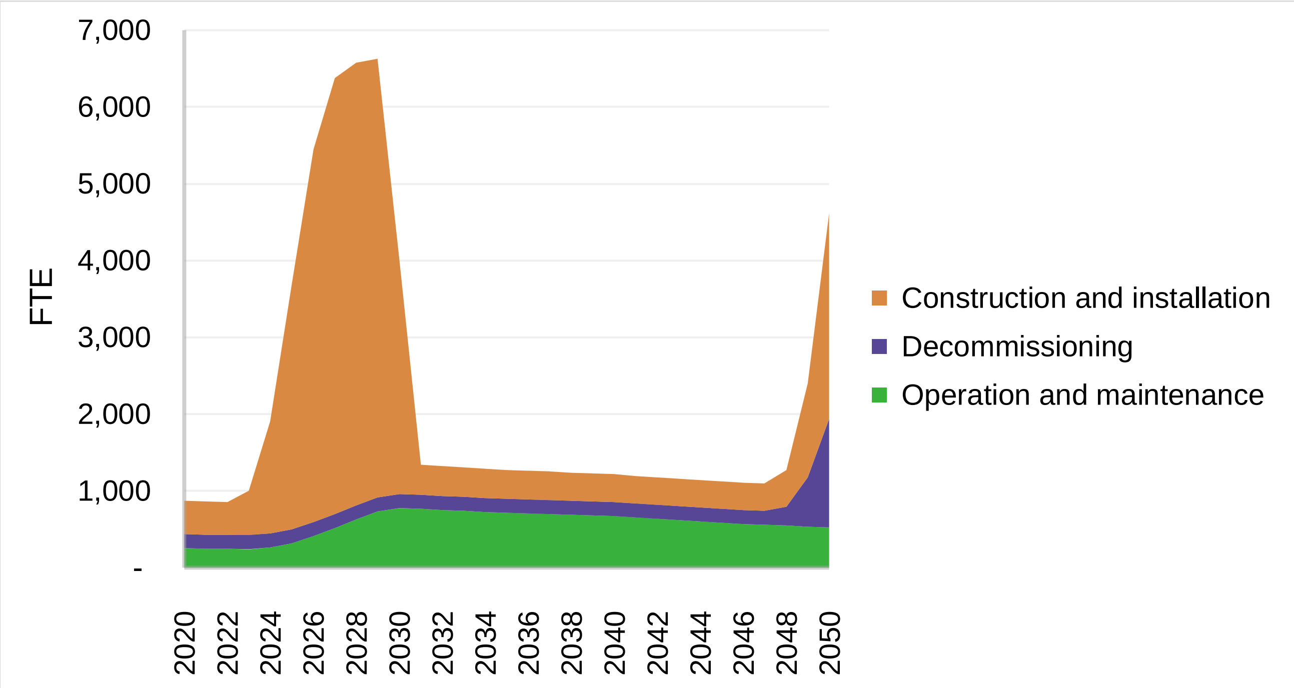


Figure 37: Suffolk offshore wind FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

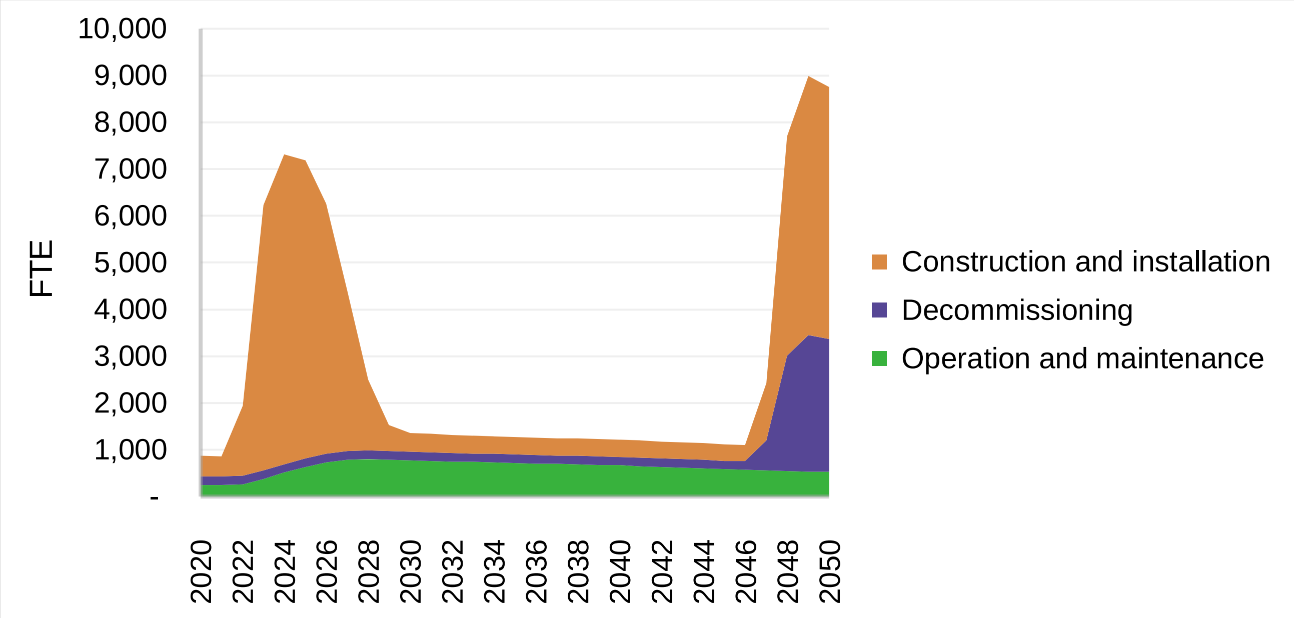


Figure 38: Suffolk offshore wind FTE by job type for the Net Zero 2050 Scenario

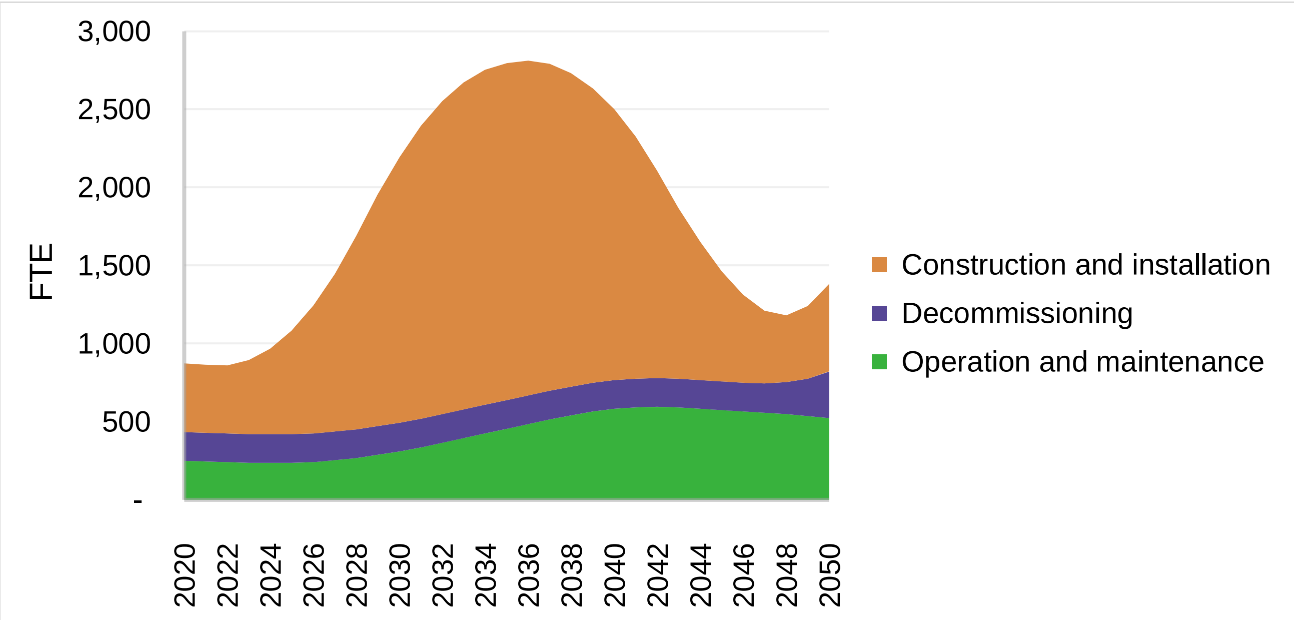


Figure 39, **Figure 40** and **Figure 41** present the number of jobs in each type over time for onshore wind, for each scenario. Given the significant capacity increases compared to current levels, replacement and decommissioning of existing capacity looks minimal in the period between the peaks associated with construction and installation (largely only operation and maintenance jobs are seen in this period). The comparatively high Net Zero capacity also means operation and maintenance jobs are significant from 2030.

Figure 39: Suffolk onshore wind FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

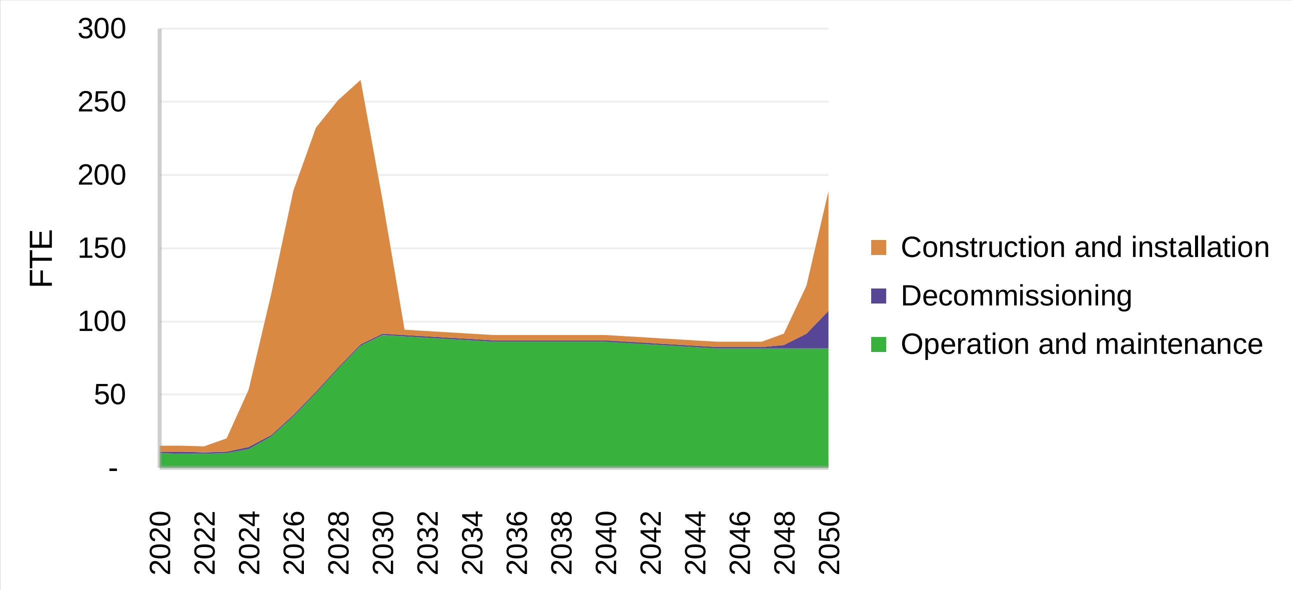
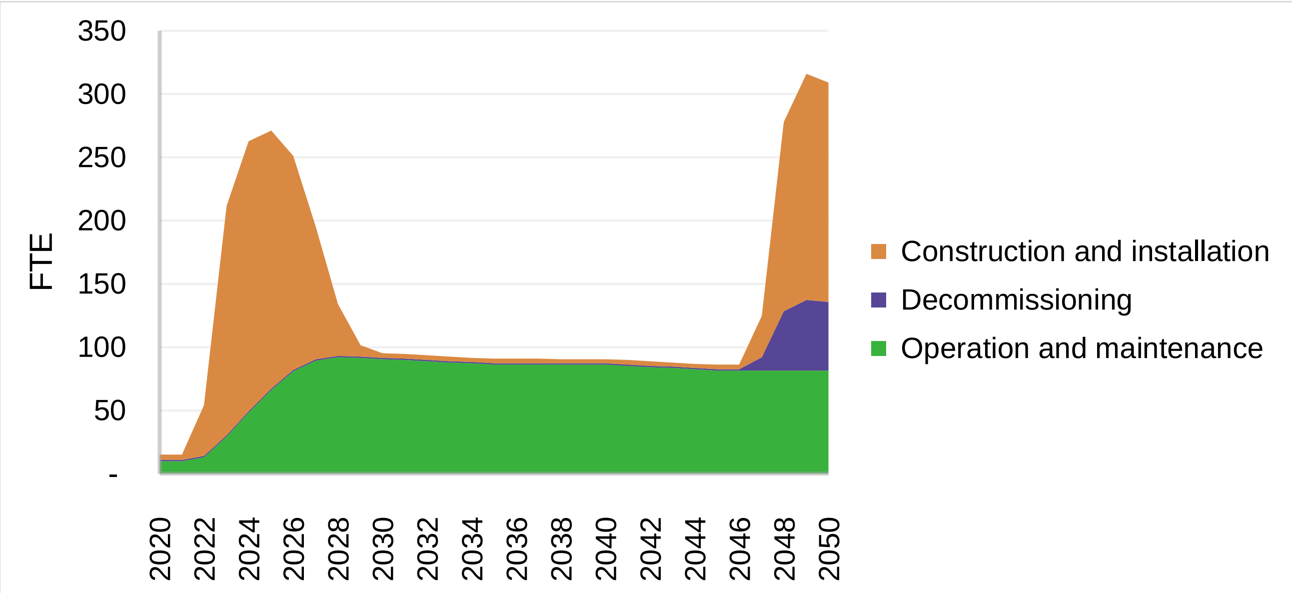


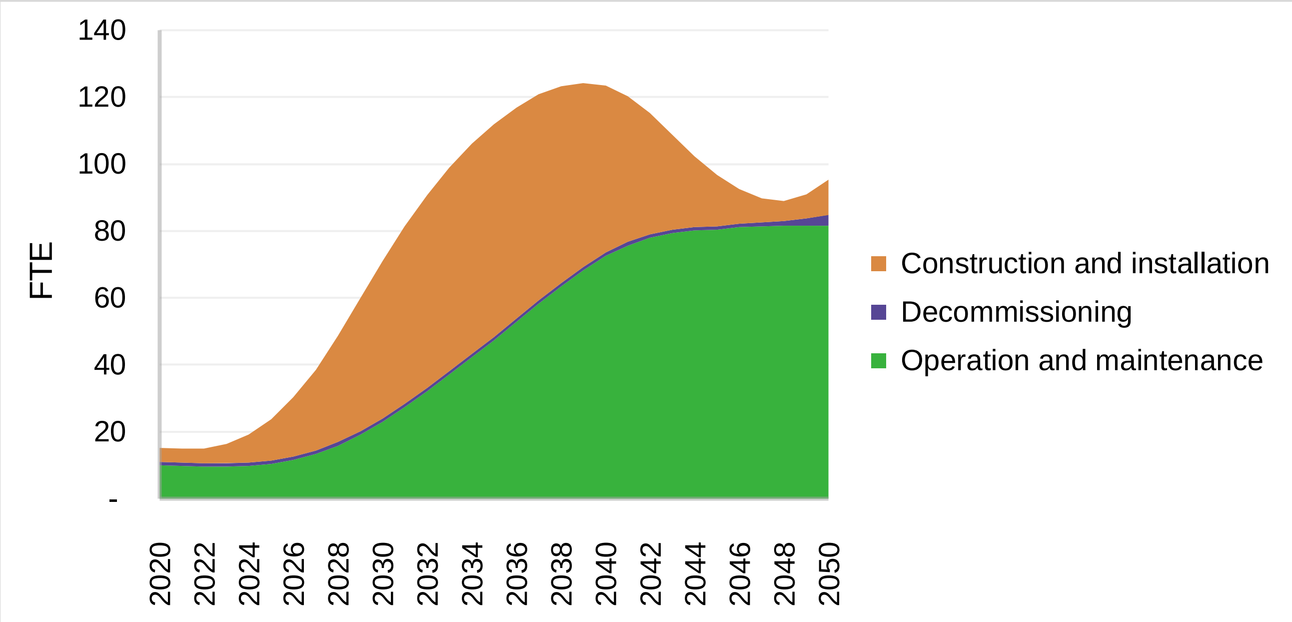
Figure 40: Suffolk onshore wind FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario



Under the Net Zero 2050 scenario shown in

Figure 41, decommissioning jobs appear insignificant. This is due to a slower rate of increase in capacity over time, meaning installations reach the end of their life at more distributed times, rather than all at once, so the peak is less pronounced for decommissioning jobs. However, with the smooth profile of capacity increase assumed under the Net Zero 2050 scenario, the number of jobs required over time still fluctuates to some extent, with the start of a second peak in jobs observed towards 2050.

Figure 41: Suffolk Onshore Wind FTE by Job Type for the Net Zero 2050 Scenario



Economic benefits in Suffolk

Estimated peak GVA that results from jobs in the categories used above are shown in

Table 8 and

		Operation and	Decommissioning	Construction and
Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	26	2	16
Urgent ramp up	2049	26	5	19
Net zero 2050	2040	23	1	7

Table 5, for offshore wind and onshore wind respectively. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios.

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	130	100	410
Urgent ramp up	2049	130	210	470
Net zero 2050	2037	100	21	150

Table 8: Suffolk offshore wind peak projected annual GVA values by job types

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Table 9: Suffolk onshore wind peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	15	2	13
Urgent ramp up	2049	15	4	15
Net zero 2050	2041	14	-	5

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA

Skills provision and challenges in Norfolk and Suffolk

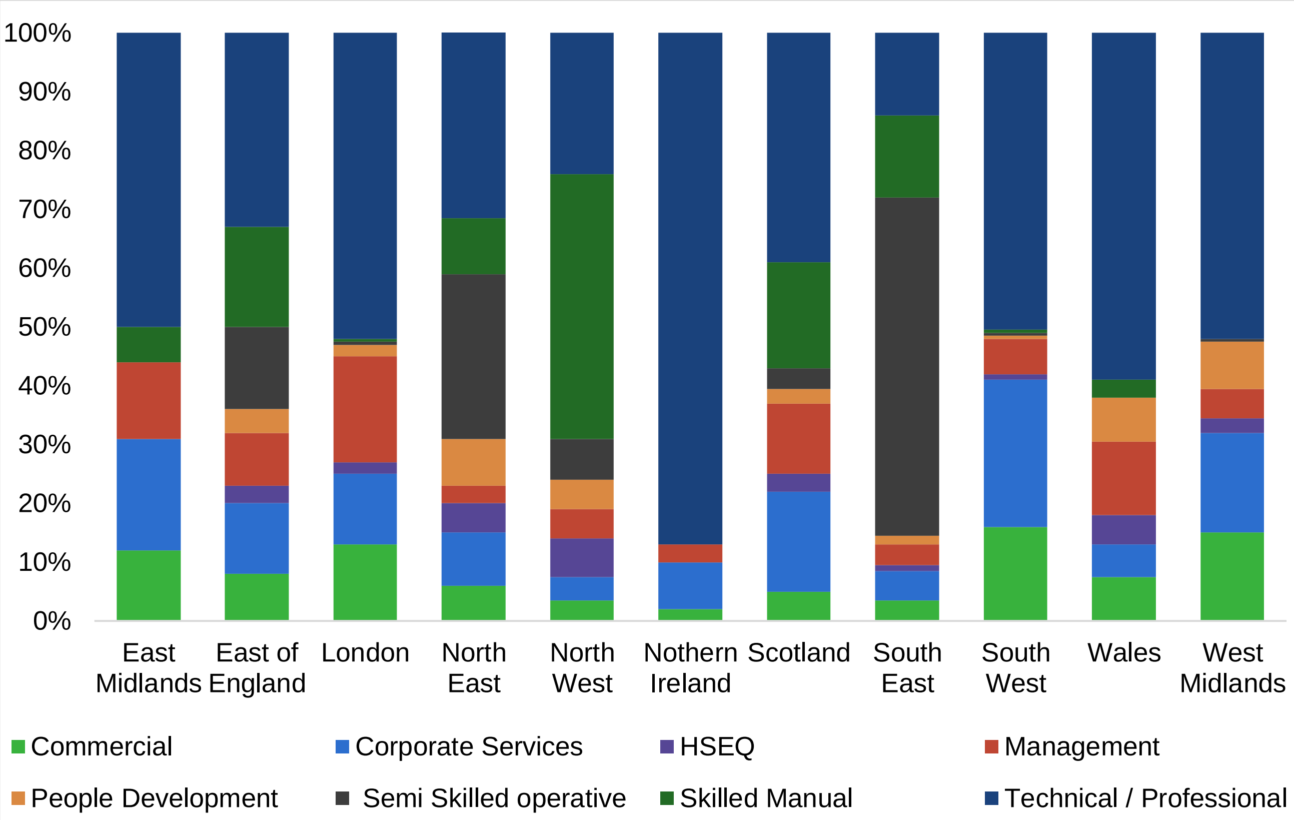
This section brings together insight from the desk research and the stakeholder engagement process to understand the skills gaps prevalent across Norfolk and Suffolk in offshore and onshore wind.

Encouragingly, most respondents from industry and training providers pointed to the success of Norfolk and Suffolk's offshore wind sector. One local training provider argued that Norfolk and Suffolk were world leading at upskilling the workforce, with many operation and maintenance staff trained locally. On the other hand, there was a feeling from some industry players that despite strong foundations, the Norfolk and Suffolk regions could go further and energise local communities, supply chains and colleges to better support the growth of the region's offshore wind sector. Onshore wind was mentioned less frequently but was seen as an important future development for Norfolk and Suffolk. Many respondents in the wind sector highlighted that National Planning Policy Frameworks are placing onerous constraints on building onshore wind in England. Respondents thought that this is preventing the region from hitting its local renewable energy generation ambitions and has stifled job creation opportunities.

Stakeholders explained that, from a practical perspective, wind construction roles are generally within a 90-mile radius of the development, meaning that construction related roles would remain localised, giving Norfolk and Suffolk a strong advantage in creating job opportunities in the area. Additionally, operations and management roles will be created in the Norfolk and Suffolk area as each site requires permanent roles in this field. This evidence suggests that a drive to keep skills within the region would aid in meeting the growth requirements needed for employers to propel the net zero transition. If addressed, Norfolk and Suffolk would have a competitive advantage in wind sector skills.

Despite the positive actions taken in the offshore wind sector however, employers still face sizeable challenges in skills gaps across low to intermediate levels for current and pipeline projects. These tended to be in operation and maintenance roles, where the positions will often need filling from the surrounding areas. **Figure 42**, taken from a recent Offshore Wind Industry Council report, reinforces the stakeholder engagement insights around the importance of intermediate skill sets. For the East of England, well over half of the roles are technical, skilled manual, and semi-skilled operatives. These roles typically require an apprenticeship or Level 3 qualification (with more technical roles also needing a degree).

Figure 42: Breakdown of skills gaps in the offshore wind sector by role and region[49]



There were mixed perspectives on the transitional capability from the oil and gas sector. On the one hand, one offshore wind developer said most of the new recruits for their projects are coming from the oil and gas sector, given their familiarity with offshore working. On the other hand, some developers argued that while it can be easier to upskill directly from the oil and gas sector, there is still a substantial training requirement. Interestingly, one private training provider mentioned that oil and gas skills are largely transferable, but that

[49] Offshore Wind Industry Council. (2022). Offshore Wind Skills Intelligence Report.

those transitioning from these sectors won't necessarily transition into a role in the renewables sector that's equivalent to their existing role, removing the incentive to transition over.

Industry stakeholders involved in offshore wind noted a steady growth in the recruitment of people with entry level qualifications. This has been due to the growth in apprenticeship schemes, many of which do not require employees to have more than two GCSEs at 'C' level or above. Nevertheless, many challenges were unearthed around why recruitment is hard. One training provider mentioned the physicality of an operation and maintenance role in the offshore wind sector which often meant that a younger workforce was needed, which does not play to Norfolk and Suffolk's demographic strengths.

It was largely agreed that positions that require high level qualifications are easier to recruit for. This is because the highly skilled and management labour market is generally fluid, with professionals at degree level or higher more willing to relocate for a job opportunity. However, the greater flexibility to move also means that high level qualifications hires may also stay outside the local area, notably considering COVID and working from home.

Employers communicated that the transient workforce was one of the main challenges facing the area, as young people tend to move away from the region once they have left school or college and gained qualifications[50]. Furthermore, training providers stated that a reasonable percentage of students gain employment relevant to their subject area in the Norfolk and Suffolk counties, however a smaller percentage explained that students will seek employment outside of the East Anglia region upon completion of courses. Offshore wind developers further explained the current skills gaps by profession and the skills required for the future of development, which encompassed a range of skills levels. These professions are listed in **Table 10** below:

Table 10: Gaps in different job types in the offshore wind sector sorted by different skill levels

Entry & Low Skilled	Intermediate Skilled	High Skilled
Construction	Electricians	Hydraulic Professionals
Operations and Maintenance	Mechanics	Stakeholder Managers
	Hydraulic Professionals	Digital Professionals
	Finance Professionals	Data Analytics
	Motor Mechanical Professionals	AI Professionals

[50] New Anglia LEP. (2022). Norfolk & Suffolk Economic Strategy Evidence Report.

		Mechanical Software Engineers
		Chemical Engineers (with experience)
		High Voltage Engineers
		Business Development Managers
		Communications
		Environmental Scientists
		Planning Consultants (including fisheries planning)
		Renewables Professionals (with experience)
		R&D Engineers

Colleges within the region have already invested in skills for offshore wind, especially East Coast College who run numerous courses and have partnerships with multiple providers including Maersk Training and Hexis Training. These courses range from Global Wind Organisation (GWO) approved courses on health and safety in offshore wind farms to courses aimed at transitioning those people in the oil and gas sector. Moreover, the community funds attached to various local offshore wind farms have enabled more targeted STEM outreach from the private sector to promote the offshore wind industry.

In addition to wind sector specific courses, many of the colleges offer broad apprenticeships and other short courses that could enable learners to transition into operation and maintenance roles or electrical engineering. Established apprenticeships in electrical subjects and maintenance engineering are prevalent across most colleges, with the modules covering a range of relevant topics including electrical inspection and maintenance. Other colleges also explicitly gear certain courses towards wind energy, providing opportunities to connect with local employers. For example, City College Norwich offer three-degree equivalent courses in electrical engineering and electronics that mention renewable energy systems and technology disciplines relevant for wind turbine operations. They also host a mechatronic maintenance technician apprenticeship which can be applied to servicing wind turbines. The College of West Anglia and East Coast College also offer engineering T Levels and Apprenticeships geared towards maintenance engineering which can be applied to the wind sector. **Table 11** details the local colleges and universities that offer courses relevant for the wind sector and includes the Colchester Institute in Essex which provides some relevant training.

Table 11: Colleges and universities in & around Norfolk and Suffolk offering wind sector related courses

Institution	Wind specific courses and potentially relevant courses	Address
City College Norwich	Engineering Technician - Mechatronic Maintenance Technician Apprenticeship Standard Level 3 Engineering Technician - Technical Support, Level 3 Standard Installation Electrician Apprenticeship Level 3 Standard HNC in Engineering (Electrical, Electronic Engineering) HND Electrical and Electronic Engineering (Top Up) HND Embedded Electronic Systems (Top Up)	Ipswich Rd Norwich Norfolk NR2 2LJ
College of West Anglia	Electrical Skills Assessment The Electricity at Work Regulations 1989 Maintenance Operations Engineering Technician Apprenticeship – Level 3 Installation Electrician and Maintenance Electrician – Level 3 Industrial Electrical Maintenance Skills (Assured by City and Guilds) - for Maintenance Engineers Level 3 Award in the Initial Verification and Certification of Electrical Installations (City & Guilds 2391-50) Level 3 Award in the Periodic Inspection, Testing and Certification of Electrical Installations (City & Guilds 2391-51) Level 3 Award in Inspection & Testing of Electrical Installations City & Guilds 2391-52	Kings Lynn Campus Tennyson Avenue King's Lynn Norfolk PE30 2QW

East Coast College	Level 2 Diploma in Safe Working Practice in the Wind Turbine Industry 3-4 week Transition to Offshore course for engineers and technicians who are already working in closely aligned industries Electrical Installation Level 2 Electrical Installation Level 3 T Level in Maintenance, Installation and Repair for Engineering and Manufacturing Level 3	Great Yarmouth Campus Suffolk Road Great Yarmouth Norfolk NR31 0ED Lowestoft Campus Rotterdam Road Lowestoft Suffolk NR32 2PJ
Suffolk New College	Electrical Installation Level 1 Electrical Installation Level 2 Electrical Installation Level 3 Net Zero Skills Centre Level 2 Engineering (PEO)	Rope Walk Ipswich Suffolk IP4 1LT
University of East Anglia	MSc Energy Engineering BEng (Hons) Engineering	Norwich Research Park Norwich Norfolk NR4 7TJ
University of Suffolk	HND Engineering (General Engineering)	Waterfront Building 19 Neptune Quay Ipswich Suffolk IP4 1QJ
West Suffolk College	Introduction to Electrical Installations (7202-01) Level 1 Electrical Installation Diploma (8202-20) Level 2 Advanced Electrical Installation Diploma (8282-30) Level 3 Installation Electrician/Maintenance Electrician Level 3 Engineering Fitter Level 3	Sixth Form Campus Out Risbygate Bury St Edmunds Suffolk IP33 3RL Built Environment Campus Anglian Lane Bury St Edmunds Suffolk IP32 6SR University and Professional Development Centre 73 Western Way Bury St Edmunds Suffolk

		IP33 3SP
Colchester Institute (Energy Skills Centre Harwich)	A course to attain CSCS green Labourer's card Level 2 EAL Diploma in Performing Engineering Operations (this is a perquisite for construction, fabricating / welding, and operation & maintenance) Working at Height Awareness	Hamilton House Foster Road Parkeston Quay Harwich Essex CO12 4QA

Given the prominence of the offshore wind sector, several specialised training providers have emerged in the area. **Table 12** provides a list of the private training providers operating in the area, including the Harwich operations centre owned by RWE which trains apprentices for their turbine maintenance. These courses tend to be highly specialised around the offshore wind and energy sectors and centre around health and safety training as well as wind turbine maintenance and inspection.

Table 12: Private training providers in Norfolk and Suffolk offering courses relevant to the wind sector

Institution	Wind specific courses and potentially relevant courses	Address
RWE (Essex, Harwich)	Offshore Wind Turbine Technician Apprenticeship | RWE in the UK Training carried out in Wales for sites in the region	Phoenix Road Essex CO12 4GD
Hexis	ECITB Wind Turbine Maintenance and Statutory Inspection GWO Basic Safety Training (BST) Modules of these two courses are also available to study separately	Energy Skills Centre East Coast College, Rotterdam Road Lowestoft NR32 2PJ
Maersk Training	Offer a GWO Basic Safety Training course	Energy Skills Centre Rotterdam Rd Lowestoft NR32 2PJ
Petans	Offer a range of GWO courses including: GW0 5 Day Full Basic Safety Training Course and sub modules	Imperial Wy Horsham St Faith Norwich NR10 3GJ

SOLAR PV

Overview of the solar PV sector in Norfolk & Suffolk

This section explores the solar PV sector in Norfolk and Suffolk, outlining current capacity, expected capacity increases in the region and how that influences future job creation. Over the last decade solar PV has steadily grown across Norfolk and Suffolk, supported by measures such as the government's Feed-in-Tariff (FiT) scheme[51]. The FIT was widely successful and the solar industry within the region has experienced continued growth in a post-subsidy era, however the industry needs to go further to reach net zero ambitions. Both Norfolk[52] and Suffolk[53] County Councils have worked with the Energy Systems Catapult to complete a Local Energy Asset Representation (LEAR). The LEAR data is used to provide councils with an overview of the best local developments for solar generation. Tools such as the LEAR aid the Councils in identifying prime areas for rooftop solar development.

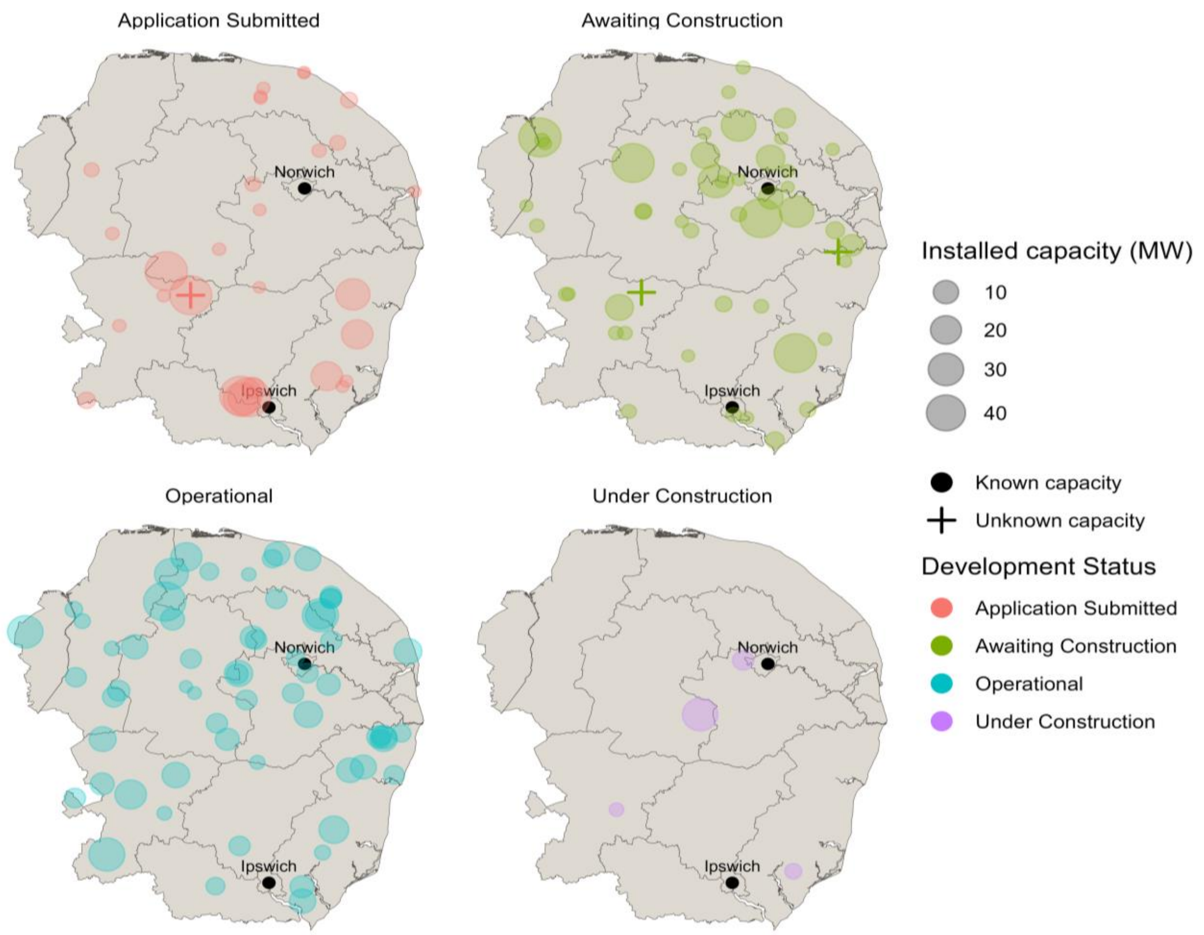
Local schemes across the region have enabled the area to boost demand for solar energy. Schemes such as 'Big Community Switch'[54] make solar PV more accessible for families in Norfolk. The group buy-in scheme has made it easier for to buy solar PV systems as the scheme works with group buying at a competitive price. A similar buy-in concept, 'Solar Together Suffolk' has helped over 1,500 homes in Suffolk to install solar panels and batteries[55]. To date, Solar Suffolk has installed 17,900 solar panels at over 1,500 homes and avoided an estimated 28,730 tonnes of CO_2 emissions across the county[56]. Both schemes demonstrate the community appetite for rooftop solar development and the potential for job creation within the field.

A large proportion of solar development in the region has derived from community rooftop solar schemes in the county. In recent years Norfolk and Suffolk have granted planning permission for ground mounted solar panels, furthering solar generation in the county. Ground mounted solar developments make use of Norfolk and Suffolk's land capacity and provide optimal and high-volume solar generation, benefitting both local and national households (where developments feed into the national grid network). **Figure 43** shows the operational and planned ground mounted solar PV developments in Norfolk and Suffolk taken from the REPD[57]. There are numerous ground mounted solar farms operational in the region, however, there are numerous solar farms that are awaiting construction or have application submitted.

---

[51] Ofgem. (2010). The FIT Scheme.
[52] Norfolk County Council. (N.D.). Norfolk Local Energy Asset Representation.
[53] Suffolk County Council. (2022). Suffolk Local Energy Asset Representation.
[54] Big Community Switch. (N.D.). Big Community Switch.
[55] Suffolk County Council. (2022). Solar Together Suffolk.
[56] Ibid.
[57] DESNZ, (2023). Renewable Energy Planning Database: quarterly extract

Figure 43: Operational and planned solar PV developments in Norfolk and Suffolk



Despite delegated planning enabling more solar development in the region, Norfolk and Suffolk has recently faced challenges in planning and consenting due to concerns around the use of Best and Most Valuable Land (BMV). Therefore, without local support of solar farms, job creation will be halted and fewer roles in operations and maintenance will be created as a result.

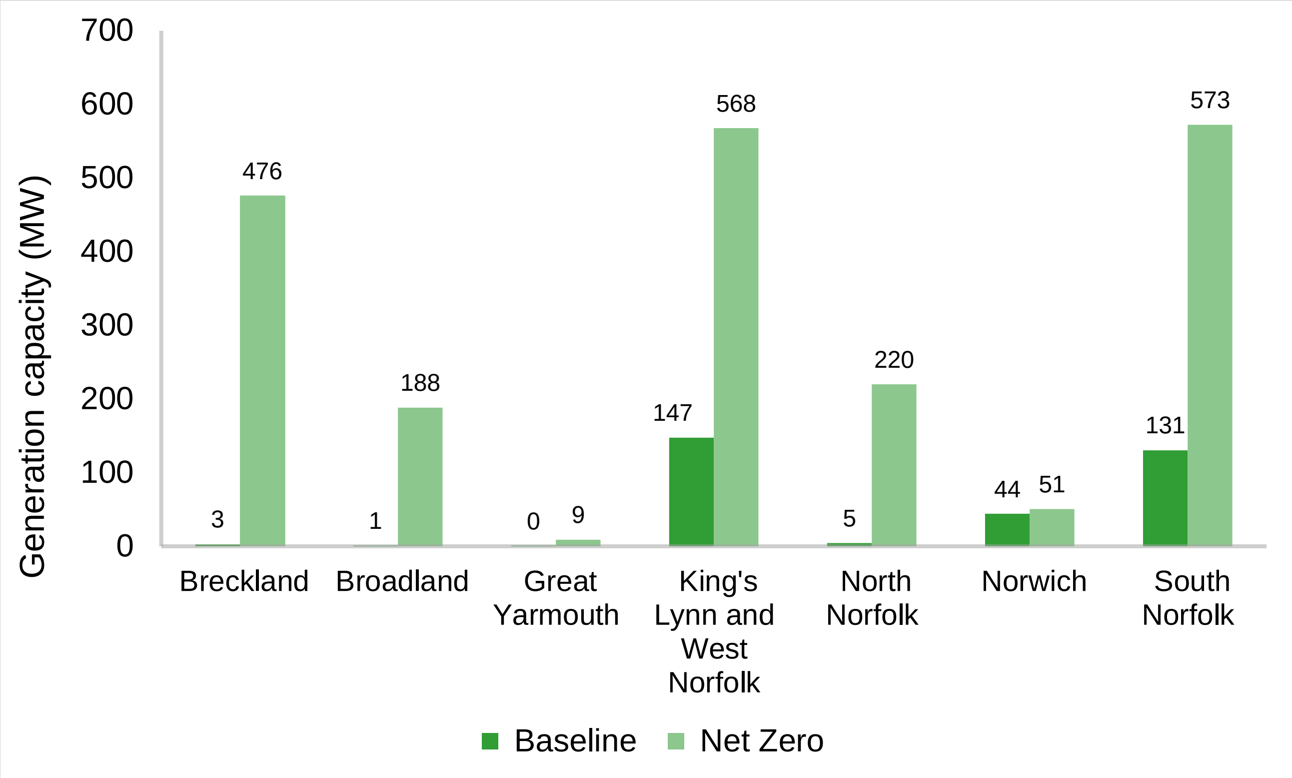
Current and expected capacity in Norfolk

As of 2020, Norwich, King's Lynn and West Norfolk and South Norfolk have driven solar generation in Norfolk. As mentioned, delegated planning powers have enabled decisions in support of solar development in these areas and it is predicted that Norfolk will become a hotbed for solar projects in the next decade. Norfolk's size and climate make it well suited to the technology with South Norfolk being home to the highest number of solar installations in the county with some 4,841 installations across the district generating some 69,481 megawatts per hour (MWh)[58]. The values shown in Error! Reference source not found. demonstrate that Norfolk will need to rapidly increase its generation capacity from 330 MW in 2020

[58] Eastern Daily Press. (2022). Norfolk set for solar power revolution by 2035.

to just over 2 GW. This represents an increase of 6 times current installed capacity for the county to meet net zero targets. Regional hotspots of installation capacity include King's Lynn and West Norfolk, South Norfolk and Breckland. For the current and future levels of ground mounted solar required for Net Zero, Gemserv used the Distributed Future Energy Scenarios from UK Power Networks.

Figure 44: Norfolk large solar PV generation capacity values[59]



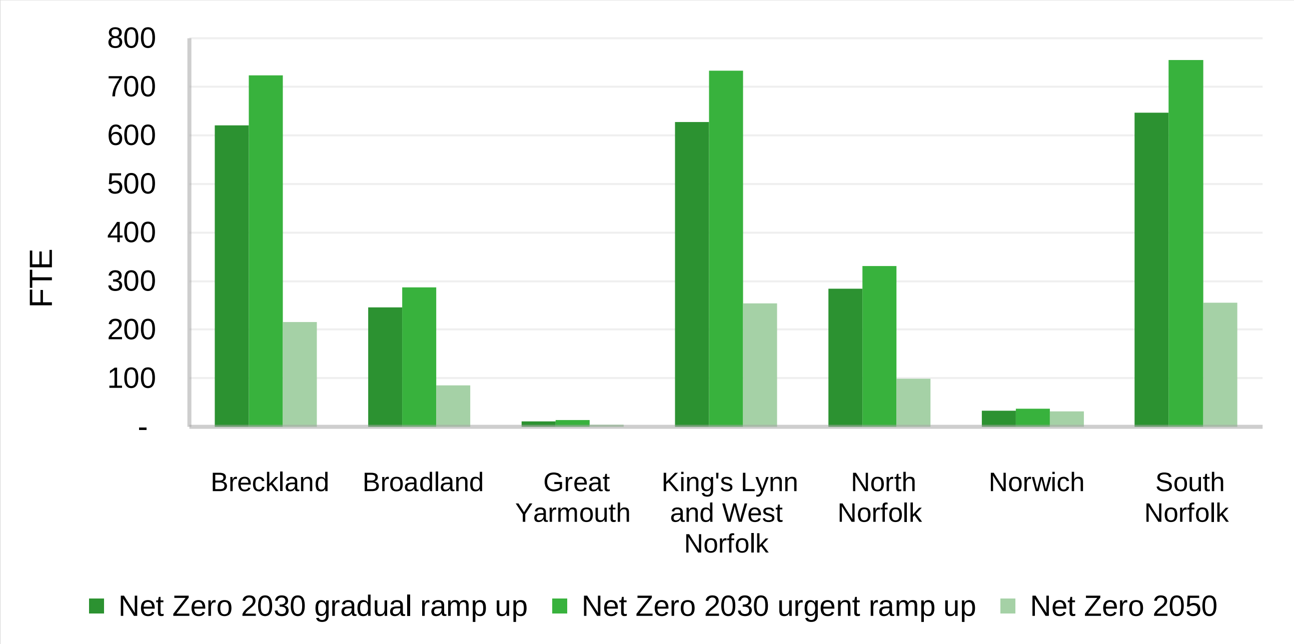
Job creation scenarios in Norfolk

For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for large solar PV in different local authorities are in line with those that see the largest increases in generation capacity – King's Lynn and West Norfolk, South Norfolk, and Breckland. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in **Figure 45**. Higher peak jobs for given scenarios are associated with faster increases in capacity.

[59] Values from Distribution Future Energy Scenarios. (2020 and 2050). [Distribution Future Energy Scenarios (DFES) 2022](#).

Figure 45: Norfolk large solar PV peak jobs across the scenarios



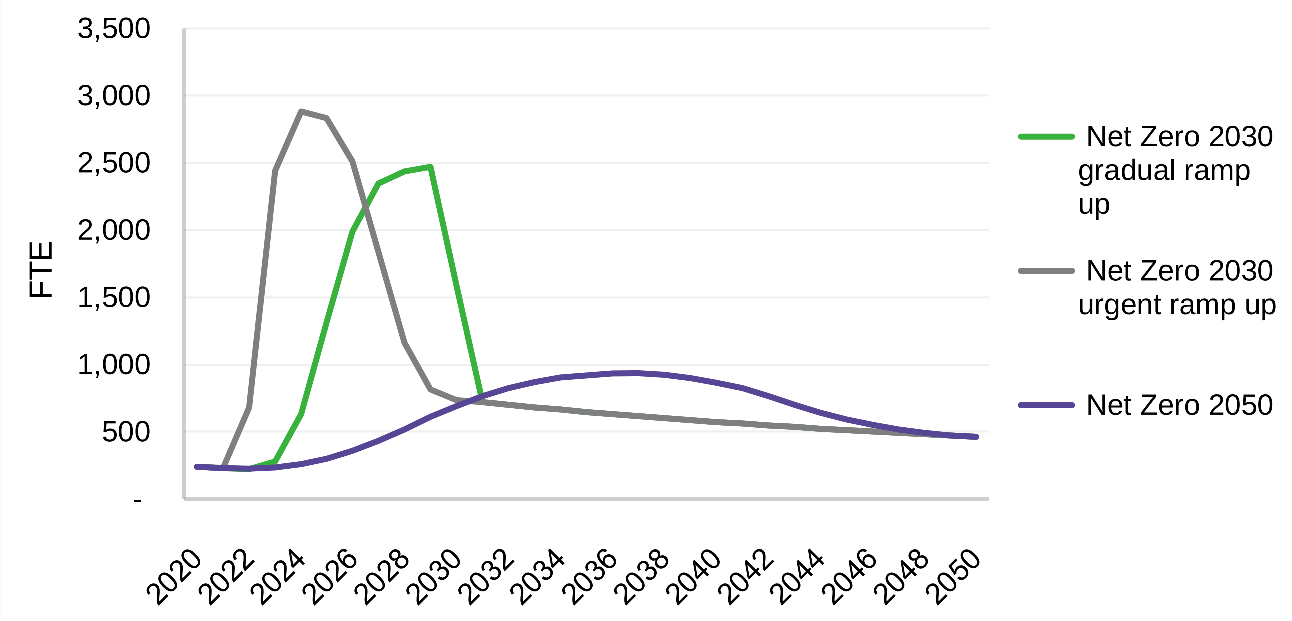
The years in which the peak jobs occur in each scenario are provided in **Table 13**Error! Reference source not found.. More insight into these values is provided by **Error! Reference source not found.**below, which depicts how the total number of jobs changes over time for each scenario.

Table 13: Year in which peak jobs occur for large solar PV in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2024	2037

The development of large solar PV jobs over time for each of the three scenarios is shown in Error! Reference source not found. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. For large solar PV we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after the 2050.

Figure 46: Norfolk large solar PV FTE over time



Current and expected capacity in Suffolk

Current solar generation capacity in Suffolk is centred around Mid Suffolk as shown below in **Figure 47**. From our analysis of projects in the planning system, Mid Suffolk will play a key role in ramping up solar generation within the county.

below demonstrates current solar projects in the planning system within Mid Suffolk that will contribute to

Project Name	Location	Application Type
EDF Tye Lane	Bramford	Application for full planning permission
Enso Energy	Burstall, Flowton, Somersham	Applications for full planning permission
Statkraft	Burstall, Flowton, Somersham	Applications for full planning permission
PACE	Palgrave	Application for full planning permission
Elgin Energy	Badley	Application for full planning permission
Green Switch Capital	Bentley	Screening opinion

net zero targets[60].

Project Name	Location	Application Type

[60] Barbergh and Mid Suffolk District Councils. (N.D.). Large-scale energy projects and NSIPs.

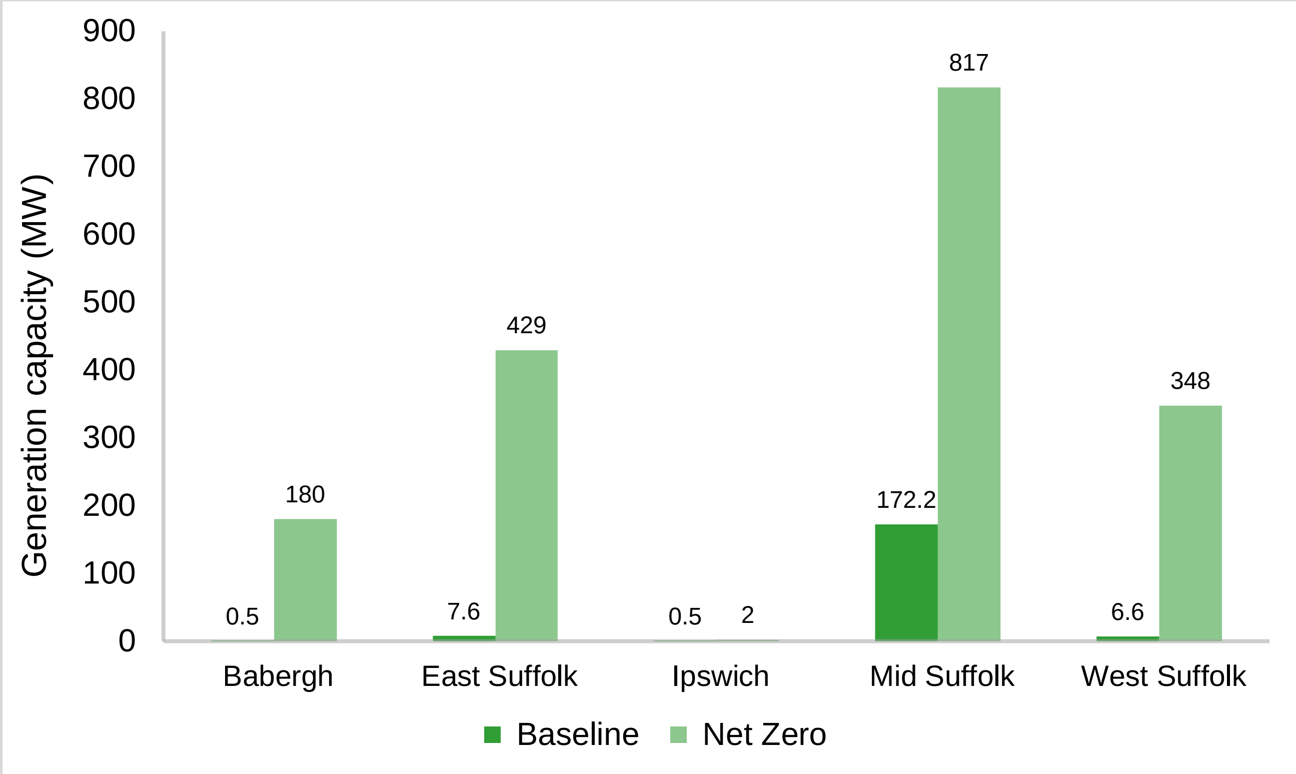
EDF Tye Lane	Bramford	Application for full planning permission
Enso Energy	Burstall, Flowton, Somersham	Applications for full planning permission
Statkraft	Burstall, Flowton, Somersham	Applications for full planning permission
PACE	Palgrave	Application for full planning permission
Elgin Energy	Badley	Application for full planning permission
Green Switch Capital	Bentley	Screening opinion

Table 14: Current solar projects in the planning system within Mid Suffolk

UK Power Network's figures for generation capacity of large solar PV installations in Suffolk put the 2020 total at 187 MW, with most generation being in Mid Suffolk. To meet the expected solar targets, Suffolk's solar generation capacity is expected to grow by 9.5 times to 1.8 GW. Mid Suffolk remains the most significant contributor, followed by East Suffolk, West Suffolk, and Barbergh**. Figure 47** gives the breakdown of expected generation capacity by local authority. It's expected large solar developments in Ipswich will be limited given how urbanised the area is.

Figure 47: Suffolk large solar PV generation capacity values[61]

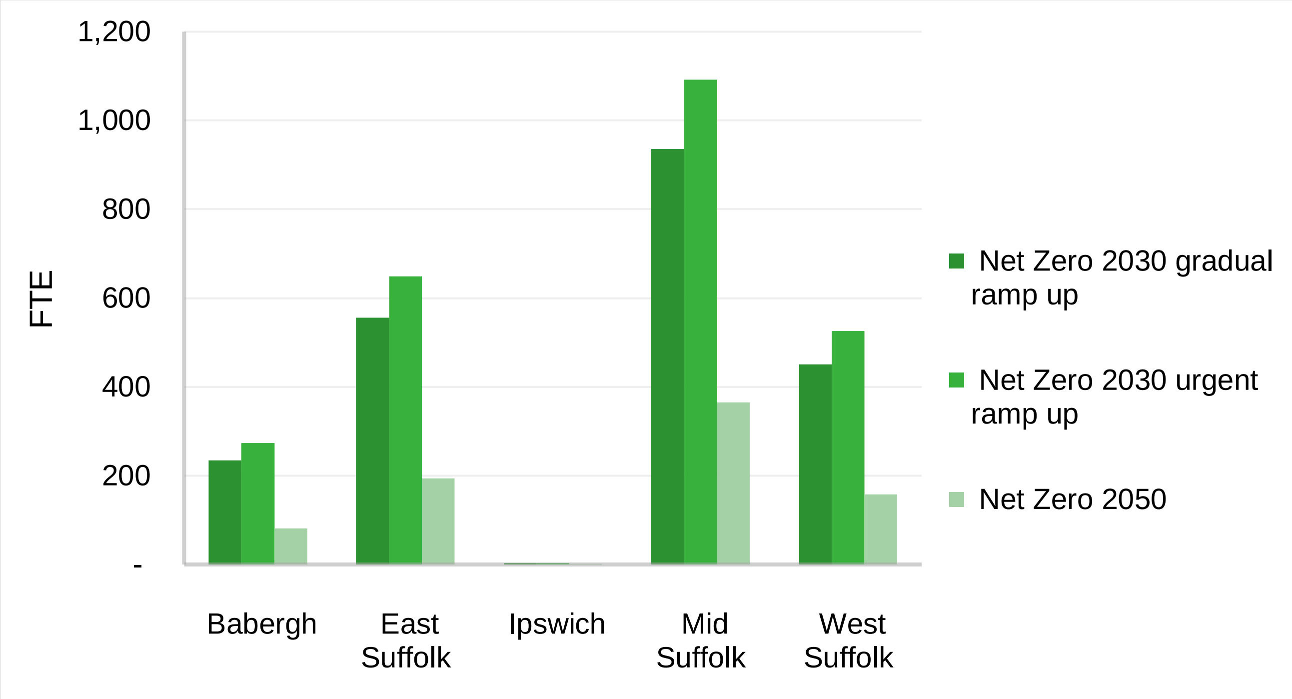
[61] Values from Distribution Future Energy Scenarios. (2020 and 2050). Distribution Future Energy Scenarios (DFES) 2022.



Job creation scenarios in Suffolk

For the increases in capacity given above, we have modelled job creation for the local authorities under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**. The job creation hotspot for large solar PV in Suffolk is in line with the local authorities with the largest capacity increases. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in **Figure 48**. Higher peak jobs for given scenarios are associated with faster increases in capacity.

Figure 48: Suffolk large solar PV peak jobs across the scenarios



The years in which the peak jobs occur are provided in

Table 15. More insight into these values is provided by **Figure 49** below, which depicts how the total number

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2024	2037

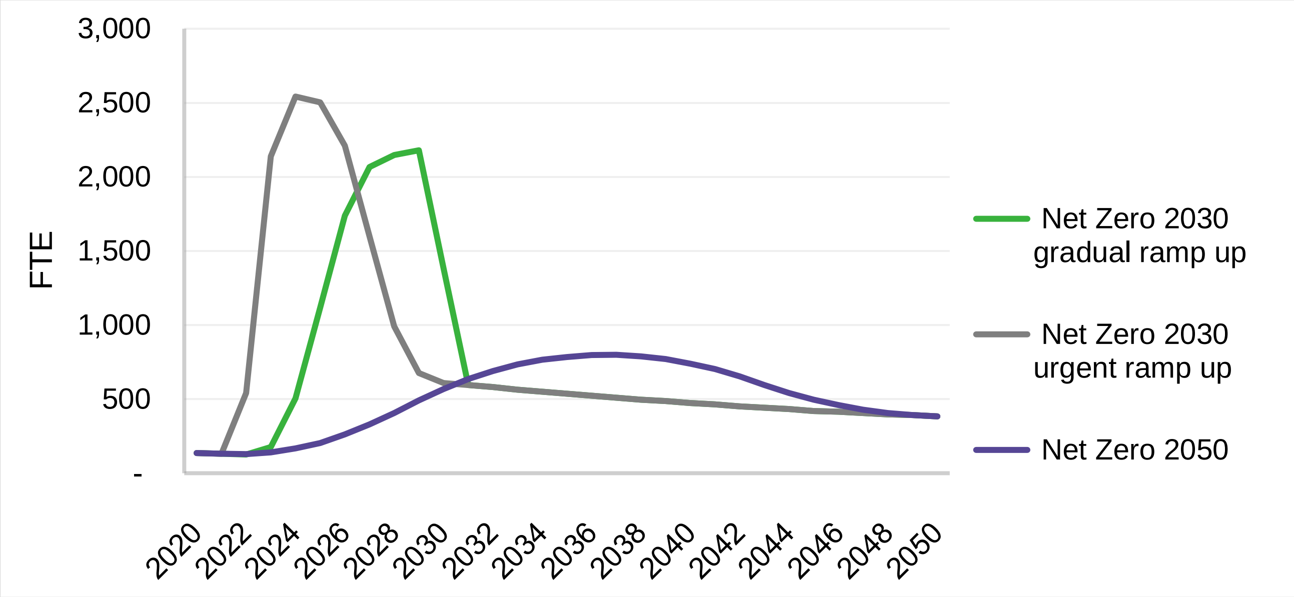
of jobs changes over time for each scenario.

Table 15: Year in which peak jobs occur for large solar PV in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2024	2037

The development of large solar PV jobs over time for each of the three scenarios is shown in Error! Reference source not found.. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. For large solar PV we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after the 2050.

Figure 49: Suffolk large solar PV FTE over time



Breakdown of job types in Norfolk and Suffolk

Jobs for solar PV relate to the design, installation, service and maintenance, and decommissioning of systems.[62] These roles can be categorised into three broad areas:

- **Design roles:** will generate and oversee engineering drawings, create specifications, and draw up designs. They will solve any civil engineering problems onsite and may adapt designs under field conditions.
- **Installers:** set up and install solar panels. Installers need both construction and electrical skills and qualifications to do this safely and correctly, such as connecting a solar system to the local or national electricity network. They measure, cut, assemble, and bolt structural framing and solar modules, safely attaching panels to roofs or other structures. They inspect installed equipment to ensure the installation meets all regulatory requirements, is safe, works, and is fit for purpose.
- **Solar maintenance and cleaning technicians**: A typical day for a PV or Thermal Maintenance Technician or Cleaning Specialist might involve cleaning installed solar panels, using robots and other purpose-built equipment, checking a solar system's power output, and identifying and rectifying or reporting any faults or problems found.

Different types of jobs have been modelled, that are associated with construction and installation of capacity, operation and maintenance of capacity, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

[62] Solar Energy UK. (2023). Careers in Solar.

Breakdown of job types in Norfolk

Error! Reference source not found., Error! Reference source not found.**51** and **Error! Reference source not found.** present the number of jobs in each type over time for large solar PV, for each scenario. For both the Net Zero 2030 scenarios, a gradual decrease in operation and maintenance jobs over time can be seen. This is due to learning rates for solar PV employment which assumes that fewer jobs will be needed in the future to maintain the same capacity, due to improved efficiencies in processes and technologies. There are minimal decommissioning jobs across the scenarios, due to low rates of capacity reaching end-of-life in the period considered, as noted above. The same can be said for any construction and installation jobs associated with replacing end-of-life capacity – which is why minimal construction and maintenance jobs are seen after 2030 in both the Net Zero 2030 scenarios.

Figure 50: Norfolk large solar PV FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

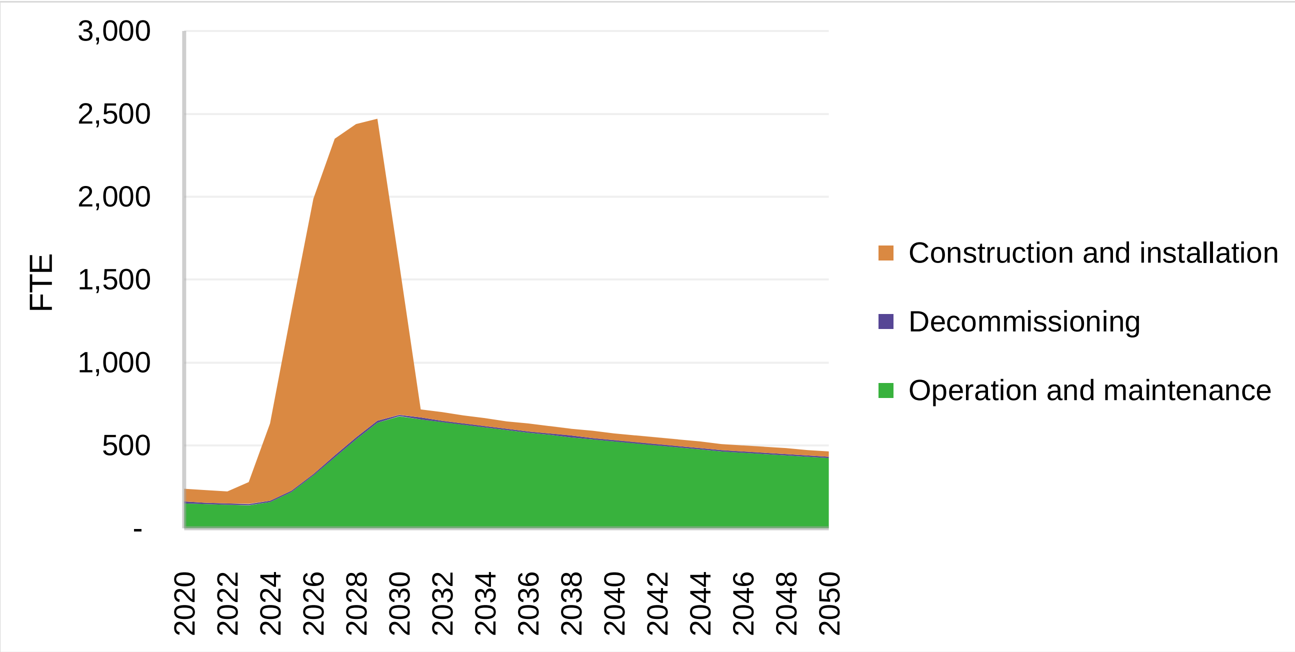


Figure 51: Norfolk large solar PV FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

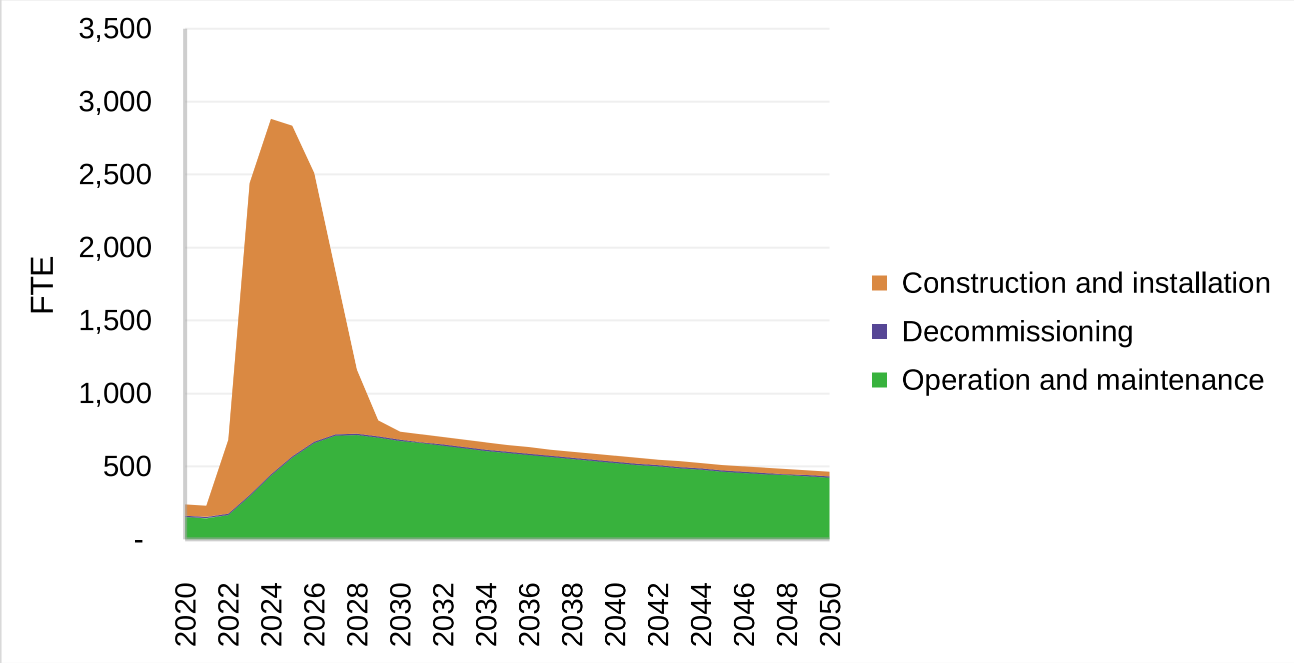
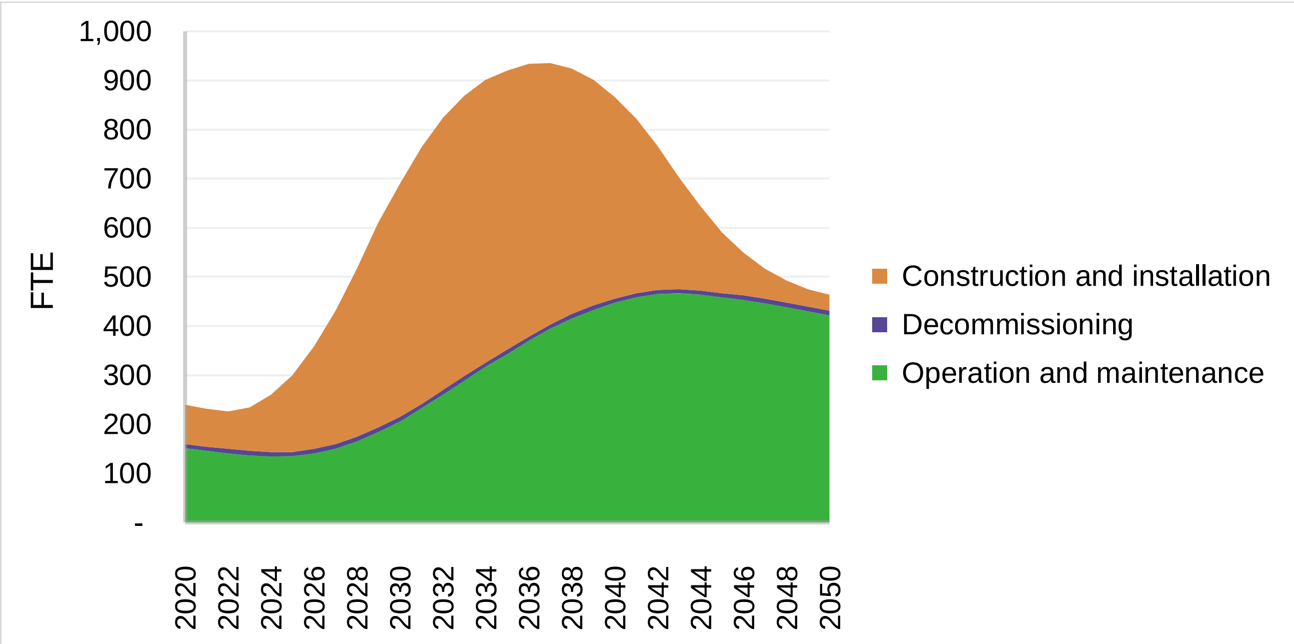


Figure 52: Norfolk large solar PV FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Norfolk

Estimated peak GVA that results from solar PV jobs in the categories used above are shown in Table 16. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	110	-	100
Urgent ramp up	2025	120	-	130
Net zero 2050	2039	78	-	30

generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios. The lack of GVA for solar PV decommissioning jobs aligns with the long lifetime of solar PV technology, as noted previously.

Table 16: Norfolk solar PV peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	110	-	100
Urgent ramp up	2025	120	-	130
Net zero 2050	2039	78	-	30

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Breakdown of job types in Suffolk

Figure 53, Figure 53 and **Figure 54** present the number of jobs in each type over time for large solar PV, for each scenario. For both the Net Zero 2030 scenarios, a gradual decrease in operation and maintenance jobs over time can be seen – this is due to assumed learning rates for solar PV employment – the principle that fewer jobs will be needed in the future to maintain the same capacity, due to improved efficiencies in processes and technologies. There are minimal decommissioning jobs across the scenarios, due to low rates of capacity reaching end-of-life in the period considered, as noted above. The same can be said for any construction and installation jobs associated with replacing end-of-life capacity – which is why minimal construction and maintenance jobs are seen after 2030 in both the Net Zero 2030 scenarios.

Figure 53: Suffolk large solar PV FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

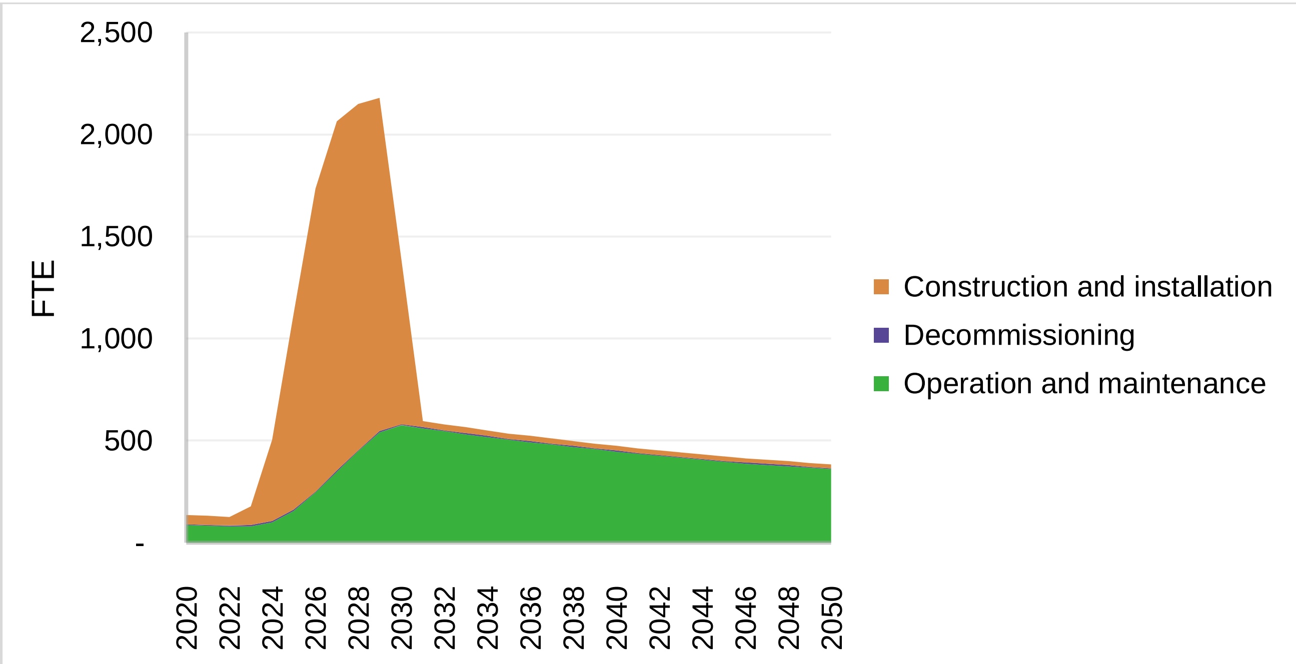


Figure 54*: Suffolk large solar PV FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario*

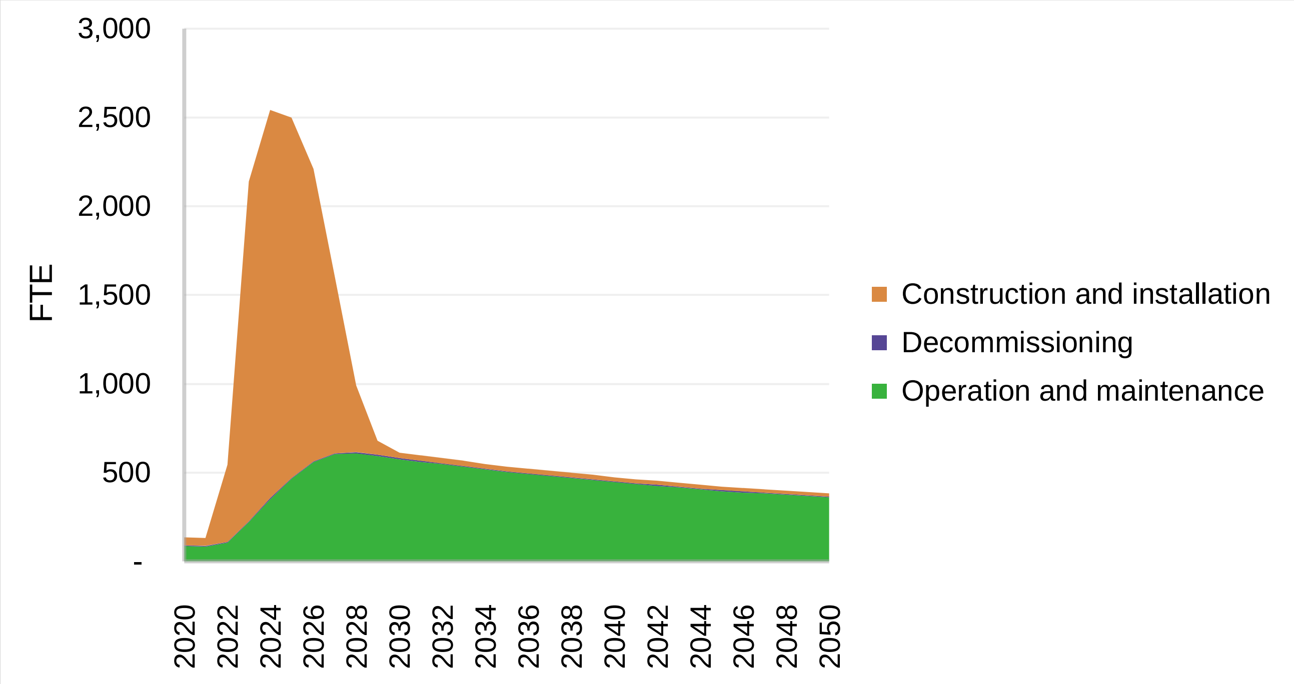
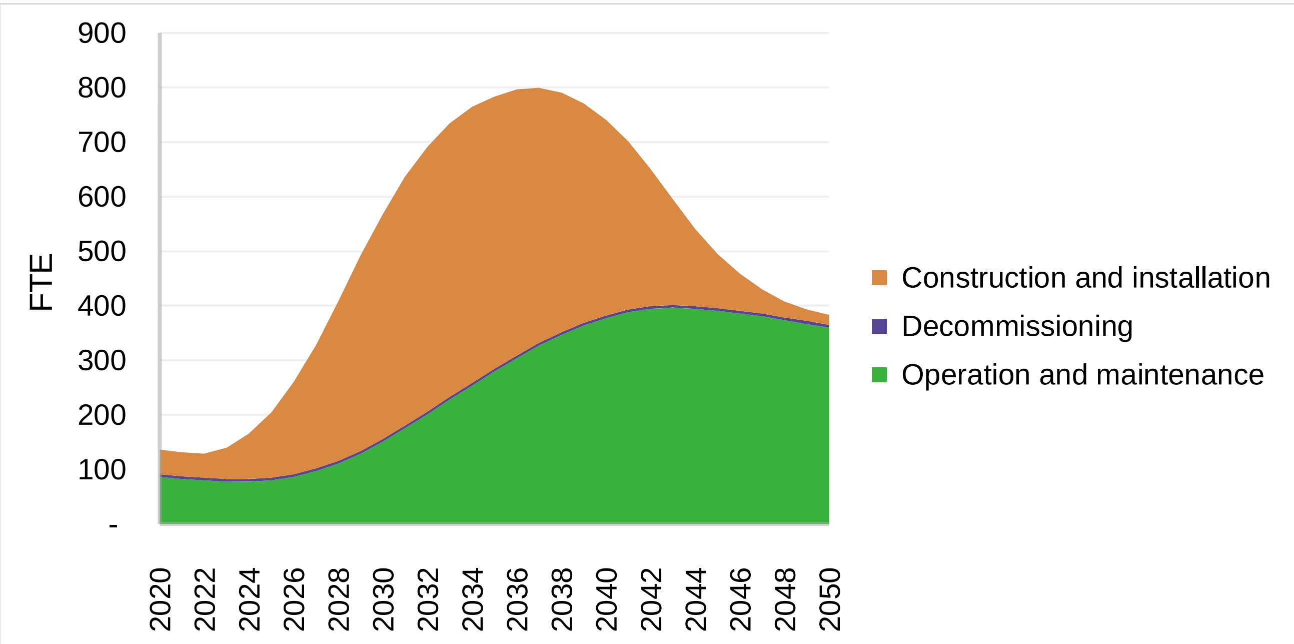


Figure 55: Suffolk large solar PV FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Suffolk

The estimated peak GVA that results from solar PV jobs in the categories used above are shown in **Table 17**. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios. The lack of GVA for solar PV decommissioning jobs aligns with the long lifetime of solar PV technology, as noted previously.

Table 17: Suffolk solar PV peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	96	-	89
Urgent ramp up	2025	100	-	110
Net zero 2050	2039	66	-	26

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Skills provision and challenges in Norfolk and Suffolk

Based on the stakeholder engagement, literature review and economic analysis, the biggest skills challenge is bringing in new solar installers and retraining existing electricians quickly enough. Local solar installers and operators claimed most of the construction and installation jobs will tend to be more local. This challenge is therefore made more acute by the region's severe lack of skills relative to future need. This is reinforced by a national survey conducted in 2020 by the Electrical Contractors' Association in partnership with Solar Energy UK. The analysis found that around half of those working in the solar industry lacked access to skilled employees[63].

Ground mounted solar installations also require different expertise compared to domestic and commercial rooftop solar installations. Like constructing offshore and onshore wind, a range of civil engineering and environmental management skillsets are required in commissioning large solar arrays, in addition to electrical skillsets. These skills range from how solar installations interact with the local environment, how to position solar panels to maximise energy generation as well as specific high voltage training for large solar arrays that connect into the grid. One interview respondent who owns and operates large solar arrays highlighted specialised contractors were required for especially high voltage connections. They also argued that the existing electrical apprenticeships weren't geared to large solar installations that need to be

[63] ECA. (2020). Skills4Climate: Industry survey report.

connected to the grid, which slows down their operations within the local area. Many respondents also highlighted the fact Norfolk and Suffolk find it difficult to attract engineering students into the local area. In fact, one respondent mentioned that local universities find it difficult to encourage the limited number of engineering students into electrical engineering, with many opting for mechanical engineering.

Nevertheless, only a relatively small amount of additional training is required to train existing electricians to install solar PV. Solar installer jobs generally require a qualified electrician which can be achieved via multiple routes like professional development courses or apprenticeships. There's also a requirement for both large- and small-scale solar installers to possess the 18th Edition of the Wiring Regulations qualifications. Ideally, workers installing ground mounted solar arrays should have completed a solar PV specific course to Level 3 alongside relevant qualification to be an authorised person to conduct high voltage work.

Interestingly, one respondent noted that underinvestment in the national electricity infrastructure is an even bigger issue for the solar industry in Norfolk and Suffolk than a shortage of adequately skilled employees. According to them, the current state of electricity infrastructure is the main obstacle for solar, wind and battery storage projects in the region. They pointed out that Norfolk and Suffolk County Councils have an important role to play in advocating to National Grid for higher levels of investment in the local electricity infrastructure. Norfolk and Suffolk will struggle to raise renewable generation capacity to the necessary level to reach net zero if the local electricity infrastructure is not in place to facilitate a significant increase in capacity. Hence, this is another key challenge that needs to be addressed for Norfolk and Suffolk County Councils to achieve their net zero ambitions.

An assessment of the local colleges and universities found that no local colleges or universities provide a dedicated Solar PV course. Nevertheless, all the colleges and universities offer routes into becoming either a qualified electrician that can opt for a career in solar, or electrical engineering related careers. For example, City College Norwich, University of East Anglia and University of Suffolk offer degree (or equivalent) courses that enable highly skilled routes into electrical engineering, with renewable systems included in modules. The University of East Anglia have also developed an MSc programme in Energy Engineering in partnership with industry and employers through close collaboration with the East of England Energy Group (EEEGR). The aim of the course is to address the national and regional shortage of high-calibre engineering graduates with specialist expertise in energy engineering. This course is professionally accredited by the Institution of Engineering and Technology (IET) on behalf of the Engineering Council.

Almost all the colleges offer Level 2 and 3 courses on electrical testing, electrical maintenance, and installation. In addition to these full-time courses, East Coast College, West Suffolk College, and the College of West Anglia do run the 18th Edition of the Wiring Regulations which provides additional qualifications which enable people to enter the solar industry. The College of West Anglia also offer bespoke business services such as an Electrical Skills Assessment which audits the electrical knowledge within a company and a refresher course on The Electricity at Work regulations for senior management.

Table 18 - Colleges and universities in Norfolk and Suffolk offering courses relevant to solar PV skills

Institution	Wind specific courses and potentially relevant courses	Address
City College Norwich	Engineering Technician - Technical Support, Level 3 Standard Installation Electrician Apprenticeship Level 3 Standard HNC in Engineering (Electrical, Electronic Engineering) HND Electrical and Electronic Engineering (Top Up) HND Embedded Electronic Systems (Top Up)	Ipswich Rd Norwich Norfolk NR2 2LJ
College of West Anglia	Electrical Skills Assessment The Electricity at Work Regulations 1989 Maintenance Operations Engineering Technician Apprenticeship – Level 3 Installation Electrician and Maintenance Electrician – Level 3 Industrial Electrical Maintenance Skills (Assured by City and Guilds) - for Maintenance Engineers Level 3 Award in the Initial Verification and Certification of Electrical Installations (City & Guilds 2391-50) Level 3 Award in the Periodic Inspection, Testing and Certification of Electrical Installations (City & Guilds 2391-51) Level 3 Award in Inspection & Testing of Electrical Installations City & Guilds 2391-52	Kings Lynn Campus Tennyson Avenue King's Lynn Norfolk PE30 2QW

	18th Edition of the Wiring Regulations	
East Coast College	Electrical Installation Level 2 Electrical Installation Level 3 T Level in Maintenance, Installation and Repair for Engineering and Manufacturing Level 3 18th Edition of the Wiring Regulations	Great Yarmouth Campus Suffolk Road Great Yarmouth Norfolk NR31 0ED Lowestoft Campus Rotterdam Road Lowestoft Suffolk NR32 2PJ
Suffolk New College	Electrical Installation Level 1 Electrical Installation Level 2 Electrical Installation Level 3 Net Zero Skills Centre[64] Level 2 Engineering (PEO)	Rope Walk Ipswich Suffolk IP4 1LT
University of East Anglia	MSc Energy Engineering BEng (Hons) Engineering	Norwich Research Park Norwich Norfolk NR4 7TJ
University of Suffolk	HND Engineering (General Engineering)	Waterfront Building 19 Neptune Quay Ipswich Suffolk IP4 1QJ
West Suffolk College	Introduction to Electrical Installations (7202-01) Level 1 Electrical Installation Diploma (8202-20) Level 2 Advanced Electrical Installation Diploma (8282-30) Level 3 Installation Electrician/Maintenance Electrician Level 3 Engineering Fitter Level 3	Sixth Form Campus Out Risbygate Bury St Edmunds Suffolk IP33 3RL Built Environment Campus Anglian Lane Bury St Edmunds Suffolk

[64] Solar PV and thermal installations are in the centre for students to use, but, no solar specific courses are listed on the website

	18th Edition of the Wiring Regulations	IP32 6SR University and Professional Development Centre 73 Western Way Bury St Edmunds Suffolk IP33 3SP
Colchester Institute (Energy Skills Centre Harwich)	A course to attain CSCS green Labourer's card Level 2 EAL Diploma in Performing Engineering Operations (this is a perquisite for construction, fabricating / welding, and operation & maintenance)	Hamilton House Foster Road Parkeston Quay Harwich Essex CO12 4QA

In addition to colleges and universities, several local private training providers also run the 18th Edition of the Wiring Regulations (**Table 19**). There are courses offered nationally by providers such as BPEC who offer Solar PV Systems courses, aimed at electricians and domestic installers to transition installing solar PV. However, no training centres across Norfolk or Suffolk offer this course, with the nearest training centres being in Essex. This demonstrates the need for local training providers and businesses to step up and help existing electricians transition into solar installations. Another potential barrier is the current cost associated with training. The Solar PV Systems BPEC course for example costs £608 (excluding VAT) which represents a significant financial outlay. This amount is potentially prohibitive, especially considering most learners will need to forgo a week's income from their current employment to undertake upskilling. Other notable courses that are relevant for ground mounted solar installations include the NOCN Level 3 Award for Solar PV Installer and Operator and the NOCN Level 5 Certificate for Certified Solar Photovoltaic Practitioner.

Table 19 - Private training providers in Norfolk and Suffolk offering courses relevant to solar PV skills

Training provider	Courses offered	Address
East of England Electrical Training	18th Edition of the Wiring Regulations	9 Mahoney Grn Rackheath Norwich Norfolk NR13 6JY
Ipswich Skills Centre	18th Edition of the Wiring Regulations	Unit 4, The Quadrangle Centre The Drift, Nacton Road Ipswich, Suffolk IP3 9QR.

WS Training	18th Edition of the Wiring Regulations	Manor Barn Church Road, Great Barton Bury St Edmunds, Suffolk IP31 2QR
Thompson Training	18th Edition of the Wiring Regulations	Unit D1 Thompson Training LTD Sharon Road, Dettingen Way Bury St Edmunds. Suffolk IP33 3TZ

RENEWABLE CLEAN HEAT AND POWER (CHP)

Overview of the renewable CHP sector in Norfolk & Suffolk

The renewable CHP sector across Norfolk and Suffolk is very small. According to the REPD, Norfolk and Suffolk possess an operational generation capacity of 21.4MW that is CHP enabled[65]. This comes primarily from anaerobic digestion and dedicated biomass plants which have the option for providing both electricity and heat. Interestingly, the baseline number given in the REPD is greater than the combined Norfolk and Suffolk 2030 generation projections taken from the National Grid Future Energy Scenarios. This is due to differences in calculating capacities however, both sets of numbers highlight that renewable CHP will only contribute to a fraction of energy and heat demand. Most of the renewable CHP sites are either situated next to industrial activities (such as farms or manufacturing facilities) or small pilot generation schemes that feed the energy needs of a commercial building. Notable sites across the region include British Sugar's 5MW total capacity site that produces biogas from pressed sugar beet pulp[66]. Renewable CHP could take off in a more significant way if local farms and agricultural businesses in the area decide to utilise waste heat from biomass, anaerobic digestion, or other alternatively fuelled generation technologies.

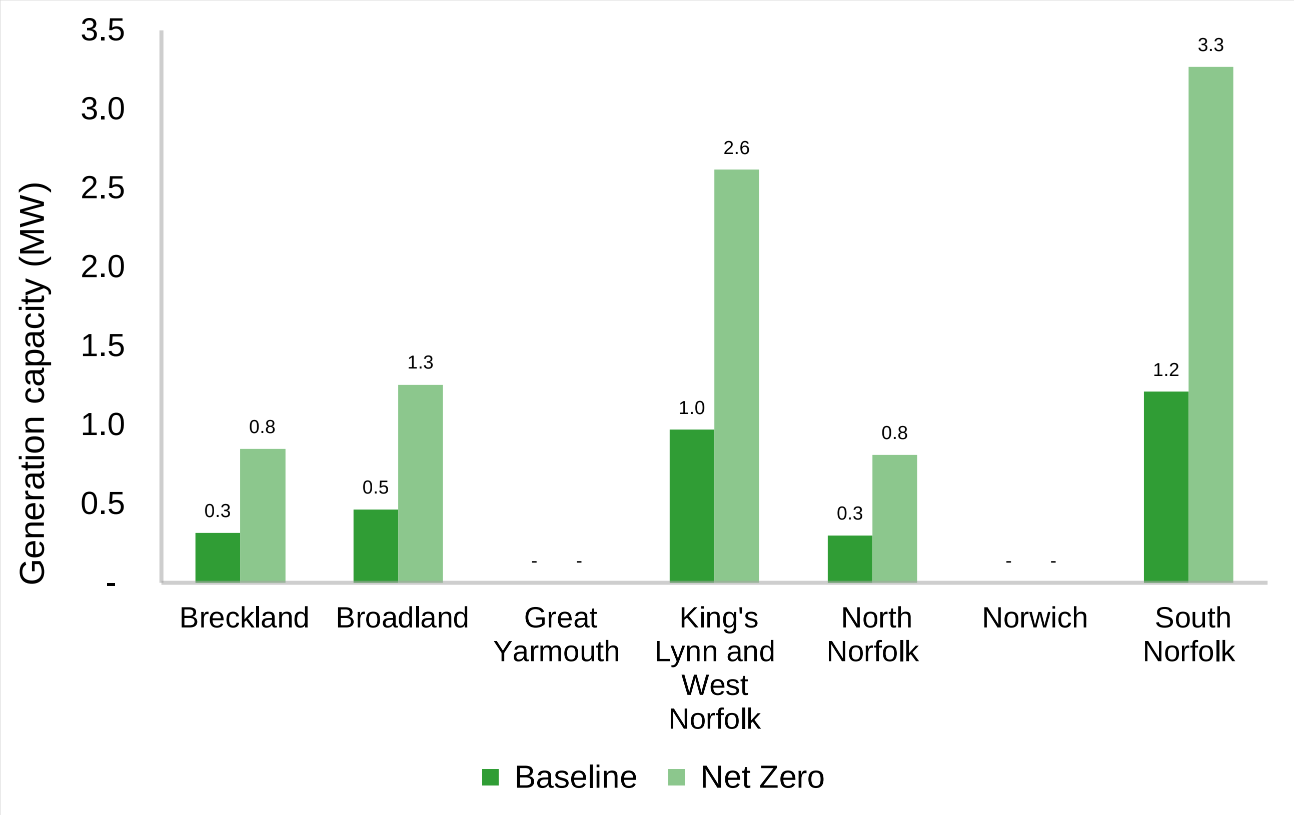
Current and expected generation capacity in Norfolk

Renewable CHP has the lowest generation capacity values for both current and Net Zero capacity out of all the sectors we consider in for energy generation. Though, data sources do not provide the exact breakdown of renewable, non-bioenergy CHP that would match to the LCREE sector we aim to cover in this section. We use the "waste CHP" category in the National Grid's Future Energy Scenarios as the most relevant data to base our projections on, and use "sewage gas" and "landfill gas" in government renewables generation data to scale estimates to local authorities. We estimate renewable CHP energy generation in Norfolk to currently

[65] DESNZ, (2023). Renewable Energy Planning Database: quarterly extract
[66] AB Sugar. (2018). Placing energy generation and efficiency at the heart of our business.

be at around 3 MW, with South Norfolk and King's Lynn and West Norfolk having the highest capacities. The total for Norfolk rises to 9 MW for Net Zero. **Figure 56** shows the values we assume in our modelling, by local authority.

Figure 56: Norfolk renewable CHP generation capacity values[67]

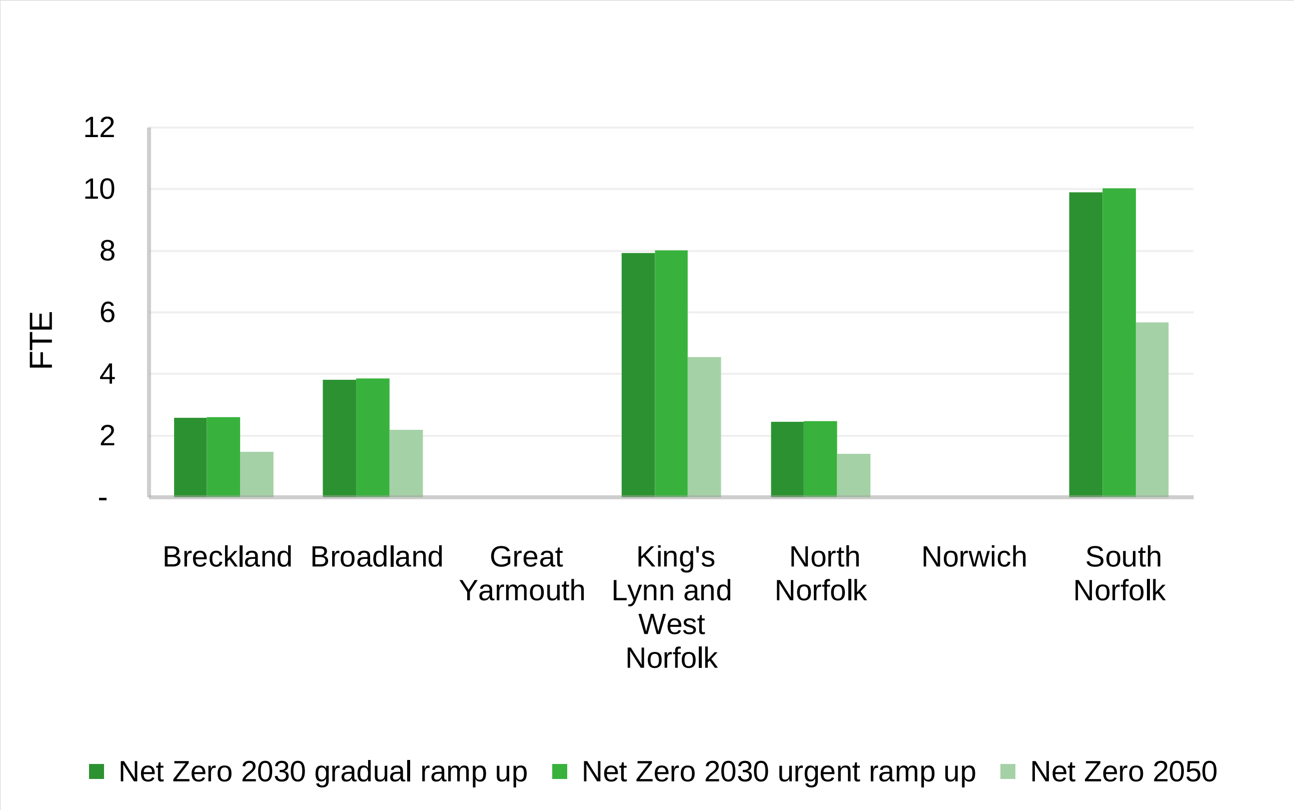


Job creation scenarios in Norfolk

For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**. Job creation for renewable CHP is seen to be low compared to other sectors, with South Norfolk having the most significant jobs with a peak of 10 under the Net Zero 2030 scenarios. Here there is little difference between peak jobs under the Net Zero 2030 scenarios, but Net Zero 2050 is lower, as shown in **Figure 57**.

[67] Estimated using values from National Grid Future Energy Scenarios (2021 and 2050), scaled to local authorities using current government data on renewables generation.

Figure 57: Norfolk renewable CHP peak jobs across the scenarios



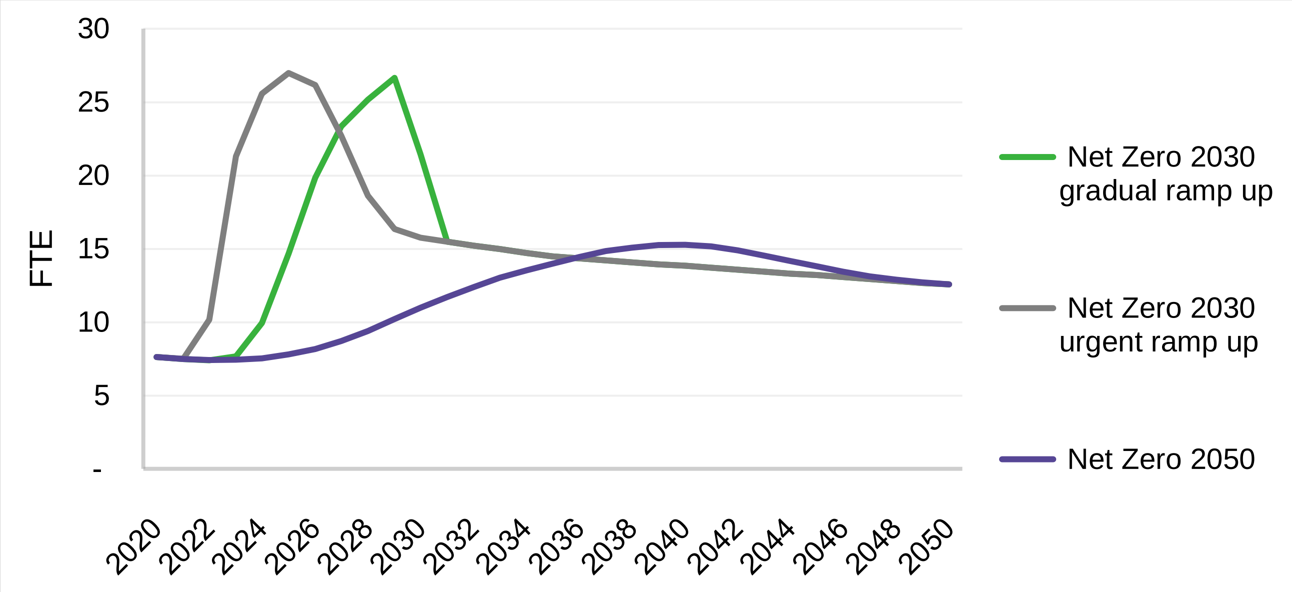
The years in which the peak jobs occur in each scenario are provided in **Table 20**. More insight into these values is provided by Error! Reference source not found. below, which depicts how the total number of jobs changes over time for each scenario.

Table 20: Year in which peak jobs occur for renewable CHP in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2025	2040

The development of renewable CHP jobs over time for each of the three scenarios is shown in **Figure 58**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. For renewable CHP we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after the 2050 period we consider here.

Figure 58: Norfolk renewable CHP FTE over time



Breakdown of job types in Norfolk

Different types of jobs have been modelled and include construction and installation of capacity, operation and maintenance of assets, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity. **Figure 59**, **Figure** 60Error! Reference source not found. and

Figure 61 present the number of jobs in each type over time for renewable CHP, for each scenario.

For both the Net Zero 2030 scenarios, a gradual decrease in operation and maintenance jobs over time can be seen – this is due to assumed learning rates for renewable CHP employment – the principle that fewer jobs will be needed in the future to maintain the same capacity, due to improved efficiencies in processes and technologies. Since the capacity increase is so low, operation and maintenance of existing capacity and construction and installation associated with replacing end-of-life capacity are a higher proportion of jobs than in many other sectors.

Figure 59: Norfolk renewable CHP FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

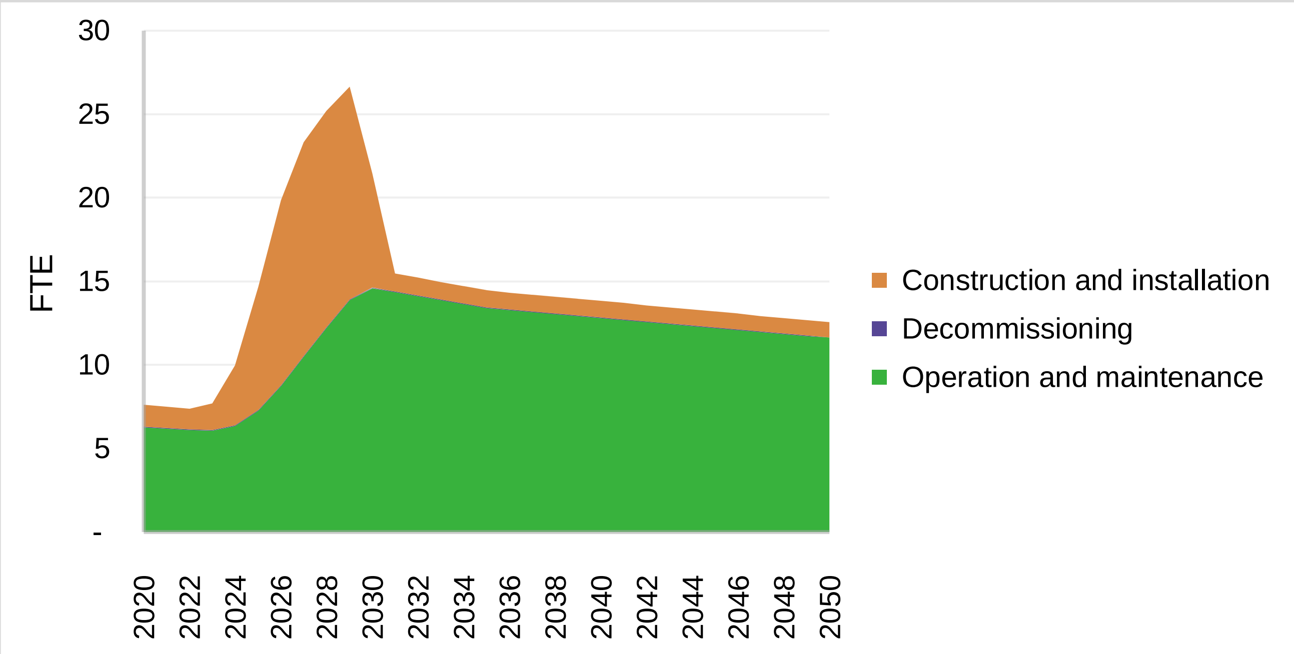


Figure 60: Norfolk renewable CHP FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

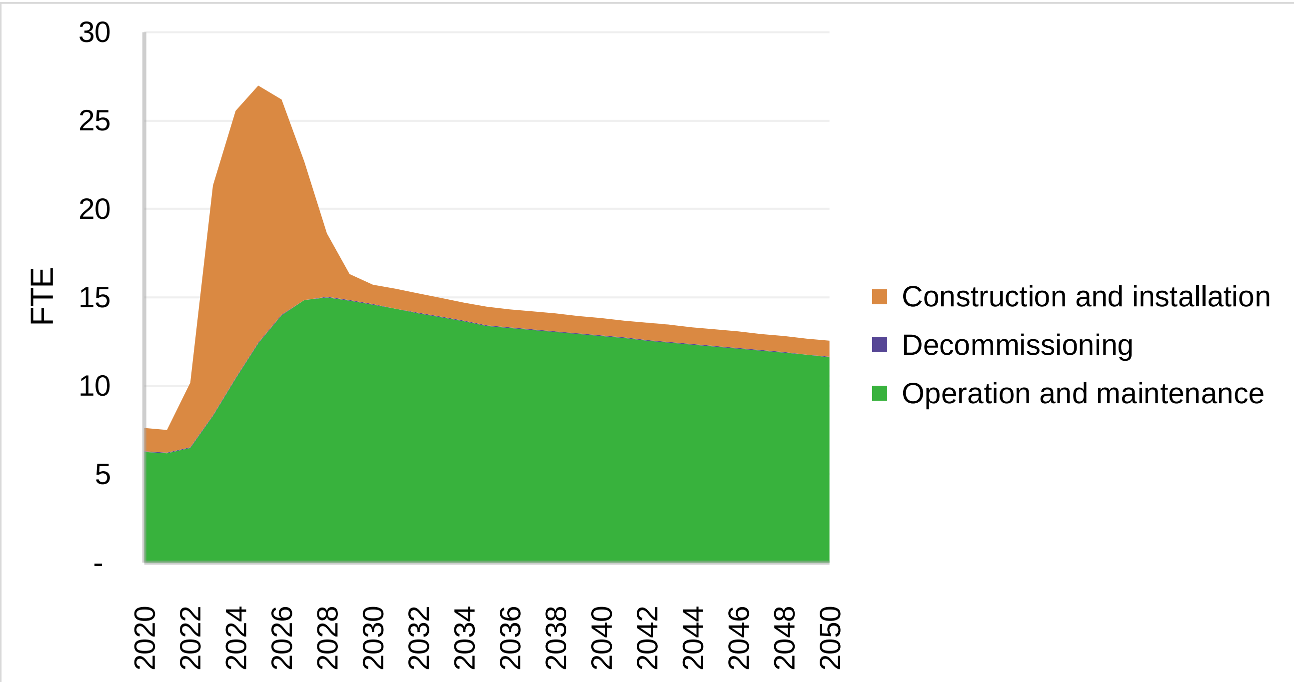
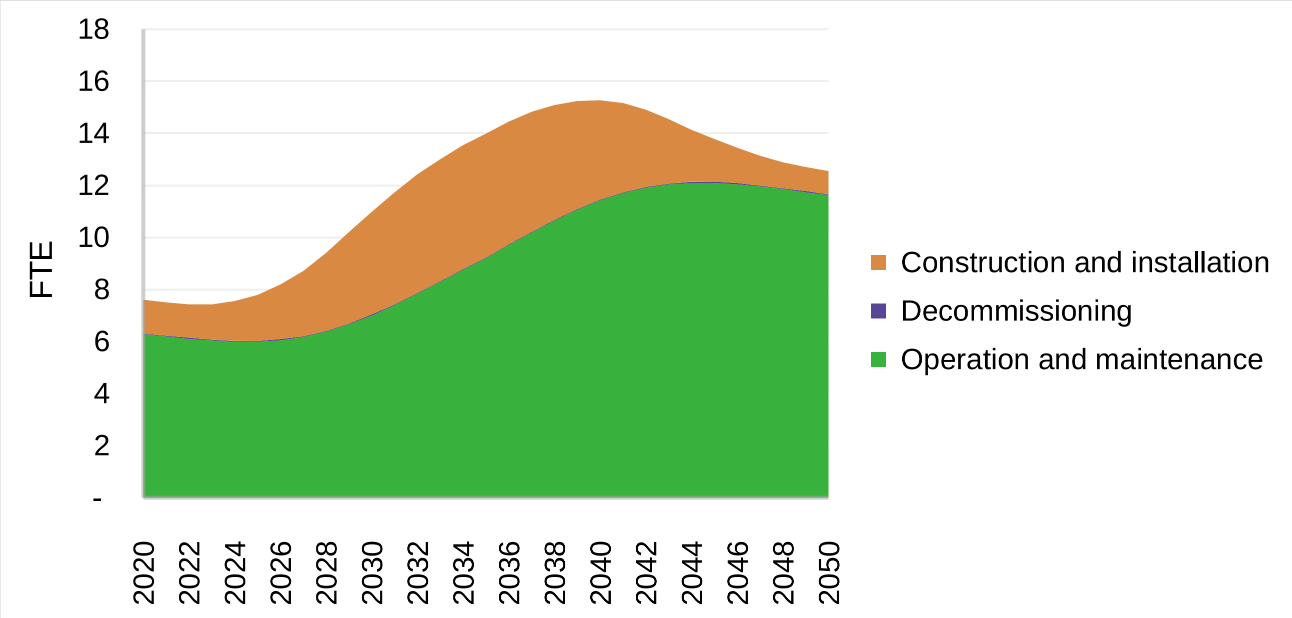


Figure 61: Norfolk renewable CHP FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Norfolk

Estimated peak GVA that results from renewable CHP jobs in the categories used above are shown in **Table 21**. The magnitude of GVA is low, in accordance with the comparatively small capacity and number of jobs required for this sector.

Table 21: Norfolk renewable CHP peak projected annual GVA values by job types

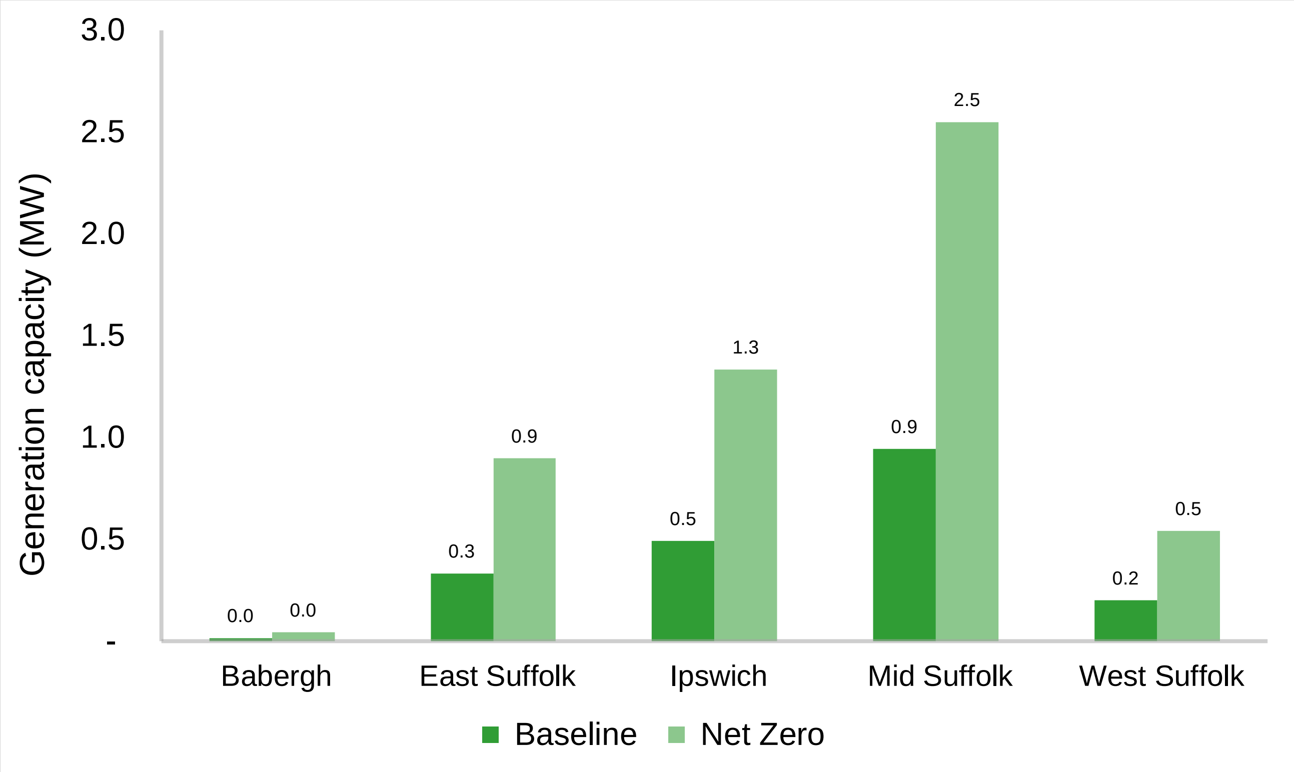
Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	0.8	0	0.5
Urgent ramp up	2025	0.8	0	0.6
Net zero 2050	2040	0.7	0	0.2

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Current and expected generation capacity in Suffolk

Renewable CHP has the lowest generation capacity values for both current and Net Zero capacity out of all the sectors we consider in for energy generation. Though, data sources do not provide the exact breakdown of renewable, non-bioenergy CHP that would match to the LCREE sector we aim to cover in this section. We use the “waste CHP” category in National Grid’s Future Energy Scenarios as the most relevant data to base our projections on, and use “sewage gas” and “landfill gas” in government renewables generation data to scale estimates to local authorities. We estimate renewable CHP energy generation in Suffolk to currently be at 2 MW, with Mid Suffolk having the highest capacity. The total for Suffolk rises to around 5 MW for Net Zero. **Figure 62** shows the values we assume in our modelling, by local authority.

Figure 62: Suffolk renewable CHP generation capacity values[68]



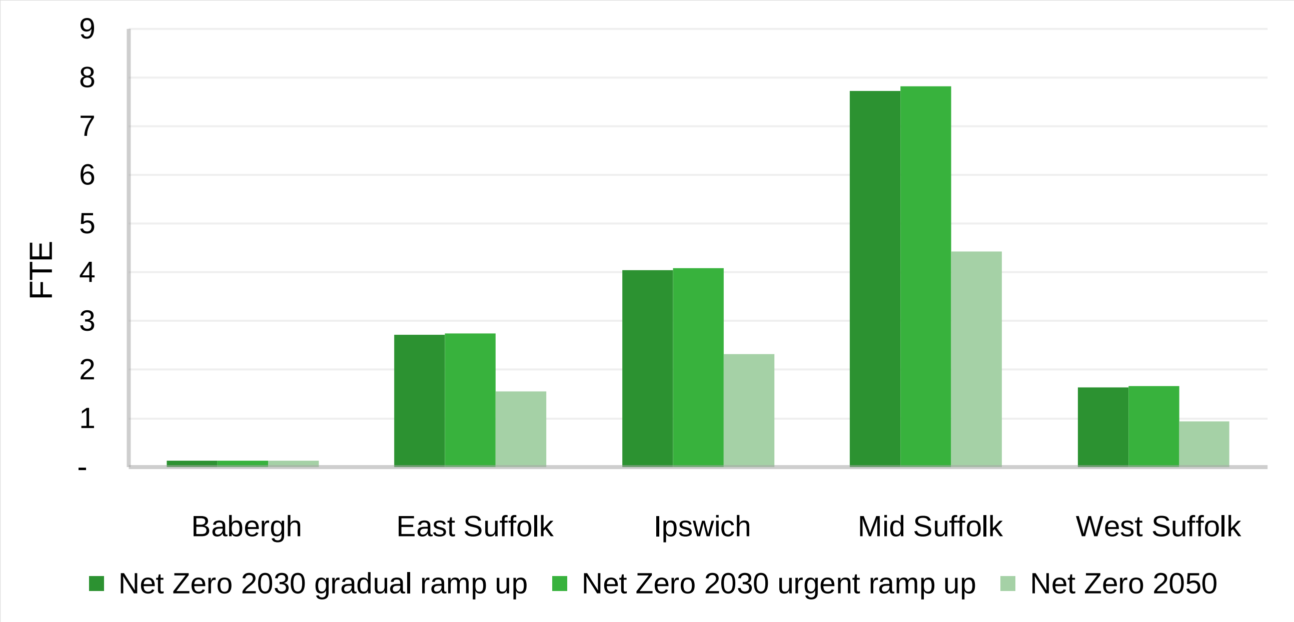
Job creation scenarios in Suffolk

For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation for renewable CHP is seen to be low compared to other sectors, Mid Suffolk having the most significant jobs with a peak of 8 under the Net Zero 2030 scenarios. Here there is little difference between peak jobs under the Net Zero 2030 scenarios, but Net Zero 2050 is lower, as shown in **Error! Reference source not found.**.

[68] Estimated using values from National Grid Future Energy Scenarios (2021 and 2050), scaled to local authorities using current government data on renewables generation.

Figure 63: Suffolk renewable CHP peak jobs across scenarios



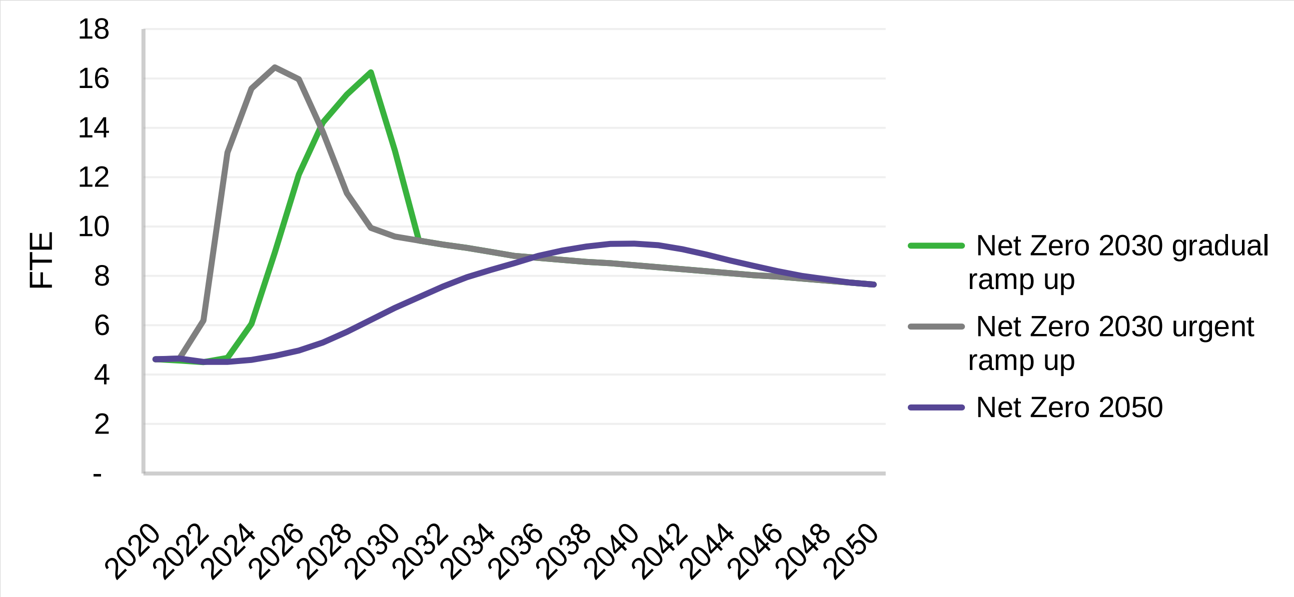
The years in which the peak jobs occur in each scenario are provided in **Table 22**. More insight into these values is provided by **Figure 64** below, which depicts how the total number of jobs changes over time for each scenario.

Table 22: Year in which peak jobs occur for renewable CHP in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2025	2040

The development of renewable CHP jobs over time for each of the three scenarios is shown in **Figure 64**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. For renewable CHP we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after 2050.

Figure 64: Suffolk renewable CHP FTE over time



Breakdown of job types in Suffolk

Different types of jobs have been modelled, associated with construction and installation of capacity, operation and maintenance of capacity, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

Figure 65, **Figure 66** and **Figure 67** present the number of jobs in each type over time for renewable CHP, for each scenario.

For both the Net Zero 2030 scenarios, a gradual decrease in operation and maintenance jobs over time can be seen – this is due to assumed learning rates for renewable CHP employment – the principle that fewer jobs will be needed in the future to maintain the same capacity, due to improved efficiencies in processes and technologies. Since the capacity increase is so low, operation and maintenance of existing capacity and construction and installation associated with replacing end-of-life capacity are a higher proportion of jobs than in many other sectors.

Figure 65: Suffolk renewable CHP FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

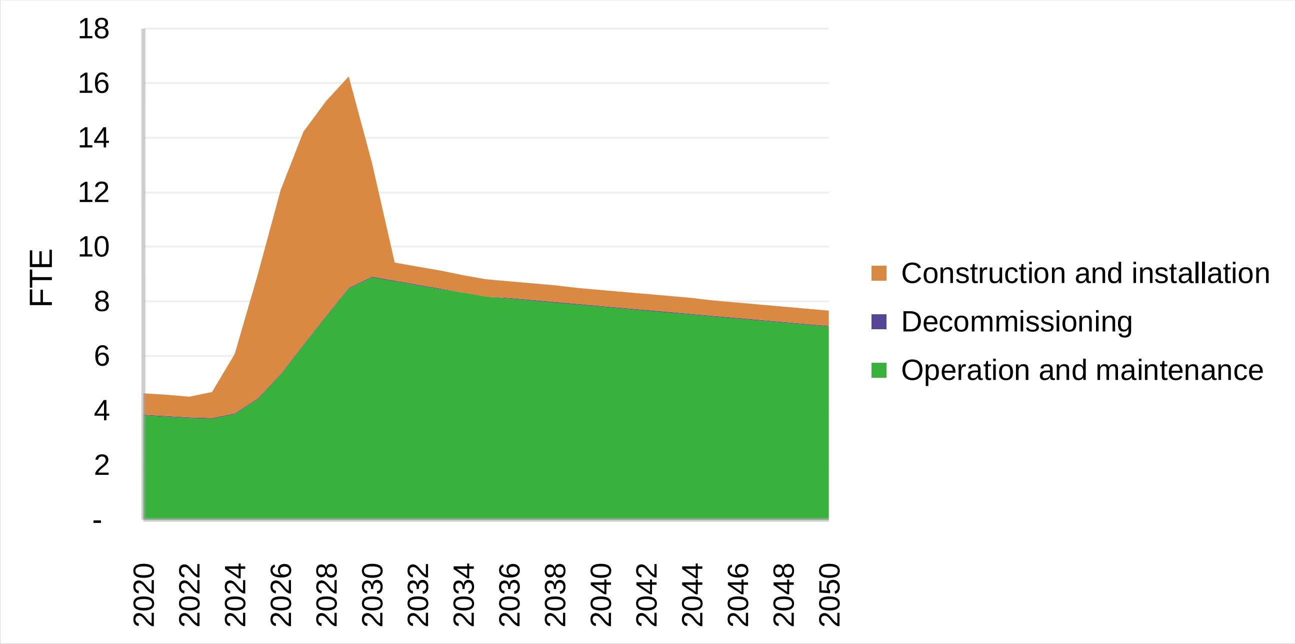


Figure 66: Suffolk renewable CHP FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

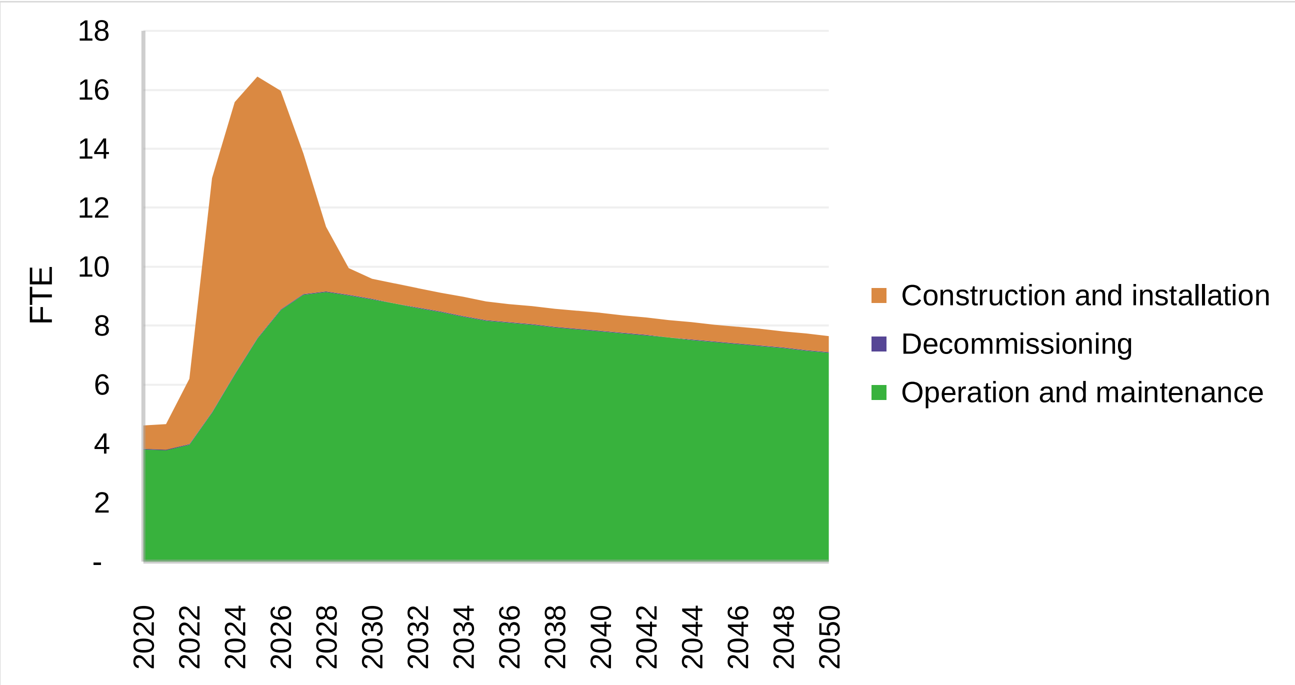
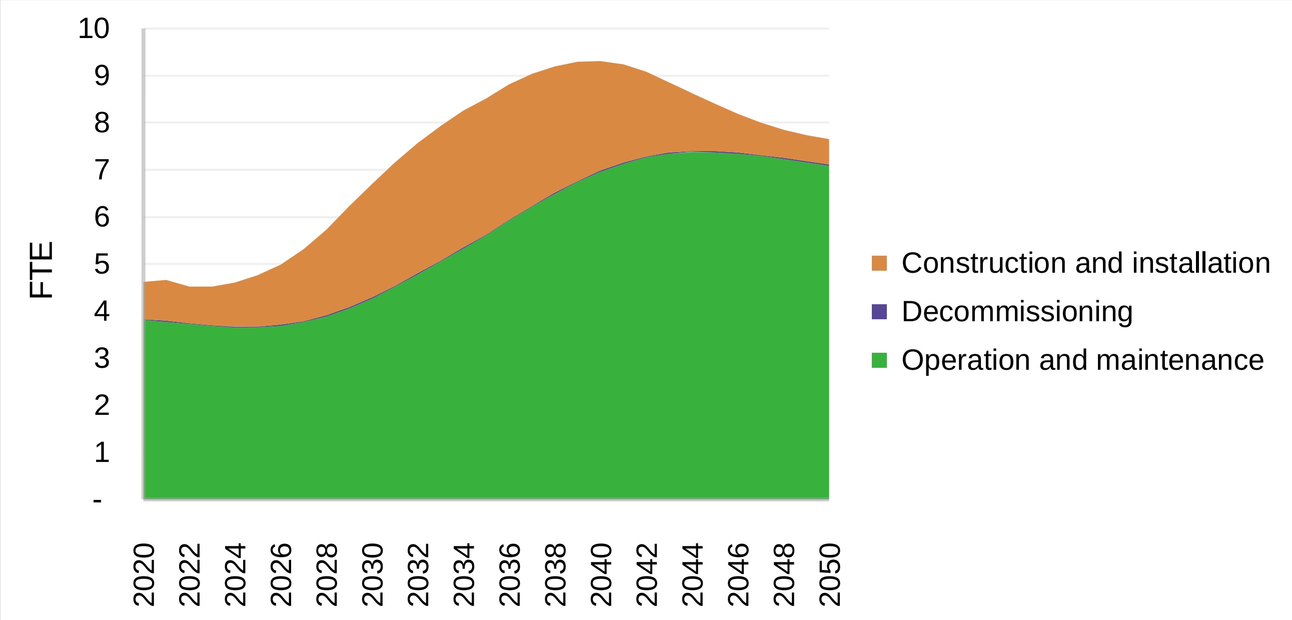


Figure 67: Suffolk renewable CHP FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Suffolk

Estimated peak GVA that results from renewable CHP jobs in the categories used above are shown in **Table 23**. The magnitude of GVA is low, in accordance with the comparatively small capacity and number of jobs required for this sector.

Table 23: Suffolk renewable CHP peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	0.4	0	0.3
Urgent ramp up	2025	0.5	0	0.4
Net zero 2050	2040	0.4	0	0.2

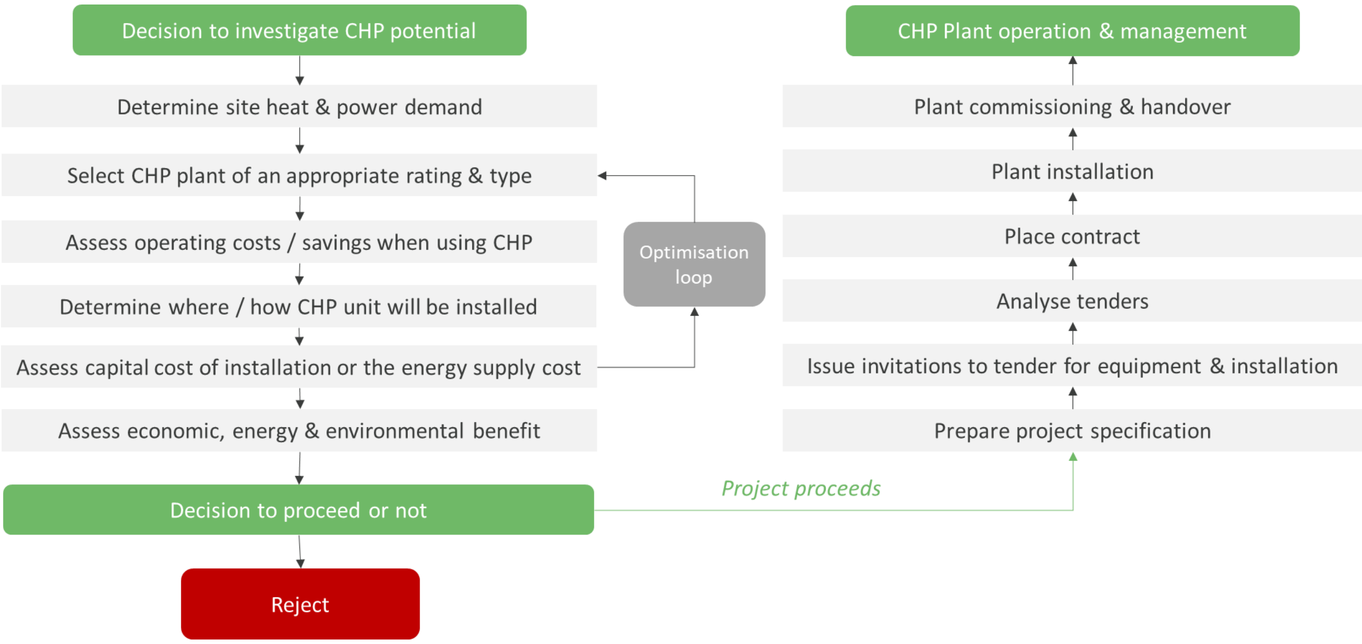
*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Renewable CHP skills provision and challenges in Norfolk and Suffolk

No stakeholders who had experience in delivering CHP systems responded during this study, therefore, the insight in this section emerged from the desk research. The project life cycle of a CHP plant is provided in **Figure 68** and is taken from a series of BEIS guides on implementing CHP systems[69].

[69] BEIS. (2021). Combined Heat and Power (CHP) developers guides.

Figure 68: Project life cycle of a CHP plant[70]



As part of the BEIS CHP project planning guide[71], a wide range of skills are required for any CHP project to be successful, these include:

- Team co-ordination and management abilities.
- Mechanical engineering skills, with experience of prime movers and combustion plant.
- Electrical engineering skills, with experience of interconnecting generating plant, its protection and control.
- Site services engineering skills and operational experience.
- Structural engineering skills.
- Energy and financial evaluation abilities.
- Equipment procurement experience.
- Legal and contractual skills.

In terms of operation and maintenance, control of a CHP package is largely automated and requires little regular input from site staff. Provided the systems connected to the unit continue to function correctly, the unit should be capable of continuous operation using its own control system. This is reflected in the relatively low jobs in operation and maintenance.

[70] [70] BEIS. (2021). Combined Heat and Power (CHP) developers guides
[71] BEIS. (2021). Combined Heat and Power – Project Development A detailed guide for CHP developers – Part 1.

CHP related training is very specialised with only a select few organisations in the UK offering relevant courses. Aztec Ava in Bristol offer a CHP and combined-cycle gas turbine course, geared specifically towards the power industry. There is also an online CHP course available from the Renewable Energy Institute, which is available for £410 where participants can attain a Galileo Masters Certificate. No local training providers in Norfolk and Suffolk run any bespoke courses related to CHP.

BIOENERGY

For the purpose this analysis, bioenergy is defined as the production of energy (electricity and heat) and the design, production, and installation of infrastructure for this purpose, including operations and maintenance. Bioenergy incorporates liquid biofuels, solid biomass and biogas, for example, bio methane, vegetable oil, peanut oil and energy crops. This sector also includes gasification and anaerobic digestion[72].

Norfolk and Suffolk are already leading the way in producing bioenergy, benefitting from existing resources from its rural landscape, such as biomass crops and animal waste. The local bioenergy industry is worth around £2 billion due to agricultural advantages, producing 13.7% of England's crops and 9% of the livestock[73]. Three notable, large power stations exist for bioenergy – Thetford and Snetterton in Norfolk and Eye in Suffolk.

Norfolk and Suffolk are leading straw producers, with 313,000 hectares of cereals and 60,000 hectares of oilseed crops, with an estimated straw yield of 1.06 million tonnes per year[74]. This benefits the Snetterton straw-fed biomass plant in Norfolk which has an electrical capacity of 44.2MW and the ability to supply 82,000 homes with energy[75]. This requires 250,000 tonnes of straw and woodchip annually to generate electricity, not only producing cleaner energy but also benefitting local farmers who supply to biomass fuel.

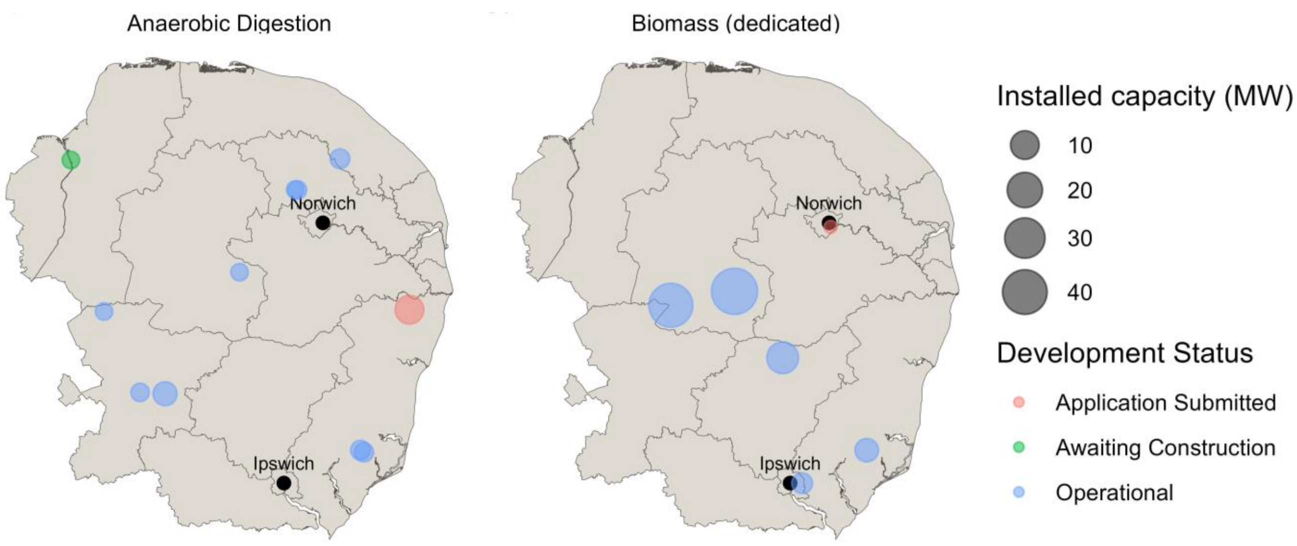
With around 180 existing bioenergy sites in Norfolk and Suffolk, these regions still have scope to expand within this sector through its sizeable agri-food sector, animal waste and biomass to increase in sustainable energy generation.

[72] Office for National Statistics. (2023). Low Carbon and Renewable Energy Economy (LCREE) Survey QMI: Methods used to produce the Low Carbon and Renewable Energy Economy (LCREE) Survey data.
[73] Norfolk & Suffolk Unlimited. (2022). Norfolk & Suffolk economic strategy.
[74] Ibid.
[75] Joseph Ash Galvanizing. (N.D.). Norfolk biomass plant.

Overview of the bioenergy sector in Norfolk & Suffolk

Bioenergy has been actively pursued in Norfolk and Suffolk given the prevalence of agricultural activity in the region. Both Norfolk and Suffolk have a range of different bioenergy generation facilities, with dedicated biomass currently having the greatest share of generation capacity. According to the REPD, Norfolk and Suffolk possess an operational generation capacity of 156MW[76]. **Figure 69** provides a map of the dedicated biomass plants and anaerobic digestion plants that are operational, awaiting construction or with planning applications submitted. A breakdown of the various generation technologies and where they're located is summarised below.

Figure 69: Map of bioenergy sites in Norfolk and Suffolk



Biomass (dedicated): The largest generation capacity in the region with 5 sites generating around 104MW of energy. The Snetterton (44MW) and Thetford (39MW) plants in Norfolk are the two notable sites, with Eye (14MW) in Suffolk also a sizeable site.

EfW Incineration: There is only the Great Blakenham (20MW) energy-from-waste site operational in Suffolk.

Anaerobic digestion: Represents the largest number of facilities in the region but with smaller generating capacities. The largest anaerobic digestion plant in the region is the British Sugar site in Bury (5MW) which generates energy from waste sugar products. Many of the other facilities tend to be co-located next to farms or other agricultural related businesses.

[76] DESNZ, (2023). Renewable Energy Planning Database: quarterly extract

Landfill gas: Many smaller sites are dispersed around Norfolk and Suffolk. The largest site is Masons Power Plant Landfill Scheme that generates around 5.5MW of energy. Other operators include Combined Landfill Projects and Renewable Power Generation who operate several small generation sites in the area. Interestingly, most of these sites had planning applications lodged over 20 years ago with the most recent project submitting its planning application in 2005.

The baseline numbers given in the REPD are greater than the combined Norfolk and Suffolk 2030 generation projections taken from the National Grid Future Energy Scenarios. This is due to differences in calculating capacities however, both sets of numbers highlight that there is some bioenergy generation capacity in the region. Compared to other renewable generation technologies, there aren't many projects in Norfolk and Suffolk that are under construction or have planning permission approved or under review. The largest project in the pipeline is a 10MW anaerobic digestion facility which will be situated on Copland Way, alongside a similar facility operated by Eco Verde Energy. Norfolk and Suffolk also have good local availability of biofuels-based crops with Thetford Forest being one of the largest softwood (coniferous) forests in public ownership in the UK. A study by E4tech also suggested straw-based biofuel production plants have good potential to be situated around Norfolk and Suffolk due to the high production volumes of straw in the location[77].

Current and expected generation capacity in Norfolk

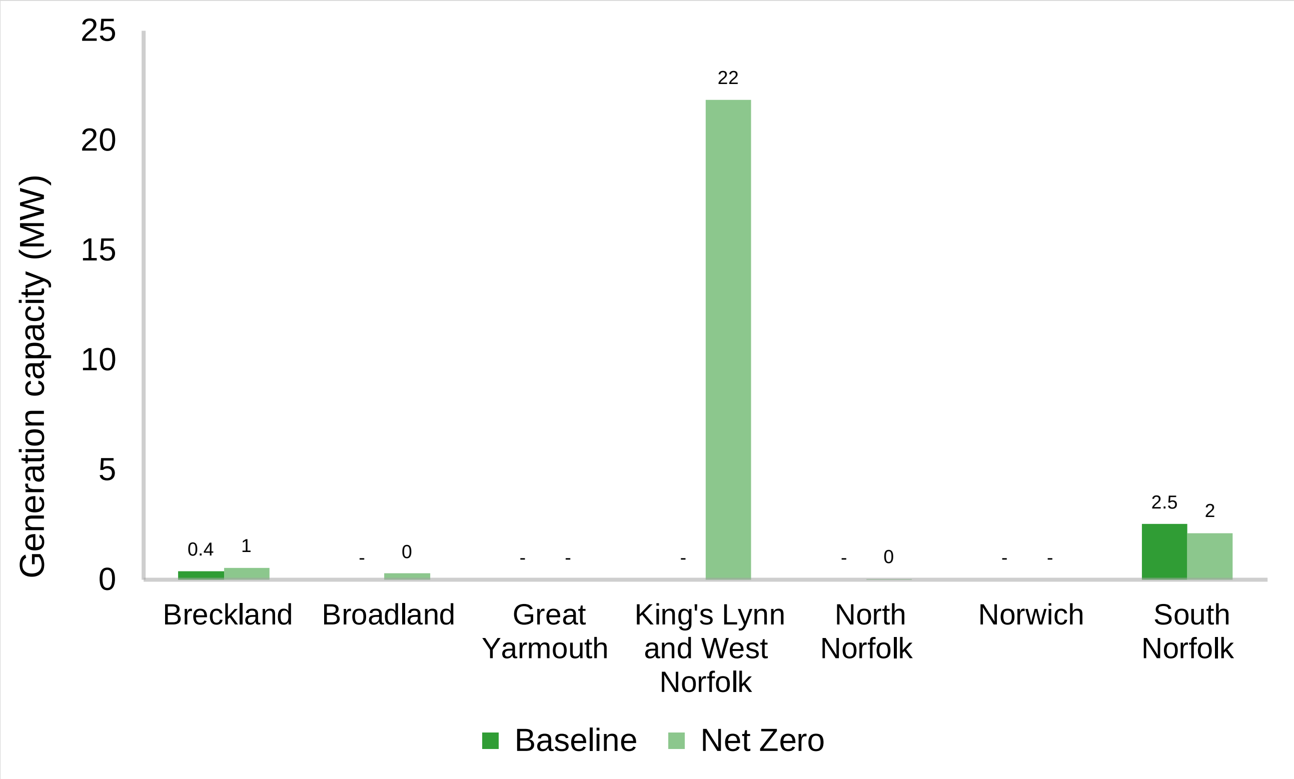
According to UK Power Networks data, bioenergy generation in Norfolk is currently estimated at about 3 MW, with South Norfolk having the highest capacity[78]. UK Power Networks' Distributed Future Energy Scenarios project a 25 MW generation capacity for bioenergy in Norfolk to achieve Net Zero, with King's Lynn and West Norfolk providing most of the generation.

Figure 70: Norfolk bioenergy generation capacity values

Figure 70shows the values we assume in our modelling by local authority. South Norfolk has the highest current generation for Norfolk's local authorities but sees a slight decrease in bioenergy generation capacity from baseline to net zero levels.

[77] E4Tech. (2017). Advanced drop-in biofuels: UK production capacity outlook to 2030.
[78] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.

Figure 70: Norfolk bioenergy generation capacity values[79]



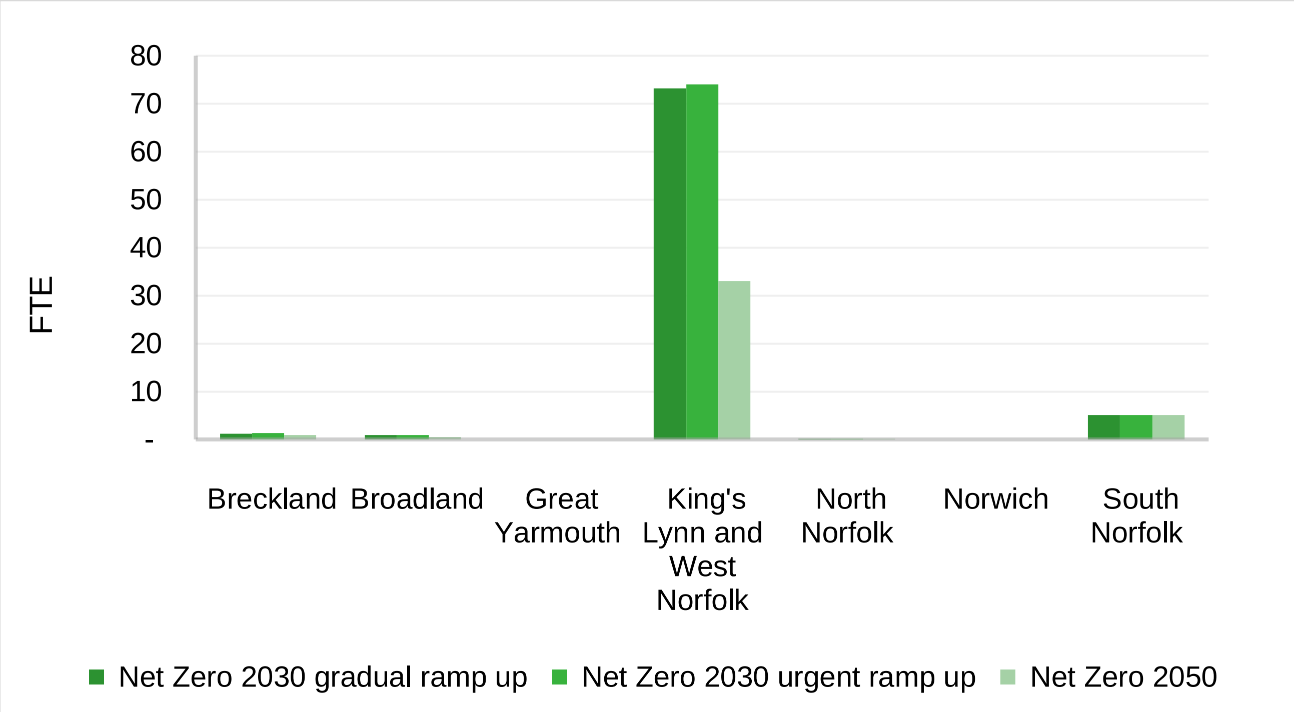
Job creation scenarios in Norfolk

For the changes in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for bioenergy in different local authorities are in line with those that see the largest increases in generation capacity – King's Lynn and West Norfolk. The peaks are similar for the Net Zero 2030 urgent ramp up scenario and Net Zero 2030 gradual ramp up, with the Net Zero 2050 scenario generally having a lower peak, as shown in **Figure 71**.

[79] Values from Distribution Future Energy Scenarios. (2020 and 2050). Distribution Future Energy Scenarios (DFES) 2022.

Figure 71: Norfolk bioenergy peak jobs across the scenarios



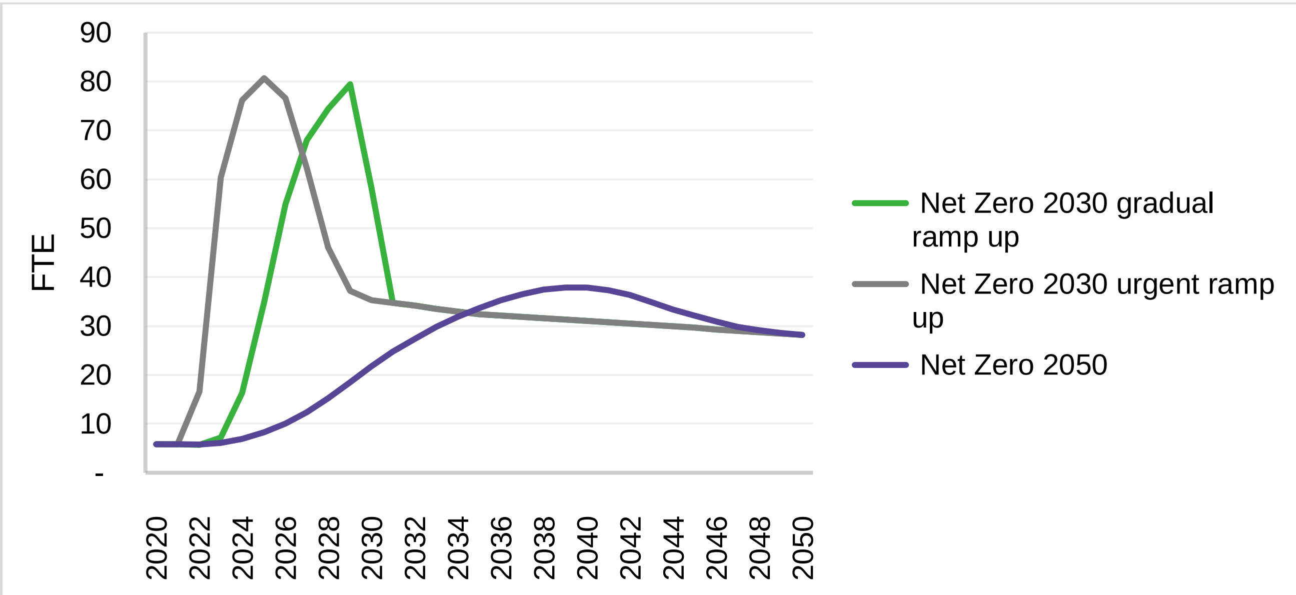
The years in which the peak jobs shown in **Figure 71** are provided in **Table 24**.

Table 24: Year in which peak jobs occur for bioenergy in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2025	2039

The development of bioenergy jobs over time for each of the three scenarios is shown in **Figure 72Error! Reference source not found.**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. For bioenergy we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after 2050.

Figure 72: Norfolk bioenergy FTE over time



Breakdown of job types in Norfolk

Different types of jobs have been modelled and include the construction and installation of capacity, operation and maintenance of assets, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity. **Figure 73**, **Figure 74** and **Figure 755** present the number of jobs in each type over time for bioenergy, for each scenario.

For both the Net Zero 2030 scenarios, a gradual decrease in operation and maintenance jobs over time can be seen – this is due to assumed learning rates for bioenergy employment – the principle that fewer jobs will be needed in the future to maintain the same capacity, due to improved efficiencies in processes and technologies. There are minimal decommissioning jobs across the scenarios, due to low rates of capacity reaching end-of-life in the period considered, as noted above. The same can be said for any construction and installation jobs associated with replacing end-of-life capacity – which is why minimal construction and maintenance jobs are seen after 2030 in both the Net Zero 2030 scenarios.

Figure 73: Norfolk bioenergy FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

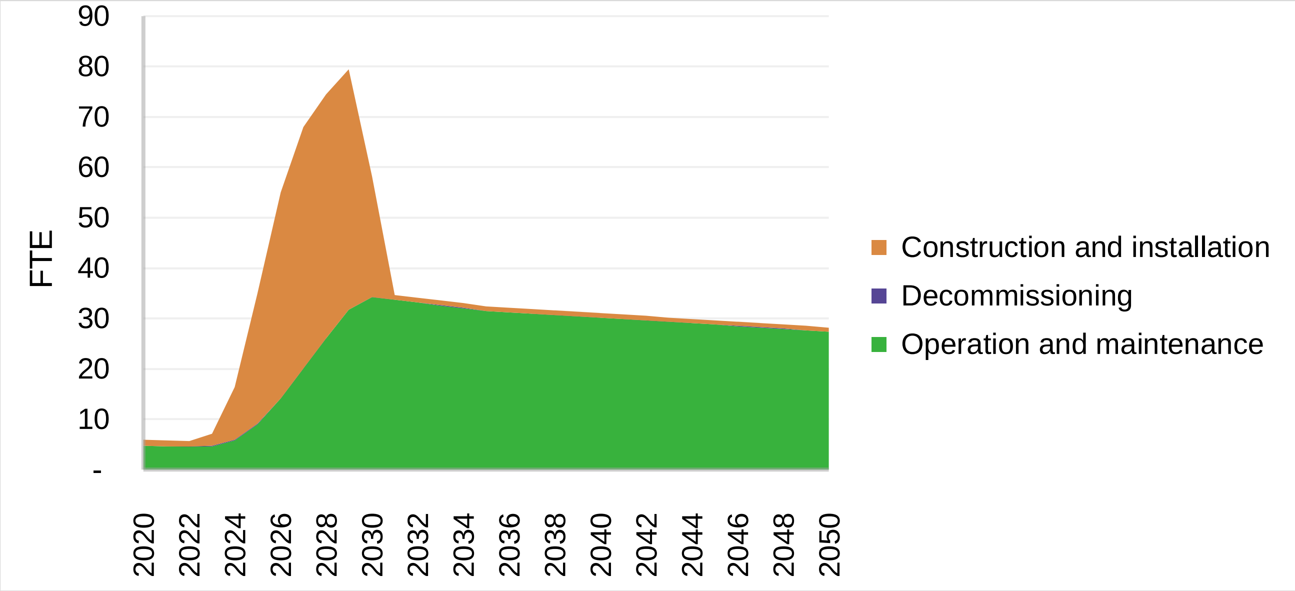


Figure 74: Norfolk bioenergy FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

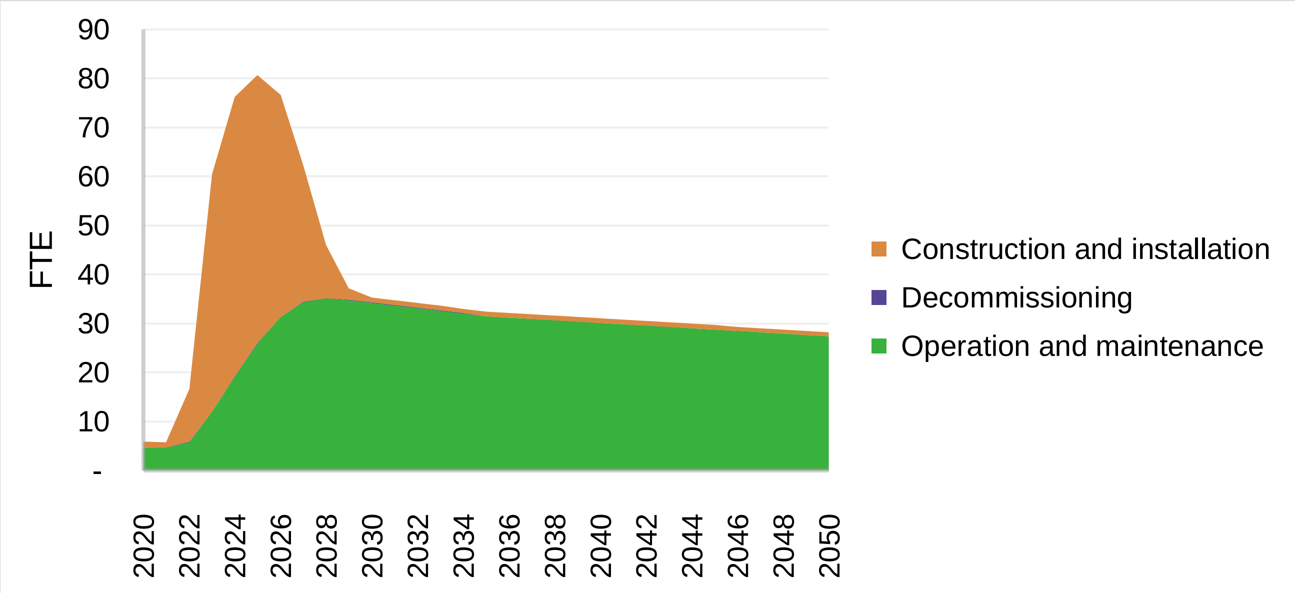
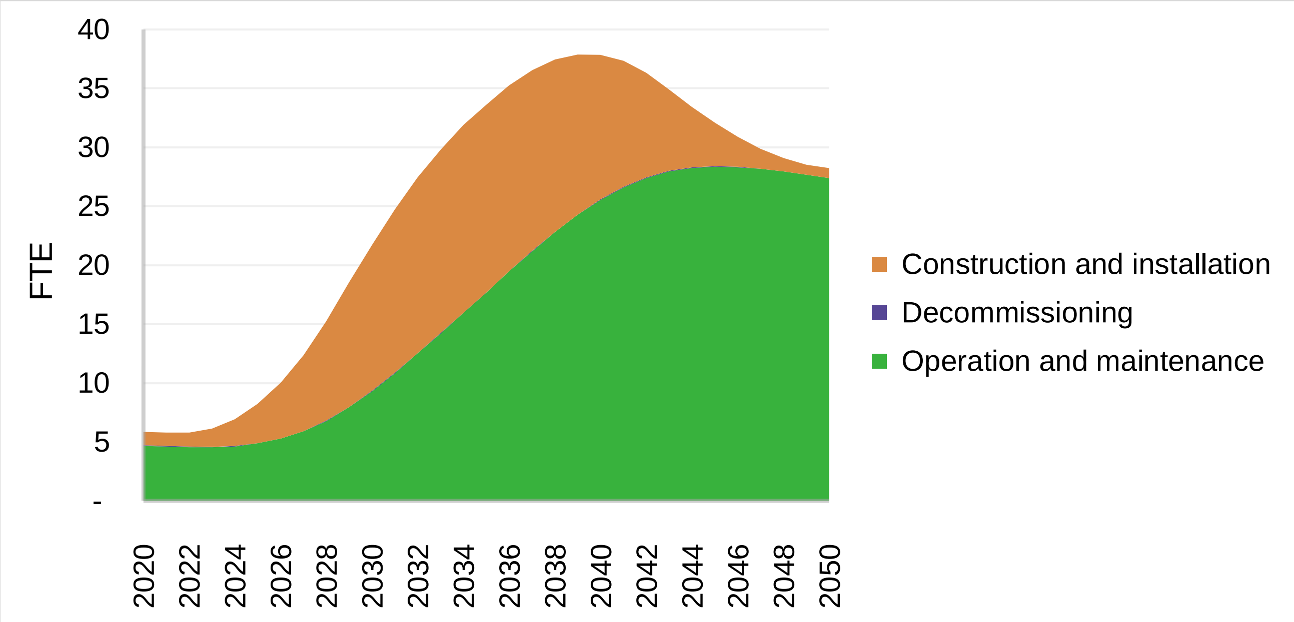


Figure 75: Norfolk bioenergy FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Norfolk

Estimated peak GVA that results from bioenergy jobs in the categories used above are shown in **Table 25**. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios. The lack of GVA for bioenergy decommissioning jobs aligns with the long lifetime of bioenergy technology, as noted previously.

Table 25: Norfolk bioenergy peak projected annual GVA values by job types

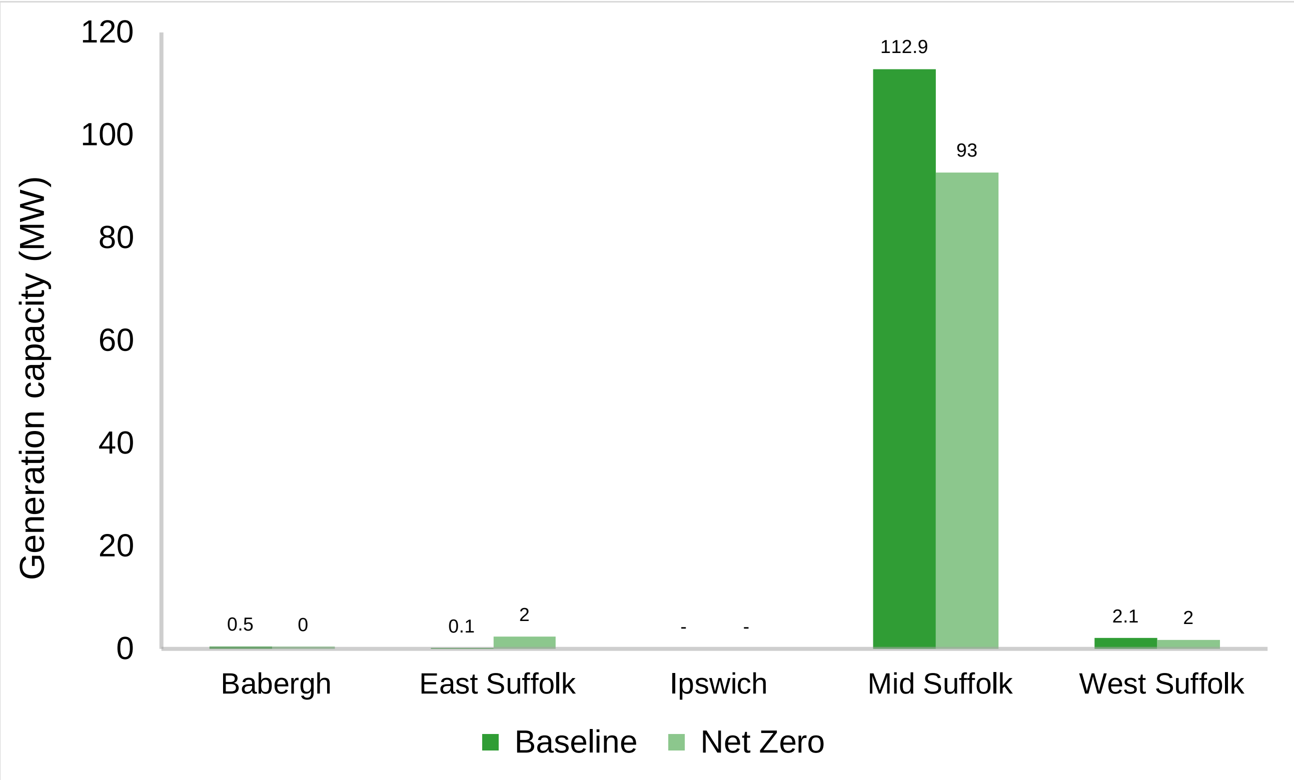
Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	1	-	3
Urgent ramp up	2025	2	-	3
Net zero 2050	2039	1	-	1

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Current and expected generation capacity in Suffolk

Bioenergy generation in Suffolk is currently estimated at 116 MW, with Mid Suffolk having the most significant capacity[80]. UK Power Networks' Distributed Future Energy Scenarios project a 97 MW generation capacity for bioenergy in Suffolk to achieve Net Zero – the only case where we see a decrease, out of the sectors we have included in this report. Mid Suffolk remains the highest contributing local authority. **Figure 76** shows the values we assume in our modelling, by local authority.

Figure 76: Suffolk bioenergy generation capacity values[81]



Job creation scenarios in Suffolk

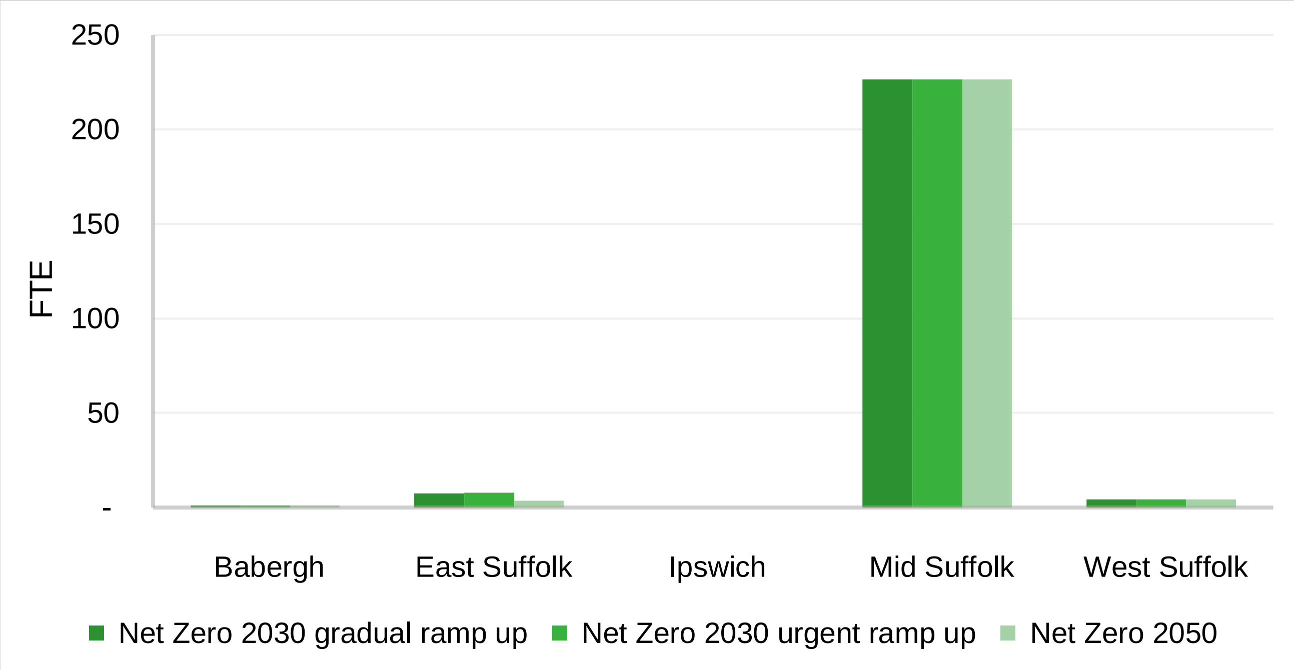
For the changes in capacity given above, we have modelled job changes in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

The biggest job hotspot for bioenergy in Suffolk is in Mid Suffolk, following its high capacity compared to the other local authorities. The peaks are similar between all the scenarios due to the overall decrease in

[80] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.
[81] Values from Distribution Future Energy Scenarios. (2020 and 2050). Distribution Future Energy Scenarios (DFES) 2022.

capacity meaning the highest number of jobs occurs at the start of the period. Peak job values by local authority are shown in **Figure 77**.

Figure 77: Suffolk bioenergy peak jobs across the scenarios



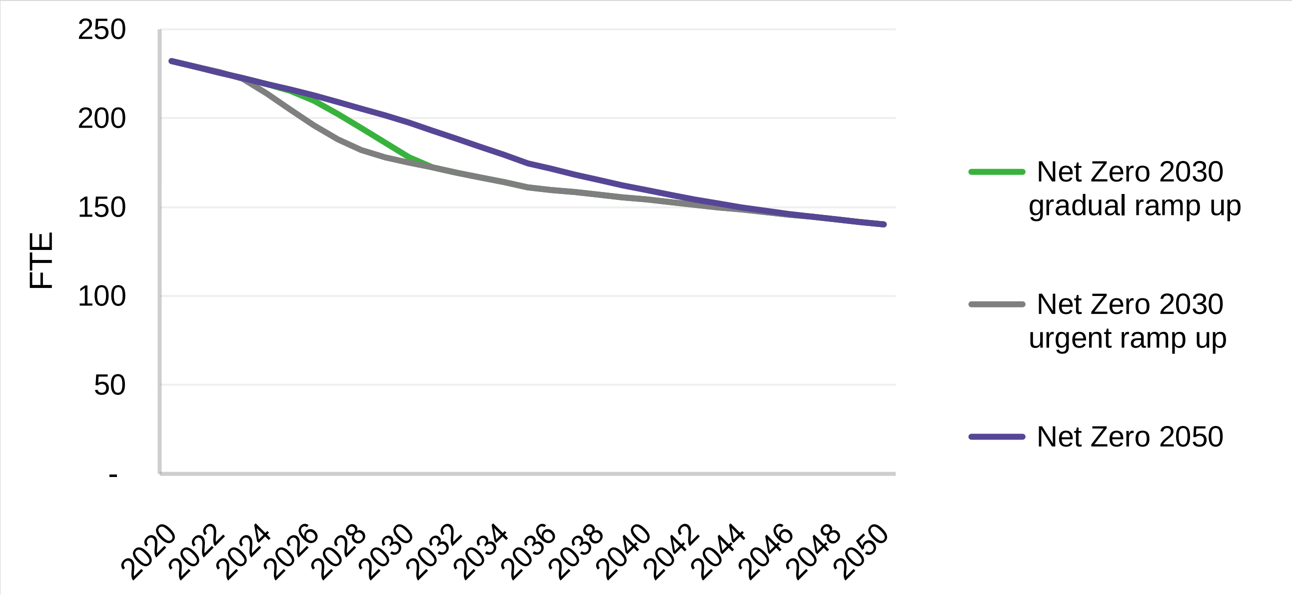
The years in which the peak jobs occur in each scenario are provided in **Table 26,** which as noted are at the start of the time period considered. More insight into these values is provided by **Figure 78** below, which depicts how the total number of jobs changes over time for each scenario.

Table 26: Year in which peak jobs occur for bioenergy in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2020	2020	2020

The development of bioenergy jobs over time in Suffolk for each of the three scenarios is shown in **Figure 78**. The decrease in jobs can be seen across all scenarios, with faster decreases under the Net Zero 2030 scenarios, as a faster transition to final capacity values is assumed.

Figure 78: Suffolk bioenergy FTE over time



Breakdown of job types in Suffolk

Different types of jobs have been modelled, as associated with construction and installation of capacity, operation and maintenance assets, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

Figure 79, **Figure 80** and **Figure 81** present the number of jobs in each type over time for bioenergy, for each scenario. Despite the decrease in bioenergy capacity in Suffolk, some construction and installation jobs remain, resulting from replacement of current capacity. This appears more significant than for other sectors due to the higher initial capacity and absence of a large capacity increase, combined with a large job intensity associated with construction and installation of bioenergy. The downwards trend in number of jobs is also influenced by assumed learning rates for bioenergy employment – the principle that fewer jobs will be needed in the future to maintain the same capacity, due to improved efficiencies in processes and technologies. Though there are some jobs associated with decommissioning, these are minimal when compared to construction and installation and operation and maintenance, due to the comparatively low number of jobs required for decommissioning of the same capacity for bioenergy.

Figure 79: Suffolk bioenergy FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

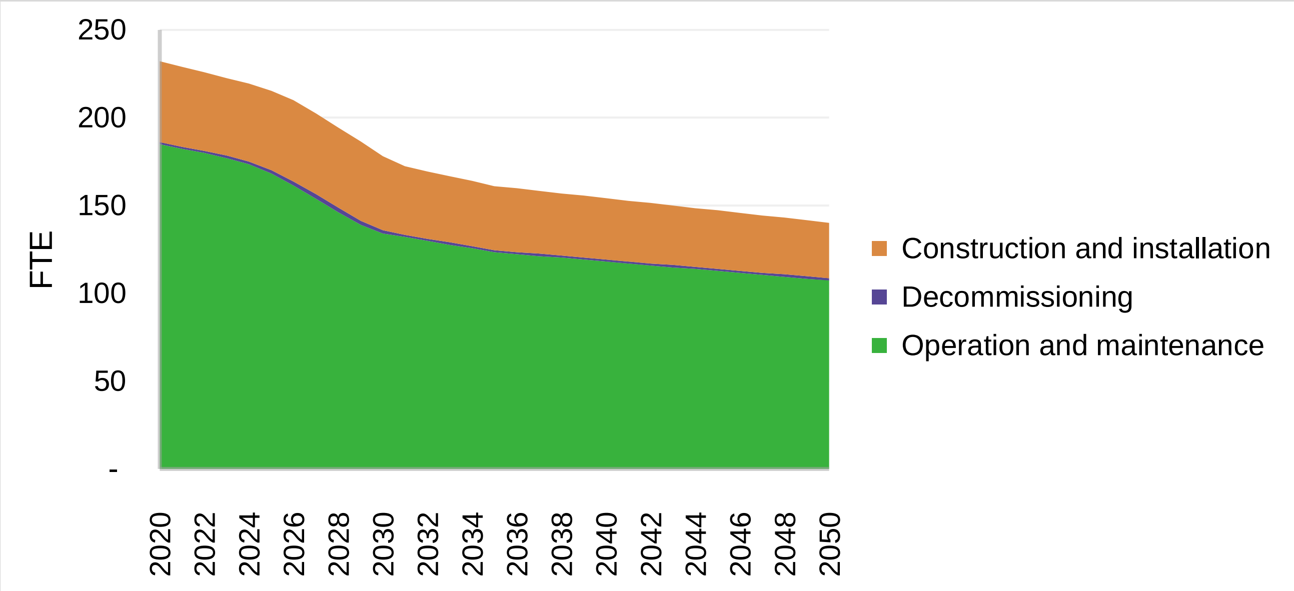


Figure 80: Suffolk bioenergy FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

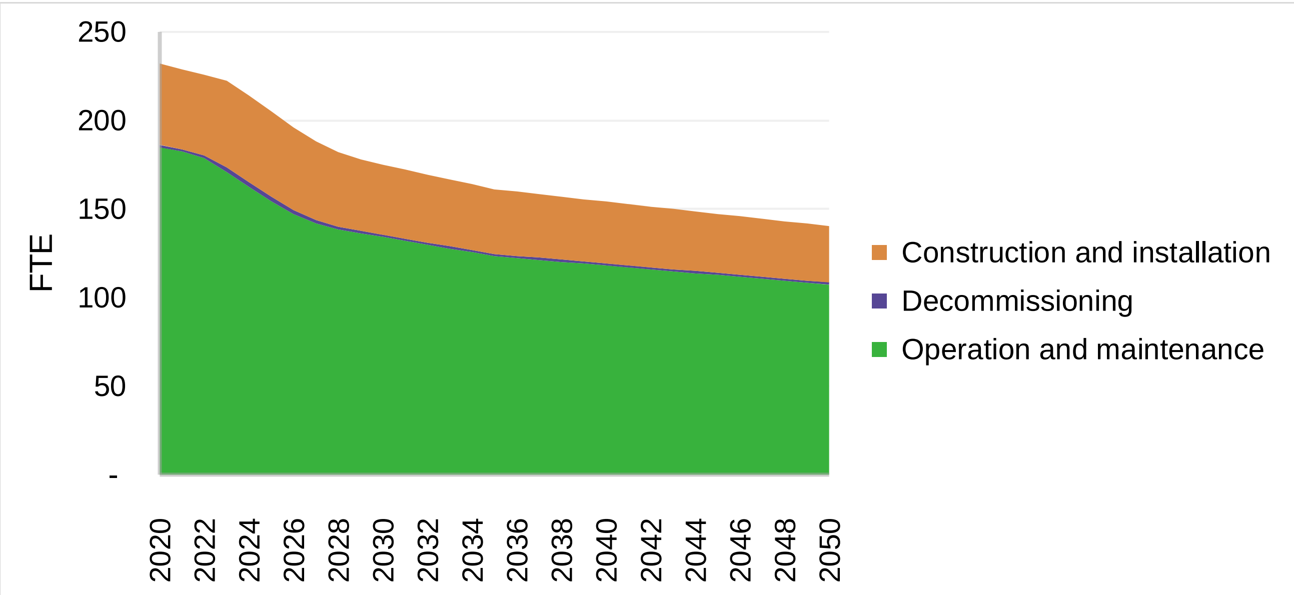
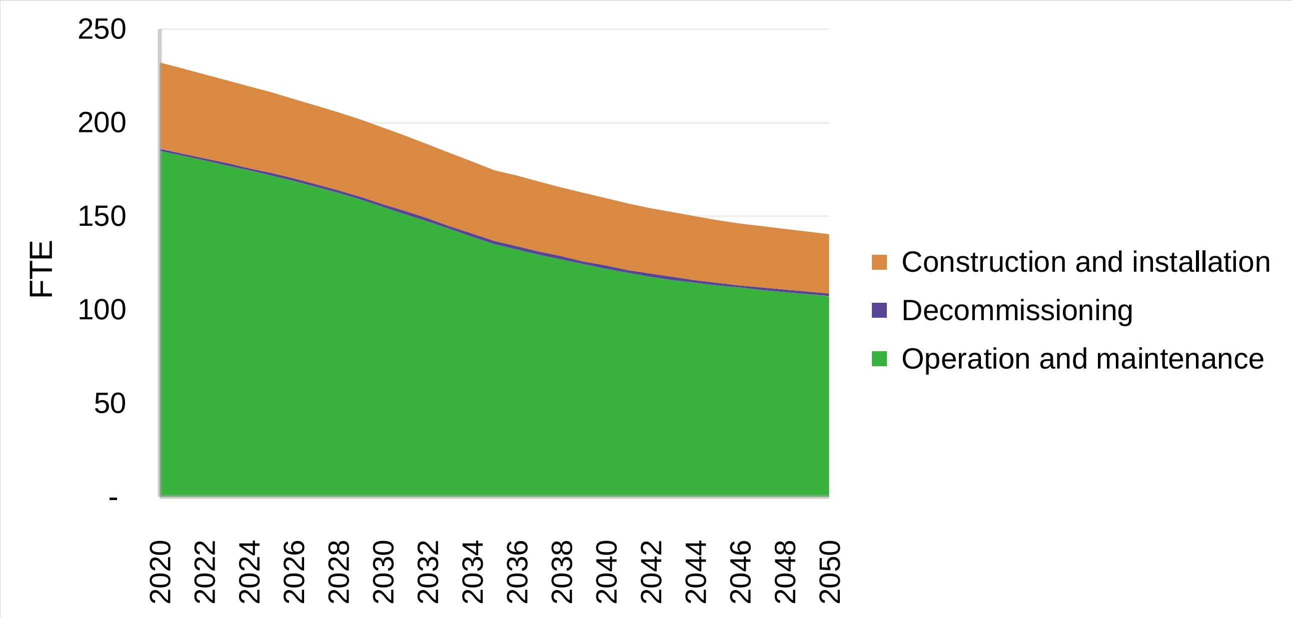


Figure 81: Suffolk bioenergy FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Suffolk

Estimated peak GVA that results from bioenergy jobs in the categories used above are shown in **Table 27**. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios. The lack of GVA for bioenergy decommissioning jobs aligns with the low job requirement, as noted previously. Given the peak years occur in 2020 its expected limited economic opportunities will occur in this sector.

Table 27: Suffolk bioenergy peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2020	8	-	2
Urgent ramp up	2020	8	-	3
Net zero 2050	2020	8	-	2

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Skills gap analysis for the bioenergy sector in Norfolk and Suffolk

No stakeholders who operated bioenergy facilities responded during this study, therefore, the insight in this section emerged from the desk research. Many of the courses on offer relating to biomass are centred around residential and small commercial applications. **Table 28** illustrates the range of the courses on offer for residential biomass installers.

Table 28: Courses available in Norfolk and Suffolk for residential biomass installers

Course	Training Provider
Solid biomass and biomass heating systems	BPEC
Level 3 NVQ Diploma in Domestic Plumbing and Heating (6189-31) (600/1122/1) Biomass Pathway	City & Guilds
H005DE biomass course	HETAS
Level 3 Award in the Installation, Commissioning and Maintenance of Wood Pellet Burning Appliances	LCL

While some skills are transferable such as combustion fundamentals, there are significant differences between residential systems, commercial systems and larger units supplying energy to the grid or heat to homes. The University of East Anglia offers an Energy Engineering course, developed in partnership with the East of England Energy Group where bioenergy is a subcategory of multiple subjects. The challenge with this is that both biomass and anaerobic digestion have highly technical and regulatory training needs linked to the development and operation of activities. The training provision nationally is limited with the courses that are available non-accredited so are not supported by existing standards for vocational training such as apprenticeship standards[82].

The one exception is for anaerobic digestion where the Chartered Institution of Waste Management runs a Special Interest Group focused on aerobic and anaerobic digestion. As part of their work, they run an OFQUAL approved technical apprenticeship: a Level 4 Medium Risk Operator Competence for Anaerobic Digestion. They also host an operator competence scheme and run assessments to ensure operators working in anaerobic digestion plants maintain their competence. This course is not offered in any local training centre in Norfolk and Suffolk.

[82] New Anglia LEP. (2019). Enabling Growth in New Anglia Clean Energy Industry through Skills Development.

HYDROGEN

The boundary condition for hydrogen in this jobs analysis relates to hydrogen consumed in fuel cells or turbines to derive power. **Hydrogen production is excluded** from the economic analysis given the lack of granular data on local hydrogen production given how nascent the industry is in the region. However, a brief overview of early hydrogen projects in the region are discussed in the overview section for completeness.

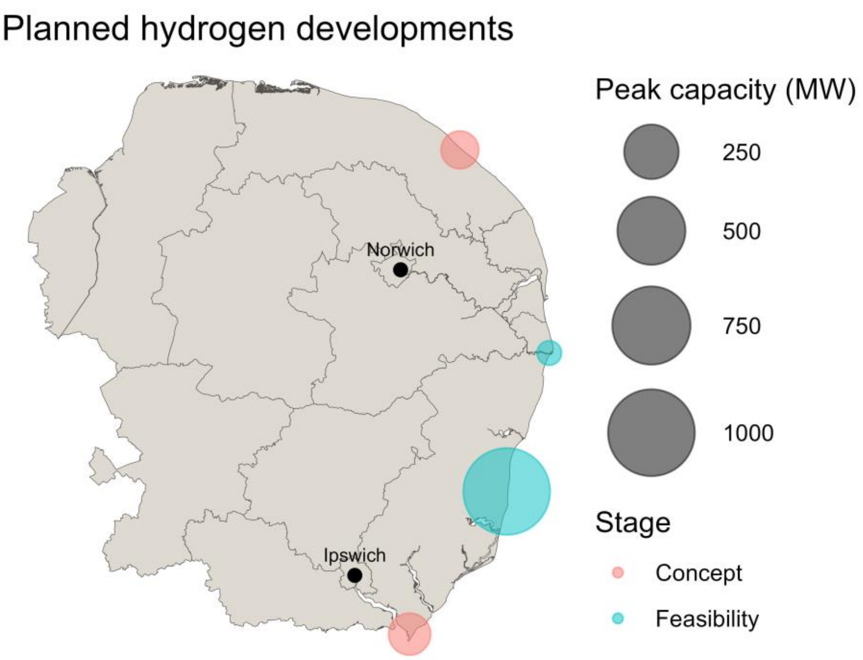
To derive jobs numbers, the economic analysis used labour intensities from the ONS LCREE category of Alternative Fuels[83]. This category contains a range of fuels including established industrial fuels such as ammonia and alcohol-based fuels alongside newer innovations such as carbon-neutral synthetic fuels, low carbon hydrogen and power to liquid fuels. While other activity in power-to-liquid and synthetic fuels could emerge in the future due to the expected increase in renewable energy generation, this study only looks at hydrogen.

Overview of the hydrogen sector in Norfolk & Suffolk

Despite hydrogen being an established fuel, its usage in the UK has been limited to the refining industries and ammonia production. However, as the UK races to decarbonise hard-to-treat and hard-to-electrify sectors such as steel, cement and chemicals, the need for hydrogen has increased. The UK's low carbon hydrogen industry is still emerging, and Norfolk and Suffolk are drafting plans to establish hydrogen clusters around key industrial areas. Hydrogen East, established by local organisations and supported by the New Anglia LEP and East of England Energy Group, are championing hydrogen clusters in the region. Given Norfolk and Suffolk's offshore wind capability, existing gas terminals and Sizewell B & C facilities give multiple options for hydrogen production in the region. In terms of tangible activity, two early-stage projects have been awarded via the Net Zero Hydrogen Fund in Lowestoft and Felixstowe. **Figure 82** provides an overview of planned hydrogen developments in the region. This data is taken from the Hydrogen UK project database which draws on public data on both conceptual projects and feasibility studies[84].

[83] Examples of alternative fuels include: Alcohol fuels (ethanol, methanol, butanol; ammonia; carbon-neutral synthetic fuels; hydrogen produced by electrolysis and/or low carbon thermochemical processes; low carbon fuels from fossil waste e.g. waste industrial gases or unrecyclable; renewable fuels of non-biological origin e.g. power to liquid.
[84] Drawn from public information

Figure 82: Planned hydrogen developments in Norfolk and Suffolk



A list of the expected developments in the region projects is listed below which are at an early stage of maturity.

Bacton Energy Hub: The UK-Belgium interconnector runs between Bacton in Norfolk and Zeebrugge in Belgium and connects Britain to the mainland Europe gas network. This pipeline has an import capacity of 25.5 billion cubic metres (bcm) a year[85]. It is the only pipeline that currently operates bi-directionally, meaning it can both import gas to Britain as well as export gas to mainland Europe[86]. Given its strategic value and export opportunity, Bacton Gas Terminal has been selected as a potential site for blue hydrogen production. Estimates from Hydrogen East on CCUS injection rates established an upper bound for blue hydrogen production at Bacton of 55.9TWh/year, with the two most cost-effective solutions able to facilitate 22.4TWh/year. Blue hydrogen production with CCUS could be operational by (or even before) 2030, subject to completion of engineering studies[87]. In December 2022, Hydrogen East unveiled a draft £1.3bn project proposal to scale up to 1GW of blue hydrogen production by 2030. Two projects have been put forward. The first would be the 'core' project to produce enough energy to allow a power plant to produce 300 megawatts of electricity per year and a 'build-out' version, costing £1.3bn, which would be

[85] Global Energy Monitor. (2022). Zeebrugge–Bacton Gas Pipeline.
[86] Scottish Government. (2020). Offshore wind to green hydrogen: opportunity assessment.
[87] Hydrogen East. (2021). Exploring the potential for hydrogen development in the New Anglia region and around the Southern North Sea.

enough to produce one gigawatt of energy each year[88]. However no formal investment has been made yet in Bacton with plans still being in the early stages.

Felixstowe Port: ScottishPower and Hutchison Ports have identified the Port of Felixstowe as a highly strategic location for a large-scale green hydrogen hub. Deploying 100MW of electrolytic hydrogen production by 2026, the system will use 100% renewable electricity to power electrolysers[89]. Attractive end use applications explored for the project include road, rail and industrial use, with the potential to create liquid forms, such as green ammonia or e-methanol. This could, in turn, provide clean fuels for shipping and aviation, and create opportunities for cost-effective export to international markets.

Lowestoft Hydrogen Hub: Hydrogen East identified Lowestoft as a prime area for deploying a commercial hydrogen project, with an initial study concluded that the area had opportunities in hydrogen including marine vessels, industrial fuel, bus and refuse truck fuel, and gas grid injection. The hydrogen electrolysers developed by Conrad Energy will initially be used as vehicle fuel for marine vessels serving offshore wind turbines, with several other off takers also interested in using the hydrogen. The plant will produce 150 tonnes of hydrogen per year, assuming 30% load factor due to intermittent renewable power input, which will annually eliminate the usage of 500,000 litres of diesel, reducing emissions by 1,250 tonnes of CO2-equivalent[90].

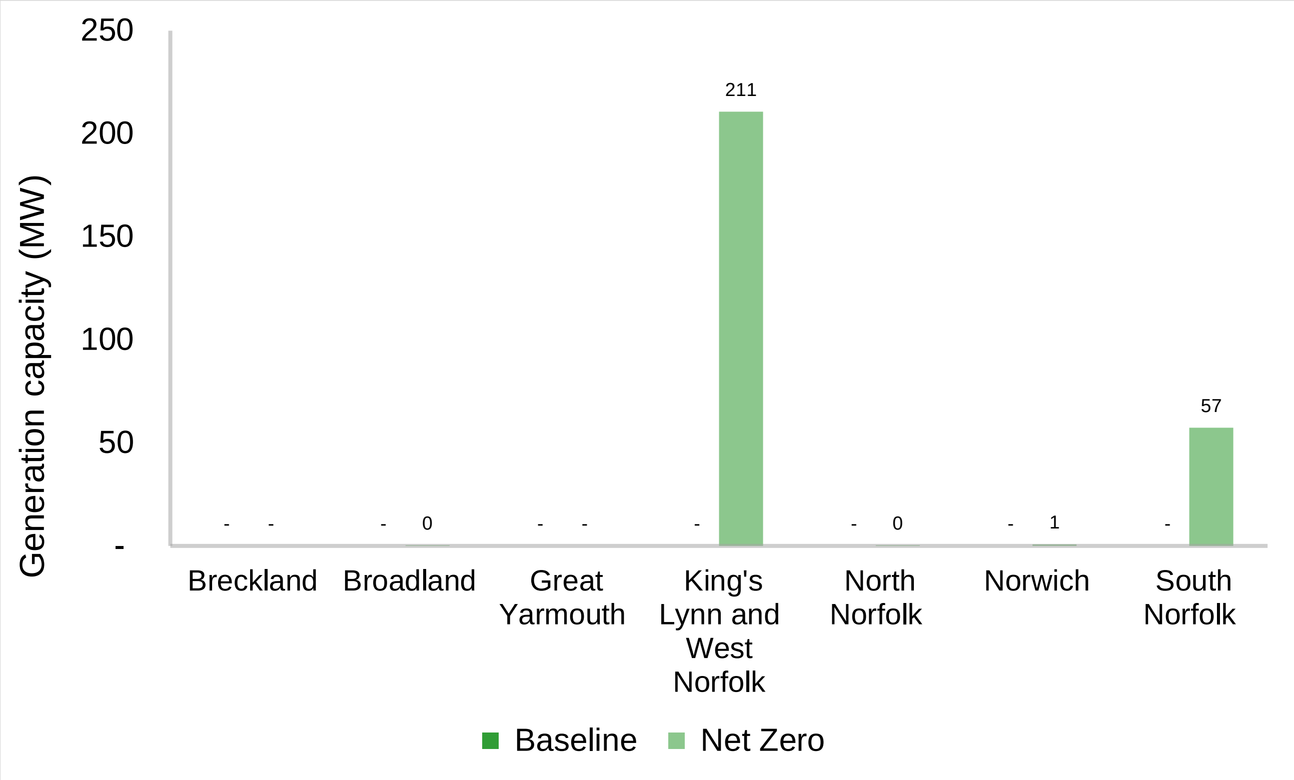
Nuclear derived hydrogen: Sizewell C has been investigating ways the site could produce and use hydrogen. This includes lowering emissions during the construction phase and, once operational, using some of the heat it generates to make hydrogen in a more efficient manner. For example, Sizewell C has been exploring launching a demonstrator project to produce hydrogen, powered by electricity from the neighbouring Sizewell B, with a 2MW electrolyser producing up to 800kg of hydrogen per day[91].

Current and expected capacity in Norfolk

Despite the promising signs of hydrogen production across Norfolk, energy generation from hydrogen is currently zero in Norfolk[92]. The data suggests that the total capacity needed to reach net zero by 2030 will be 269MW, with the majority in King's Lynn and West Norfolk, followed by South Norfolk. **Figure** shows the values we assume in our modelling, by local authority.

[88] Eastern Daily Press. (2022). £1.3bn hydrogen energy project for north Norfolk revealed.
[89] DESNZ. (2023). Net Zero Hydrogen Fund strands 1 and 2: summaries of successful applicants round 1 (April 2022) competition.
[90] Conrad Energy. (2023). Conrad Energy delighted to confirm Net Zero Hydrogen Funding for Lowestoft
[91] EDF Energy. (2020). Expression of Interest – Sizewell C Hydrogen Demonstrator Project
[92] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.

Figure 83: Norfolk hydrogen energy generation capacity values[93]



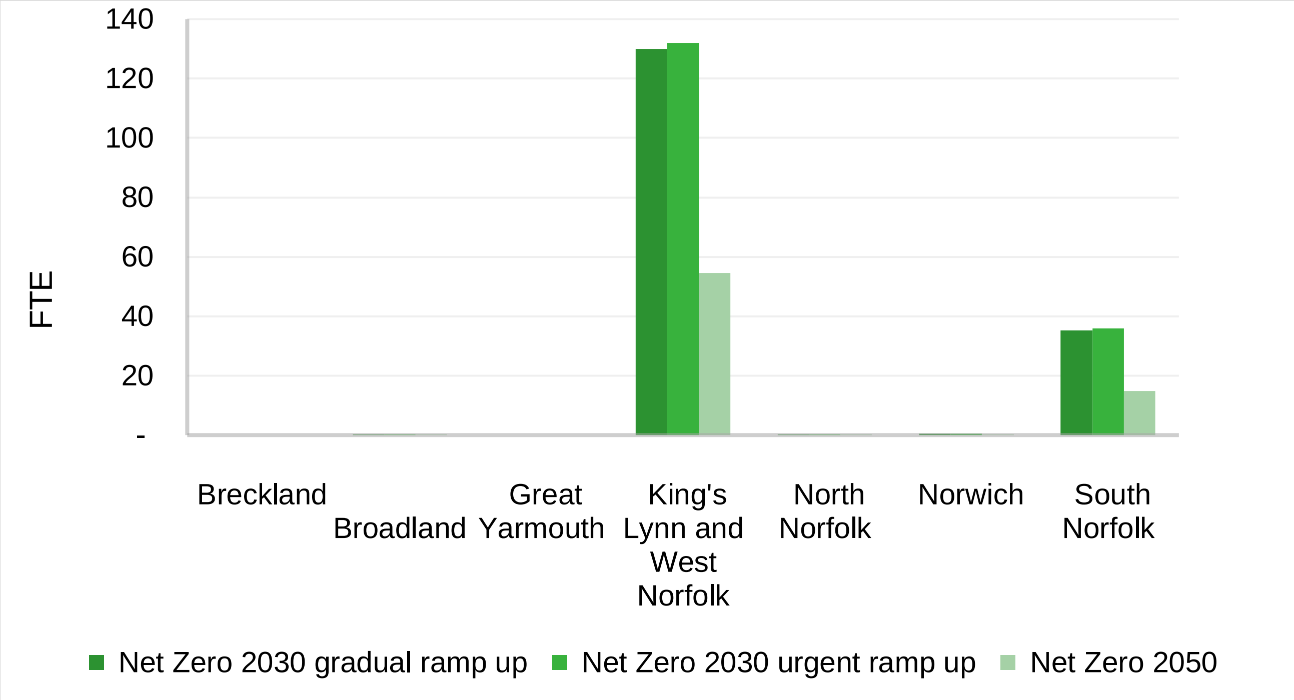
Job creation scenarios in Norfolk

For the increases in generation given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**. Given the narrow scope of hydrogen for this analysis, this is significantly below what is projected by local industry bodies so our projections can be seen as a **cautious estimate** of what the future capacity (and job projections) could be.

In our modelling we do not include jobs associated with producing hydrogen, but instead focus on the construction and installation, operation and maintenance, and any decommissioning of hydrogen energy generation facilities. Job creation hotspots for hydrogen in different local authorities are in line with those that see the largest increases in generation capacity – King's Lynn and West Norfolk, followed by South Norfolk. The peaks are similar for the Net Zero 2030 urgent ramp up scenario and Net Zero 2030 gradual ramp up, with the Net Zero 2050 scenario having a peak less than half of the previous scenarios, as shown in **Figure .**

[93] Values from Distribution Future Energy Scenarios. (2020 and 2050). Distribution Future Energy Scenarios (DFES) 2022.

Figure 84: Norfolk hydrogen peak jobs across the scenarios



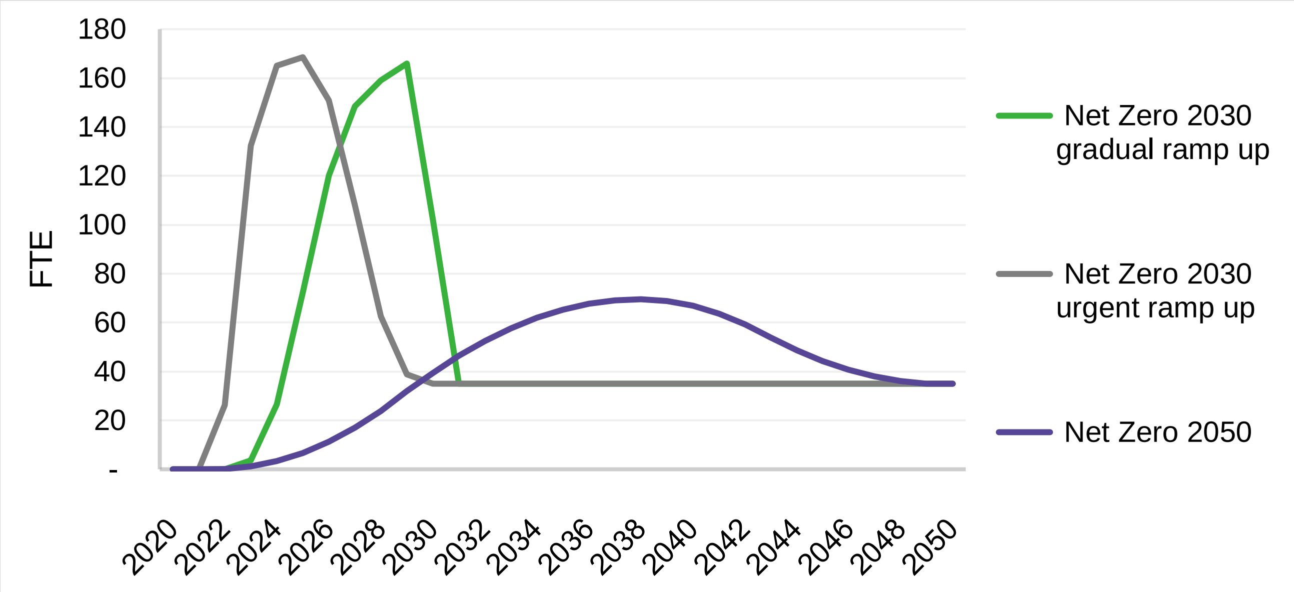
The years in which the peak jobs occurError! Reference source not found. are provided in **Table 29**. More insight into these values is provided by **Figure** below, which depicts how the total number of jobs changes over time for each scenario.

Table 29: Year in which peak jobs occur for hydrogen in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2025	2038

The development of hydrogen jobs over time for each of the three scenarios is shown in **Figure** . Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. For hydrogen we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after 2050.

Figure 85: Norfolk Hydrogen FTE over time



Breakdown of job types in Norfolk

Different types of jobs have been modelled and are grouped into three broad categories: construction and installation of hydrogen-based energy generation, operation and maintenance of assets, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

Figure , Error! Reference source not found. and

Figure present the number of jobs in each type over time for hydrogen, for each scenario.

Unlike some sectors, we do not see a gradual decrease in operation and maintenance jobs over time – due to the assumption that these jobs will be very similar to those in current gas power plants, a mature technology, and as such no increases in productivity over time are expected. There are minimal decommissioning jobs across the scenarios, due to low rates of capacity reaching end-of-life in the period considered, as noted above, in addition to a relatively low job intensity required for decommissioning (again due to assumed similarities to gas power plants). The lifetime of installations also affects any construction and installation jobs associated with replacing end-of-life capacity – which is why minimal construction and installation jobs are seen after 2030 in both the Net Zero 2030 scenarios, and in 2050 in the Net Zero 2050 scenario.

Figure 86: Norfolk hydrogen FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

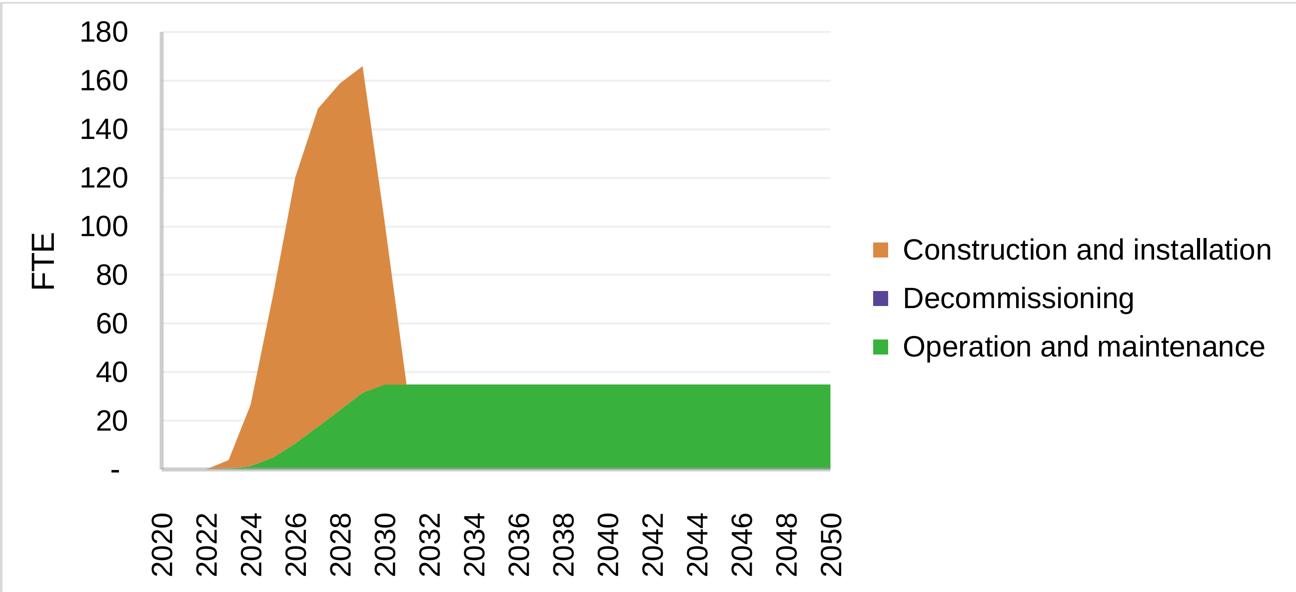


Figure 87: Norfolk hydrogen FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

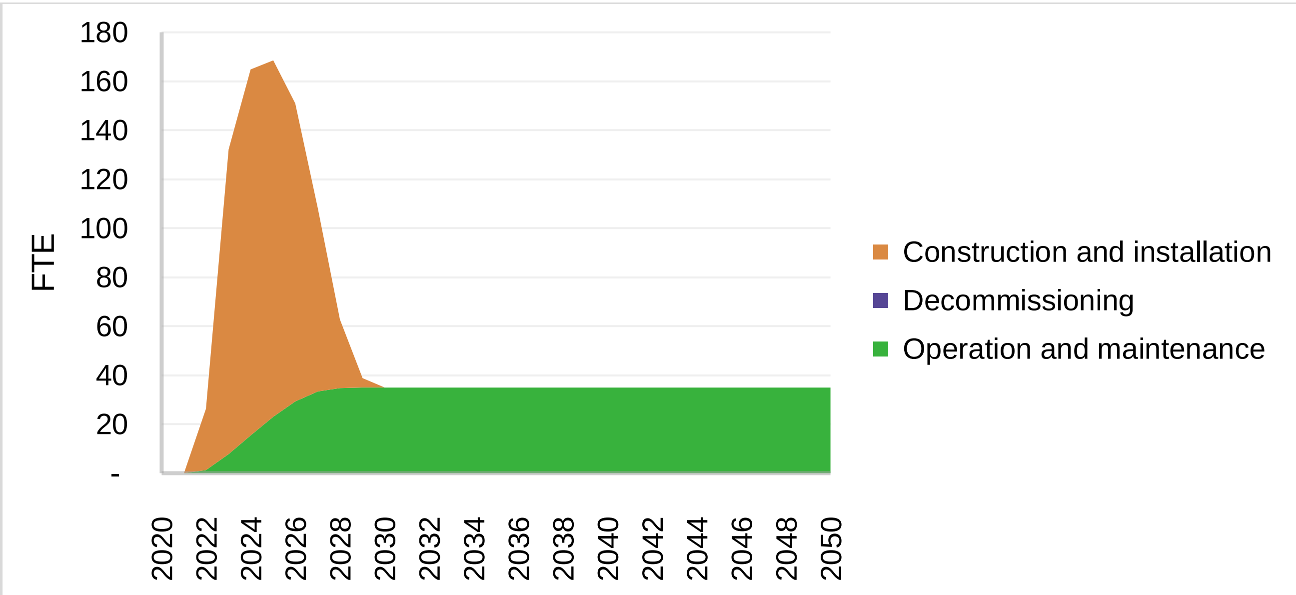
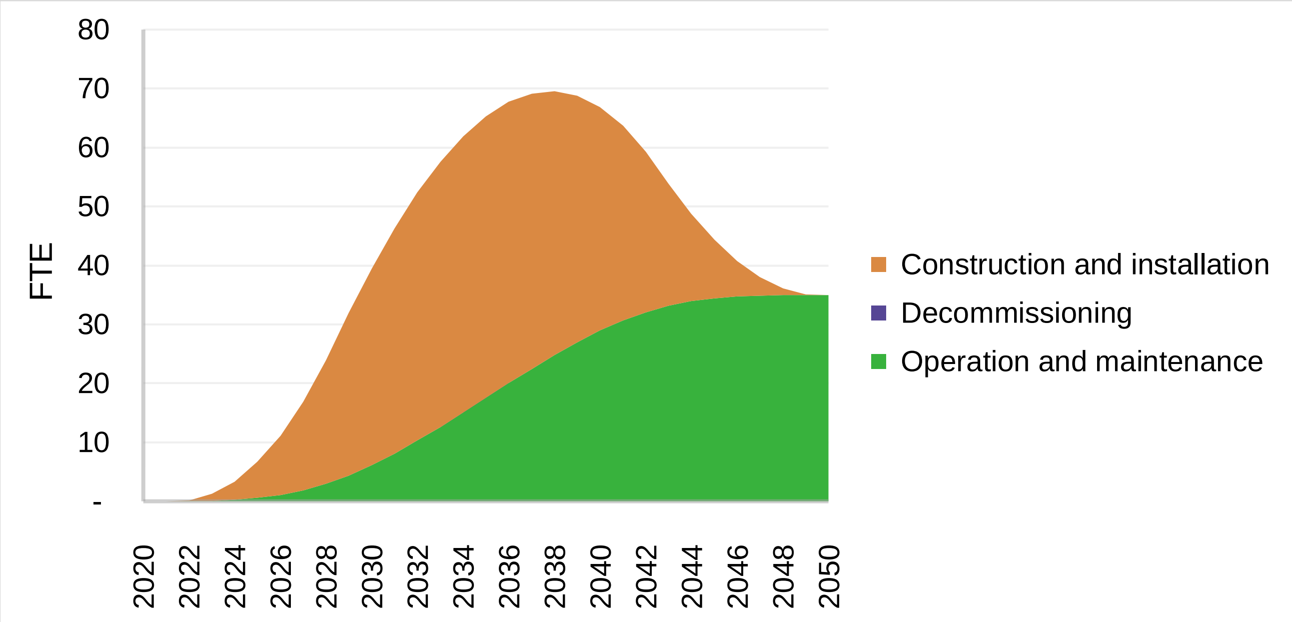


Figure 88: Norfolk hydrogen FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Norfolk

Estimated peak GVA that results from hydrogen jobs in the categories used above are shown in **Table 30**. Since the urgent ramp up usually has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios. The lack of GVA for hydrogen decommissioning jobs aligns with the long lifetime of hydrogen technology, as noted previously.

Table 30: Norfolk hydrogen peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	6	-	9

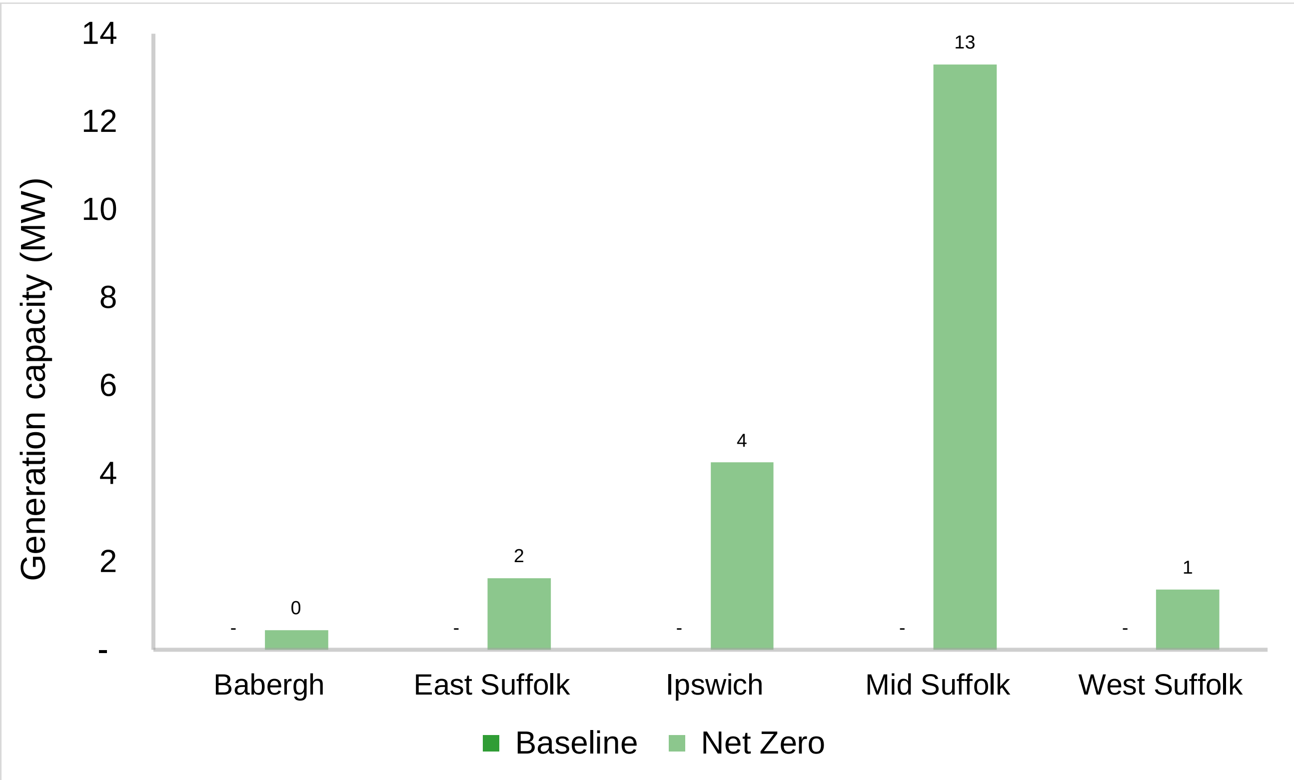
Urgent ramp up	2025	6	-	10
Net zero 2050	2040	6	-	3

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Current and expected generation capacity in Suffolk

Despite some early announcements of funding for feasibility studies, energy generation from hydrogen is currently zero in Suffolk, according to UK Power Networks' Distributed Future Energy Scenarios[94]. They project Net Zero capacity to be around 21 MW, with the majority in Mid Suffolk, followed by Ipswich. **Error! Reference source not found.** shows the values we assume in our modelling, by local authority.

Figure 89: Suffolk hydrogen generation capacity values[95]



Job creation scenarios in Suffolk

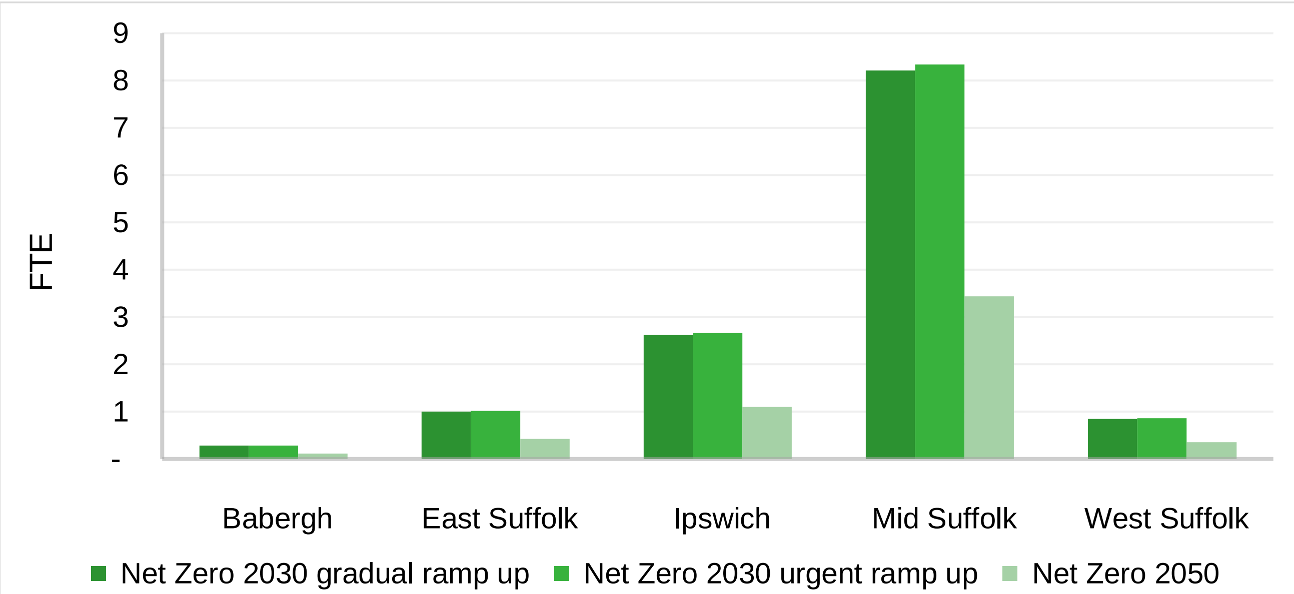
For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in

[94] UK Power Networks. (2022). [Distribution Future Energy Scenarios (DFES) 2022](#).
[95] Values from Distribution Future Energy Scenarios. (2020 and 2050). [Distribution Future Energy Scenarios (DFES) 2022](#).

different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

In our modelling we do not include jobs associated with manufacturing hydrogen production equipment, but instead focus on the construction and installation, operation and maintenance, and any decommissioning of hydrogen energy generation facilities. Job creation hotspots for hydrogen in different local authorities are in line with those that see the largest increases in generation capacity – Mid Suffolk, followed by Ipswich. The peaks are similar for the Net Zero 2030 urgent ramp up scenario and Net Zero 2030 gradual ramp up, with the Net Zero 2050 scenario having a peak less than half of the previous scenarios, as shown in **Figure .** Given the narrow scope of the analysis, this is significantly below what is projected by local industry bodies so our projections can be seen as a **cautious estimate** of what the future capacity (and job projections) could be.

Figure 90: Suffolk hydrogen peak jobs across the scenarios



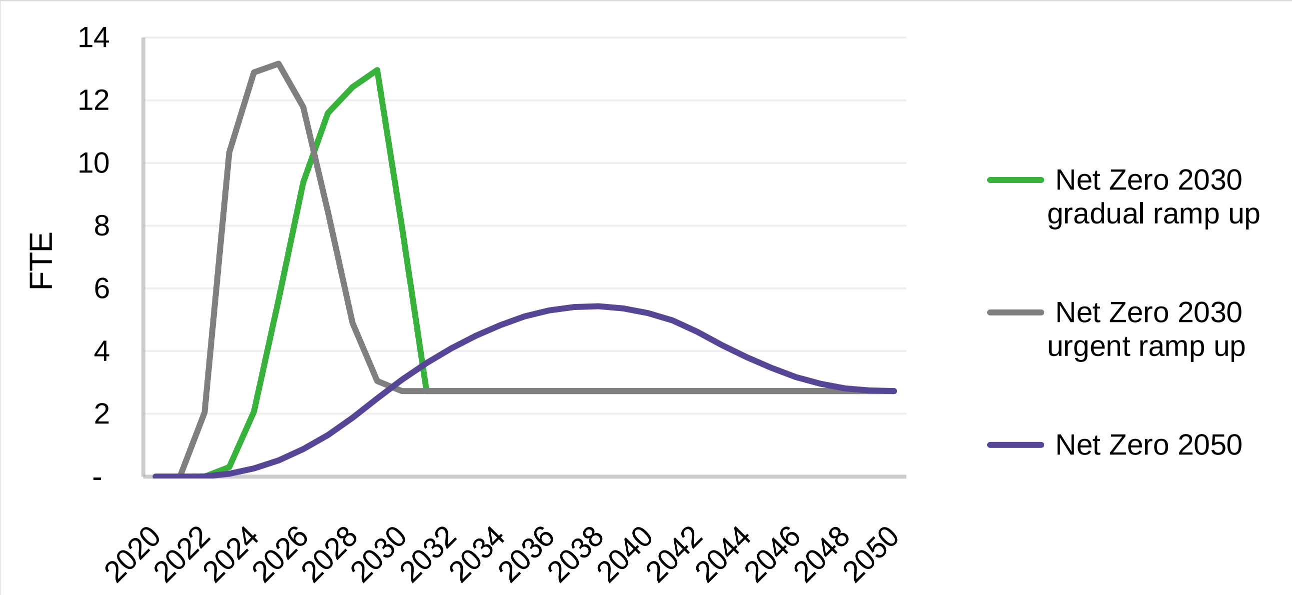
The years in which the peak jobs occur are provided in **Table 31**. More insight into these values is provided by **Figure** Error! Reference source not found. below, which depicts how the total number of jobs changes over time for each scenario.

Table 31: Year in which peak jobs occur for hydrogen in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2025	2038

The development of hydrogen jobs over time for each of the three scenarios is shown in **Figure** . Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. For hydrogen we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after 2050.

Figure 91: Suffolk hydrogen FTE over time



Breakdown of job types in Suffolk

Different types of jobs have been modelled, as associated with construction and installation of capacity, operation and maintenance of capacity, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

Figure 92, **Figure 93** and **Figure 944** present the number of jobs in each type over time for hydrogen, for each scenario.

Unlike some sectors, we do not see a gradual decrease in operation and maintenance jobs over time – due to the assumption that these jobs will be very similar to those in current gas power plants, a mature technology, and as such no increases in productivity over time are expected. There are minimal decommissioning jobs across the scenarios, due to low rates of capacity reaching end-of-life in the period considered, as noted above, in addition to a relatively low job intensity required for decommissioning (again due to assumed similarities to gas power plants). The lifetime of installations also affects any construction and installation jobs associated with replacing end-of-life capacity – which is why minimal construction and installation jobs are seen after 2030 in both the Net Zero 2030 scenarios, and at 2050 in the Net Zero 2050 scenario.

Figure 92: Suffolk hydrogen FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

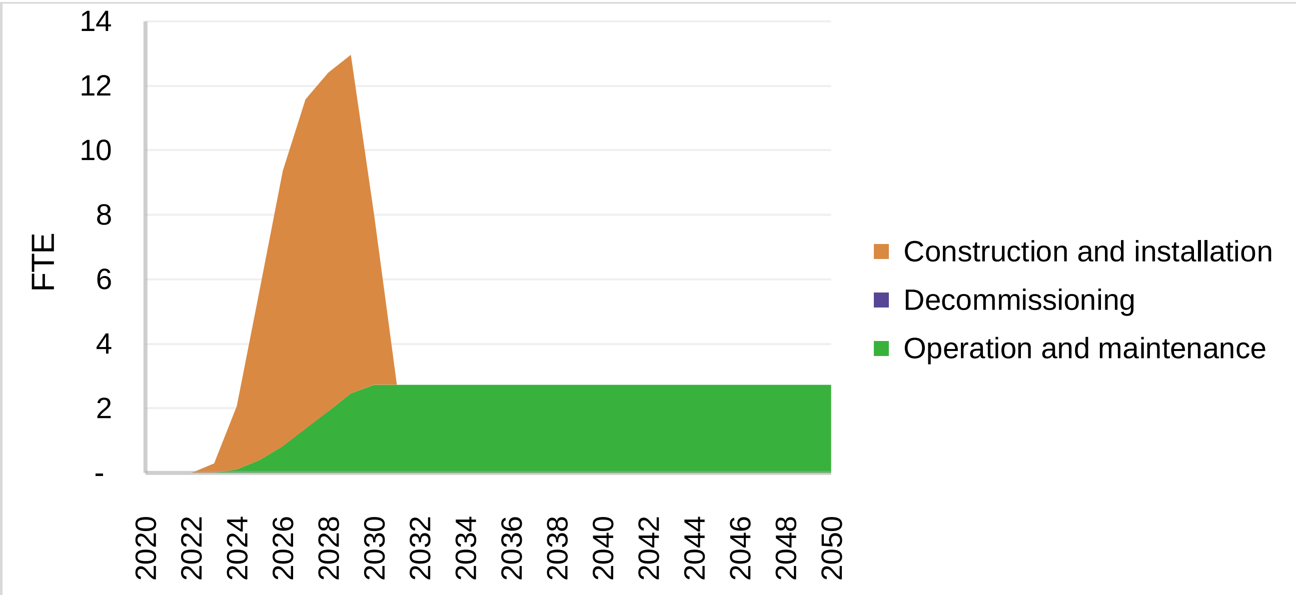


Figure 93: Suffolk hydrogen FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

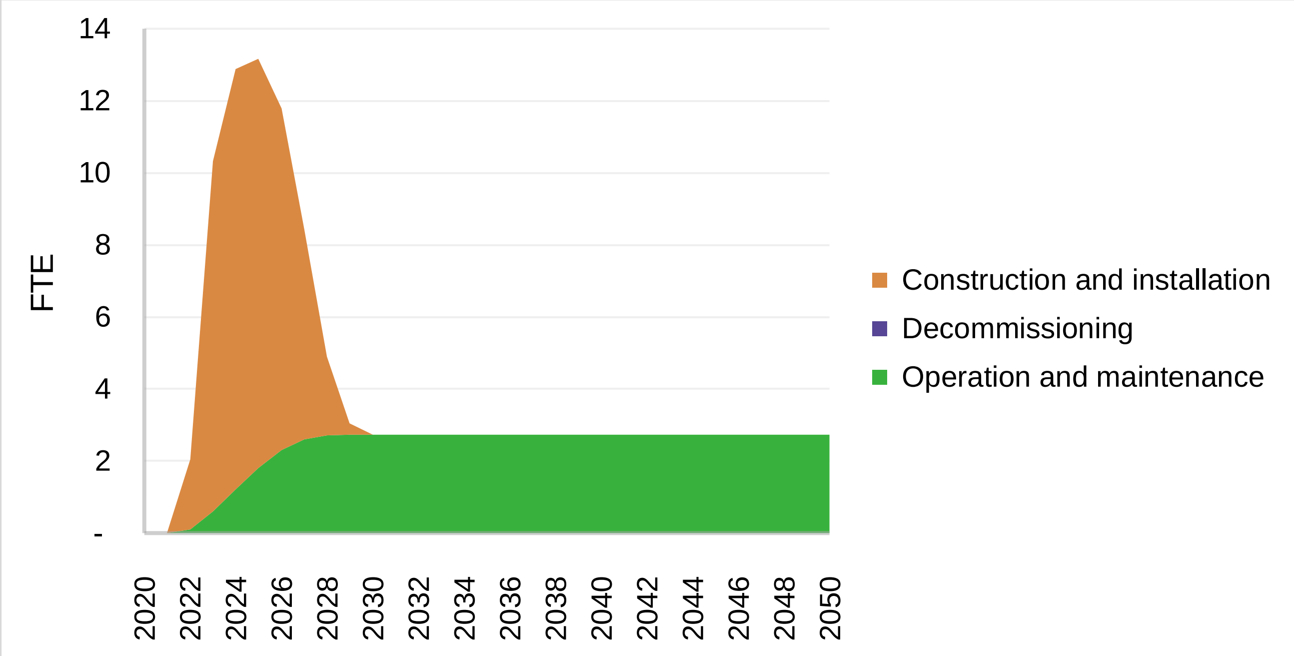
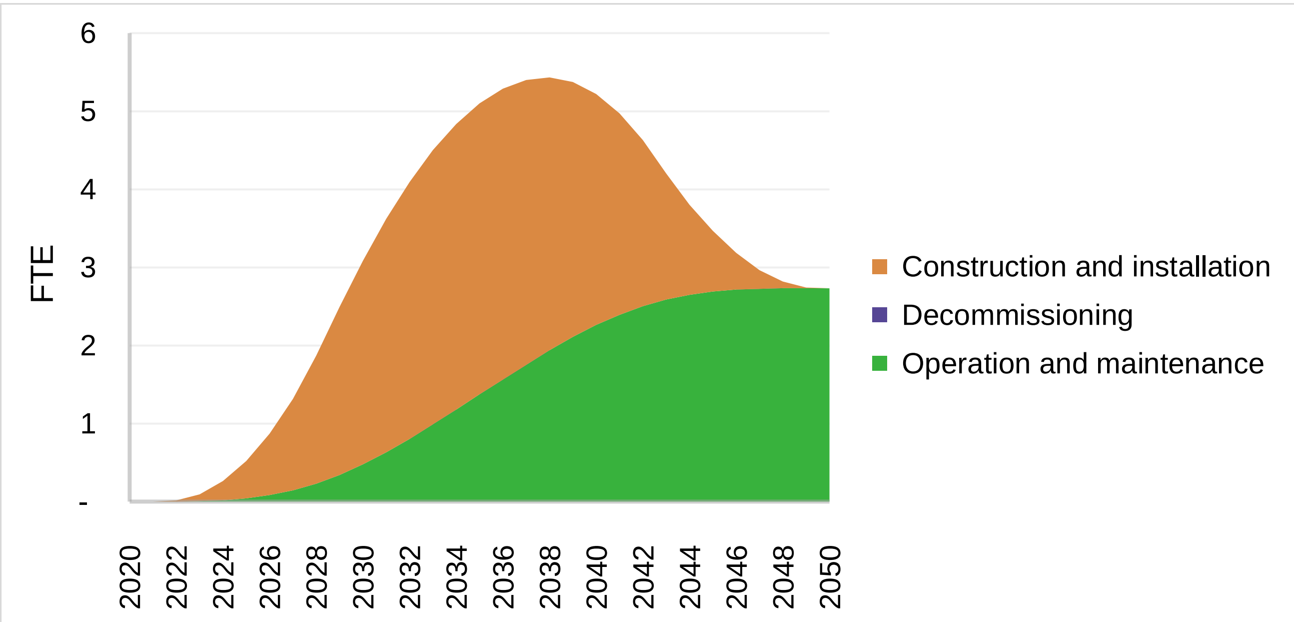


Figure 94: Suffolk hydrogen FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Suffolk

Estimated peak GVA that results from hydrogen jobs in the categories used above are shown in **Table 32**. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios. The lack of GVA for hydrogen decommissioning jobs aligns with the long lifetime of hydrogen technology, as noted previously. The low number of jobs means GVA from all job types is also minimal.

Table 32: Suffolk hydrogen peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2029	-	-	1
Urgent ramp up	2025	-	-	1
Net zero 2050	2040	-	-	-

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Skills gap analysis for hydrogen in Norfolk and Suffolk

The desk research has identified that skills mapping for the hydrogen economy still needs to occur nationally. Most work that analyses the hydrogen skills gaps has been either been detailed and limited in scope, or high level and broad in scope. Individual sectors and regions have started to take steps within their own field to define the skills problem and identify potential solutions. However, as the hydrogen sector becomes more mature and projects begin to reach commercialisation, many organisations are beginning to create standards that regions like Norfolk and Suffolk can build from.

In July 2022, Cogent Skills were asked to facilitate the development of the UK's first national occupational standards for hydrogen production, storage, and transportation[96]. The new occupational standards will set out the standards of performance individuals must achieve, together with the knowledge and skills required to work safely and effectively in the hydrogen production, storage, and transportation industry[97]. Cogent Skills have built on this further by establishing the Hydrogen Skills Alliance in collaboration with the High Value Manufacturing Catapult. The Alliance aims to champion skills fore sighting across all sectors relating to hydrogen and deliver a skills framework akin to the National Electrification Skills Framework electrification[98].

[96] Recognised across the UK, NOS are an important element of the skills development in emerging technologies. They are recognised by employers, regulators and awarding bodies, and can be directly transferred into qualifications or training programmes, influence job descriptions or be used as a measure of workplace competence.
[97] Cogent Skills. (2022). First national occupational standards for hydrogen set to shape skills required for green jobs.
[98] DESNZ. (2023). Hydrogen Champion Report.

It’s important that Norfolk and Suffolk Councils are aware of these national developments and ensure any

Skill set transition identified	Production	Transport and Storage	End Use
Experience in the compressing, pipeline transmission, truck transportation and safe handling of gas and liquid fuels			
Mechanical integrity and instrumented system analysis and operation readiness inspection			
Selection and application of materials, coatings and sealants, equipment, and measurement and detection technologies appropriate for hydrogen			
Understanding of electrochemical processes and ability to install, troubleshoot, service and maintain equipment and technology associated with deployment of hydrogen fuel cells, electrolysers, etc.			
Knowledge and understanding of regulations, codes and standards			
Expanded training for fire, law enforcement and emergency medical personnel required to respond to incidents involving hydrogen and hydrogen fuel cell vehicles			
Training for working for underground storage of hydrogen gas sector, which includes a specialised knowledge for assessing salt caverns			
Construction using drilling and completions			
Maintenance using mechanical integrity testing (MIT) and well workovers and surface infrastructure for ongoing operation and controls			

future skills programmes developed locally are aligned to this national effort.

Despite the emerging nature of job roles, some work has been done international work in Canada and Australia has been conducted to understand the skills requirements for the hydrogen sector. While international standards and contexts vary to a degree, the insights in future skills requirements outlined below apply to the UK and its regions (**Figure 95*****: Additional skill sets from the industries transitioning to hydrogen***

). Therefore, they are provided here as examples of good practice and could be used by Norfolk and Suffolk to draw upon when considering future training provision; both in relation to transitioning the existing work force and training new entrants.

Figure 95: Additional skill sets from the industries transitioning to hydrogen

Skill set transition identified	Production	Transport and Storage	End Use
Experience in the compressing, pipeline transmission, truck transportation and safe handling of gas and liquid fuels	Skill set is not relevant	Skill set is relevant	Skill set is not relevant
Mechanical integrity and instrumented system analysis and operation readiness inspection	Skill set is relevant	Skill set is relevant	Skill set is relevant
Selection and application of materials, coatings and sealants, equipment, and measurement and detection technologies appropriate for hydrogen	Skill set is relevant	Skill set is relevant	Skill set is relevant
Understanding of electrochemical processes and ability to install, troubleshoot, service and maintain equipment and technology associated with deployment of hydrogen fuel cells, electrolysers, etc.	Skill set is relevant	Skill set is not relevant	Skill set is somewhat relevant
Knowledge and understanding of regulations, codes and standards	Skill set is relevant	Skill set is relevant	Skill set is relevant
Expanded training for fire, law enforcement and emergency medical personnel required to respond to incidents involving hydrogen and hydrogen fuel cell vehicles	Skill set is relevant	Skill set is relevant	Skill set is relevant
Training for working for underground storage of hydrogen gas sector, which includes a specialised knowledge for assessing salt caverns	Skill set is not relevant	Skill set is relevant	Skill set is not relevant
Construction using drilling and completions	Skill set is relevant	Skill set is somewhat relevant	Skill set is somewhat relevant
Maintenance using mechanical integrity testing (MIT) and well workovers and surface infrastructure for ongoing operation and controls	Skill set is relevant	Skill set is relevant	Skill set is not relevant

Skill set is relevant — Skill set is somewhat relevant — Skill set is not relevant

Figure 95*: Additional skill sets from the industries transitioning to hydrogen*

also highlights is that upskilling is complex and will be required across the hydrogen value chain. Where

Skill set transition identified	Production	Transport and Storage	End Use
Experience in the compressing, pipeline transmission, truck transportation and safe handling of gas and liquid fuels			
Mechanical integrity and instrumented system analysis and operation readiness inspection			
Selection and application of materials, coatings and sealants, equipment, and measurement and detection technologies appropriate for hydrogen			
Understanding of electrochemical processes and ability to install, troubleshoot, service and maintain equipment and technology associated with deployment of hydrogen fuel cells, electrolysers, etc.			
Knowledge and understanding of regulations, codes and standards			
Expanded training for fire, law enforcement and emergency medical personnel required to respond to incidents involving hydrogen and hydrogen fuel cell vehicles			
Training for working for underground storage of hydrogen gas sector, which includes a specialised knowledge for assessing salt caverns			
Construction using drilling and completions			
Maintenance using mechanical integrity testing (MIT) and well workovers and surface infrastructure for ongoing operation and controls			

transitions are relevant to all the value chain elements, these usually relate to safety and testing whereby introducing hydrogen into new applications will require new standards. There are also some specific skill requirements unique to hydrogen where specialist skills, rather than minor upskilling, will be needed. This ranges from becoming familiar with electrolysers operations and maintenance, scientific and technical knowledge relating to hydrogen storage, especially salt caverns, and updating skill sets to deal safely with hydrogen especially in vehicles and industry settings.

The Green Jobs Taskforce supports this research, citing that while over 90% of UK's oil and gas workforce have medium to high skills transferability into new energy sectors, there is only a medium transferability in the hydrogen sector, specifically blue hydrogen [99]. It was estimated that approximately 50% of the 200,000 total jobs in the UK offshore energy sector in 2030, which includes hydrogen, will be filled by workers transferring from the oil and gas sector. Therefore, new graduates and recruits from outside the offshore energy sector will be crucial. This point was also reinstated by a number of interviewees, who felt that while those leaving the oil and gas could fill some of the roles, a range of factors including salary expectations, skills sets, and general demographics mean new entrants will be key for sectors like hydrogen and offshore wind to be successful.

Given the nascent nature of the hydrogen sector nationally and within Norfolk and Suffolk, dedicated training provision for hydrogen related industries doesn't exist. The University of East Anglia's Energy Engineering degree touches upon hydrogen as part of its module structure, but no dedicated courses exist within the region.

Table 33: Colleges and universities in & around Norfolk and Suffolk offering courses relevant to hydrogen

Institution	Courses offered
University of East Anglia	MSc Energy Engineering

According to the OFQUAL database, there are limited number of courses available in England on hydrogen, with only one Level 1 awareness course offered by the Institute of the Motoring Industry regarding hydrogen vehicles. There are two OCN NI Level 2 and Level 3 Awards for Hydrogen Applications and Technologies, however, these are only available in Northern Ireland and not available for international students. There's an opportunity for Norfolk and Suffolk Council to work with Hydrogen East and local training providers, potentially trailblazing new courses, working closely with national initiatives like the National Hydrogen Skills Alliance.

[99] BEIS. (2021). Green Jobs Taskforce Report.

EV CHARGING

This section provides insight into the number of charge points required to meet Norfolk and Suffolk's net zero ambitions. The calculations are made by estimating the electric vehicle (EV) penetration in Norfolk and Suffolk, assuming a proportion of off-street parking availability and then estimating the charge point requirements. From there, employment intensities for the installation and ongoing maintenance of charge points are determined to ascertain the total jobs required.

The economic modelling only considers the jobs required to install and maintain EV charge points. Any jobs that are created in EV maintenance and manufacture of vehicles is out of scope for this study. For maintenance, a range of EV maintenance courses are offered nationally via the Institute of the Motor Industry (see **Appendix 4**) with multiple local colleges offering courses. Furthermore, as EVs have fewer moving parts, studies have shown that maintenance costs are lower, potentially reducing the jobs needed in this industry[100].

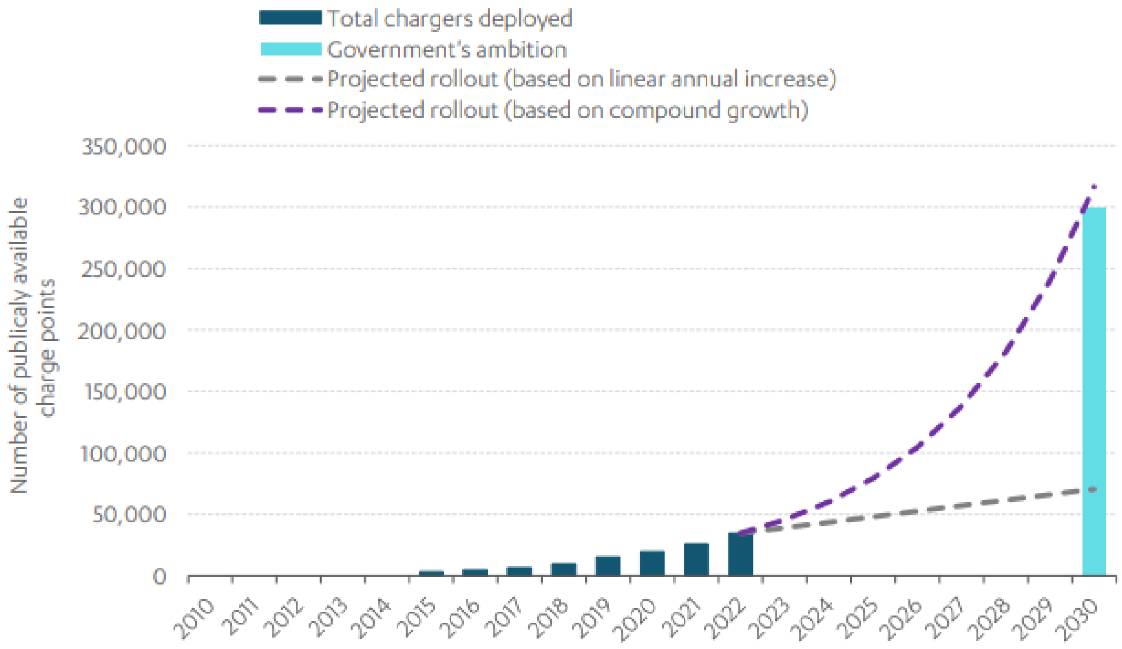
While a small amount of vehicle manufacturing occurs in Norfolk, this was also deemed out of scope for the economic modelling. Like maintenance, the labour intensity for EV assembly reduces vs internal combustion engines, so jobs are assumed to be constant in this area[101]. Nevertheless, despite these areas not being included in the economic modelling, qualitative insights are provided where respondents noted skills challenges in the areas of vehicle maintenance or manufacturing.

Overview of the EV charging sector in Norfolk and Suffolk

In 2020, the UK announced a phase out date for the sale of new fossil fuel vehicles. From 2030, no new fossil fuel cars can be sold on the UK market, with plug-in hybrids allowed until 2035. As of May 2023, the UK government is consulting on a ZEV mandate being introduced in 2024, requiring a minimum % of EVs being sold by manufacturers. To prepare the UK for this EV transition, the UK Government has committed £1.5 billion with the aim of 300,000 public charge points by 2030. Despite these commitments, in the last year, only 8,680 chargers have been installed. At this annual rate, the UK would not hit 300,000 charge points until 2053, well past the target date. Projections from the National Infrastructure Commission shown in **Figure 96** also show that an annual growth rate of around 30% will need to be maintained to stay on target which reinforces the need for EV charge points installers[102].

[100] RAC. (2022). EV maintenance, service, and repairs guide
[101] CNBC. (2022). Ford says making its own parts for electric vehicles could offset job losses
[102] National Infrastructure Committee. (2023). Infrastructure Progress Review 2023

Figure 96: Publicly available EV charge point roll-out need, 2015-2030



Source: Department for Transport - Electric vehicle charging device statistics (October 2022)

Note: Linear growth based on historic average annual increase in total deployment projected forward to 2030. Compound growth based on average annual percentage growth in deployment between 2020 and 2022, projected forward to 2030

It should be noted that the figure of 300,000 public charge points is seen as rather arbitrary in the EV industry, as it has no relevance to rapid, fast or slow vehicle charging, a key determinant on the number of charge points required to fulfil demand. For this jobs analysis, Gemserv has assumed a high reliance on home charging installations, assuming all those with access to off street parking could install a home charger. In this scenario, there must be sufficient skill sets to install and maintain cheaper, low power home charging units, usually found at 3.6kW, as well as those who can install and maintain costly, and highly utilised high-power units likely to be in the range of 150kW. The labour intensities assumed in the model and found in the literature also reflect this difference.

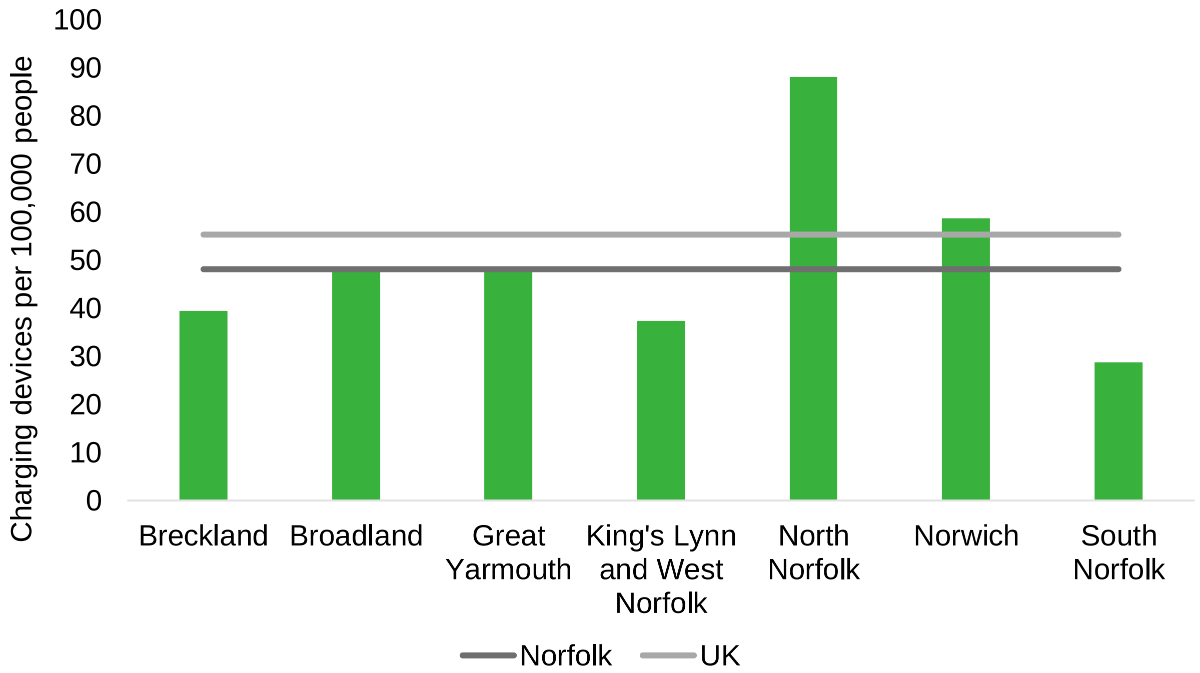
Government support for EV charging roll out is centred around local authorities, with central government providing local government a toolkit for installing electric vehicle charging infrastructure. This is to empower local authorities to facilitate the rollout of high-quality charging infrastructure to meet residents' needs, particularly in locations less commercially attractive to private investors. The following funding streams are available nationally to install EV charge points, including:

- a £500 million infrastructure package for local authorities to expand the provision of local public charge points
- £10 million for a pilot of the local electric vehicle infrastructure fund to help local authorities scale up their local charging provision
- £950 million rapid charging fund to accelerate the rollout of high-powered chargers on the strategic road network
- Ofgem announced £300 million for additional network investment in May 2021, half of which will target the development of electric vehicle infrastructure, including rapid charge points to reduce range anxiety and improve consumer confidence
- £56 million of public and industry funding for increasing charge points across the country
- Government published the Electric Vehicle Smart Charging Action Plan in January 2023, which outlines the next steps that government and Ofgem will take to deliver energy flexibility from electric vehicle charging, providing affordable, green power.

The state of public charging provision per 100,000 population in Norfolk and Suffolk is below the national average, with significant variances by local authority.

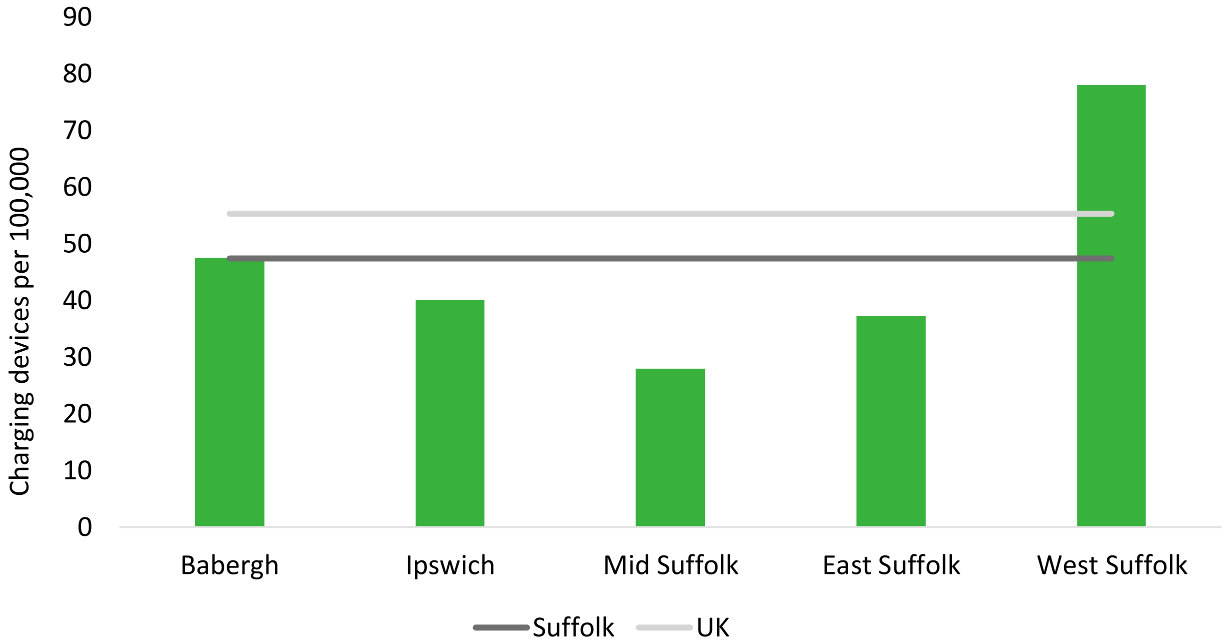
Figure 97shows the average public chargers available per 100,000 people across key local authorities, with some areas such as North Norfolk and Norwich above the Norfolk and national average, whereas other areas such as South Norfolk and Breckland significantly below the national and Norfolk average.

Figure 97: Public charging devices per 100,000 population in Norfolk



In Suffolk the situation is similar with West Suffolk considerably above the national and Suffolk average (**Figure 98**). While Babergh is equal with the Suffolk average, the other three local authority areas of Ipswich, East Suffolk and Mid Suffolk are considerably below the Suffolk and national average. In summary, the public charging roll out in Norfolk and Suffolk is still in its early stages with both Councils needing to greatly accelerate its deployment via the LEVI funding scheme and other private sector led initiatives.

Figure 98: Public charging devices per 100,000 population in Suffolk

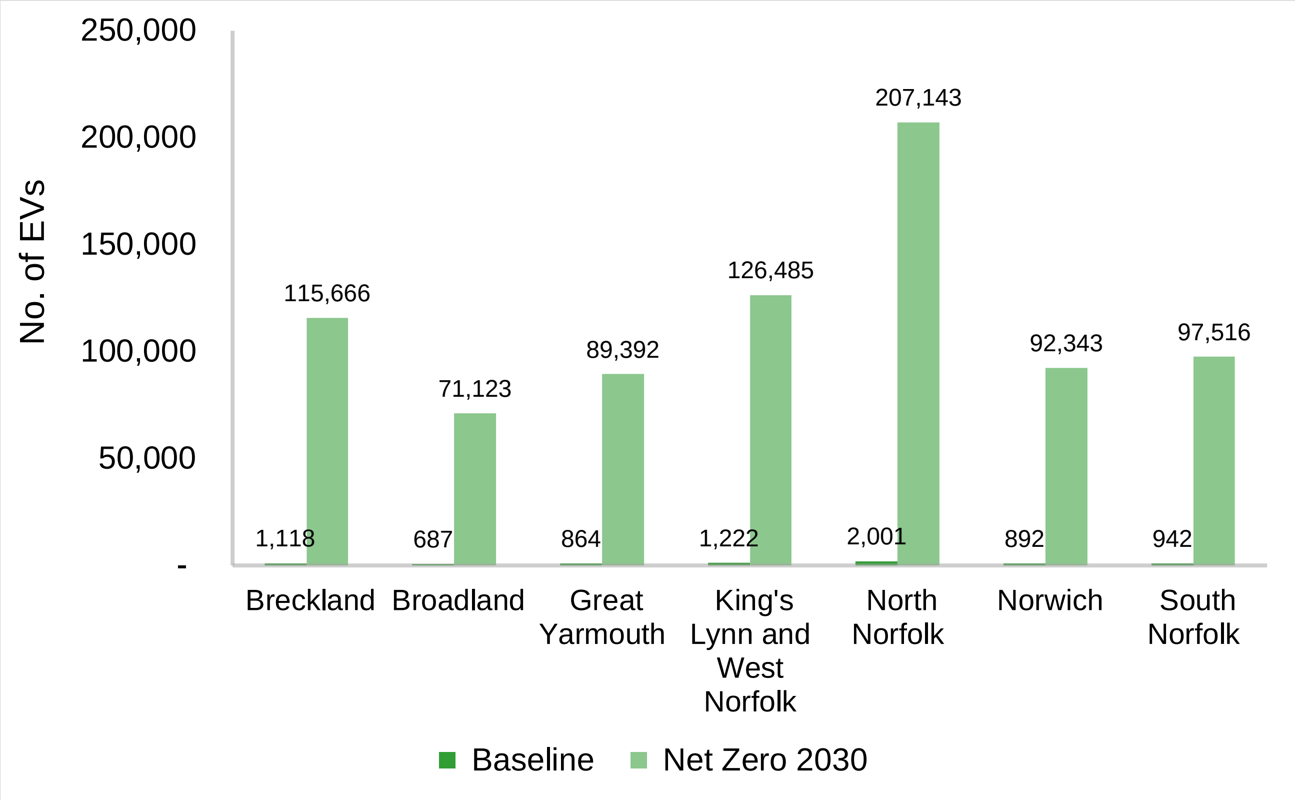


Current and expected capacity in Norfolk

For EV charging capacity we have taken the number of EVs as our indicator for estimating jobs associated with charge points. We include both private domestic and public charge points in our totals, which have an assumed ratio of around 8 domestic chargers for every 1 public charger. Our assumptions for the number of jobs required for installation and maintenance of charge points are roughly 9 times higher for public charge points than domestic. More detail on the methodology is provided in **Appendix 1**. The baseline number of EVs in Norfolk is currently estimated at about 7,700 vehicles (using CCC estimates and government data)[103], increasing to 800,000 for Net Zero, with the highest number in North Norfolk. **Figure 99** shows the values we assume in our modelling, by local authority.

[103] Baseline and projected values taken from CCC Balanced Pathway 2021 and 2050 figures (https://www.theccc.org.uk/publication/sixth-carbon-budget/), scaled to local authorities using government data for total number of cars (https://www.gov.uk/government/statistics/vehicle-licensing-statistics-july-to-september-2022).

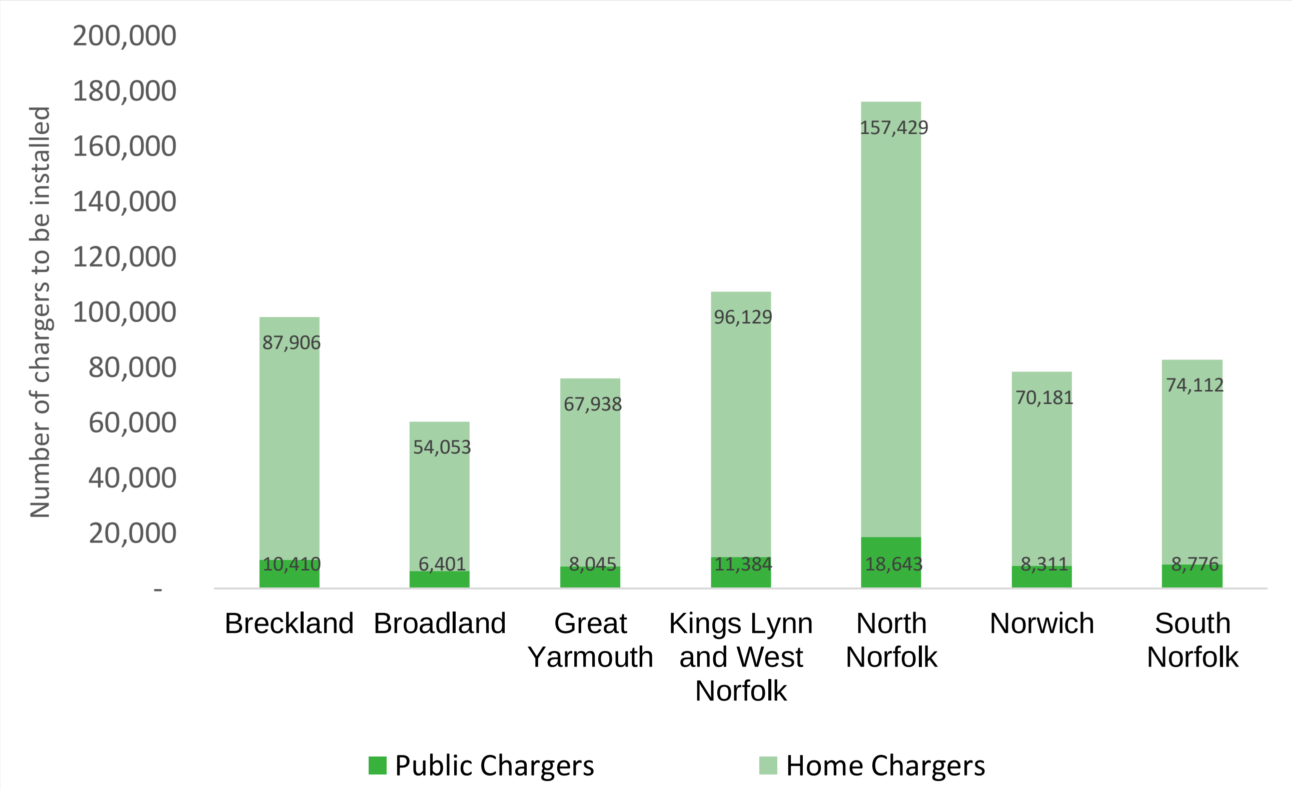
Figure 99: Number of battery electric vehicles in Norfolk[104]



Based on the predicted number of EVs in the vehicle parc for Norfolk and the ratio between public and private charge points, **Figure 100** shows the number of charge point installations needed across the different local authorities. As mentioned earlier, the scenario we've used assumes a high penetration of home charger solutions.

[104] Baseline and projected values taken from CCC Balanced Pathway 2021 and 2050 figures (https://www.theccc.org.uk/publication/sixth-carbon-budget/), scaled to local authorities using government data for total number of cars (https://www.gov.uk/government/statistics/vehicle-licensing-statistics-july-to-september-2022).

Figure 100: Number of public and home charging installations needed in Norfolk

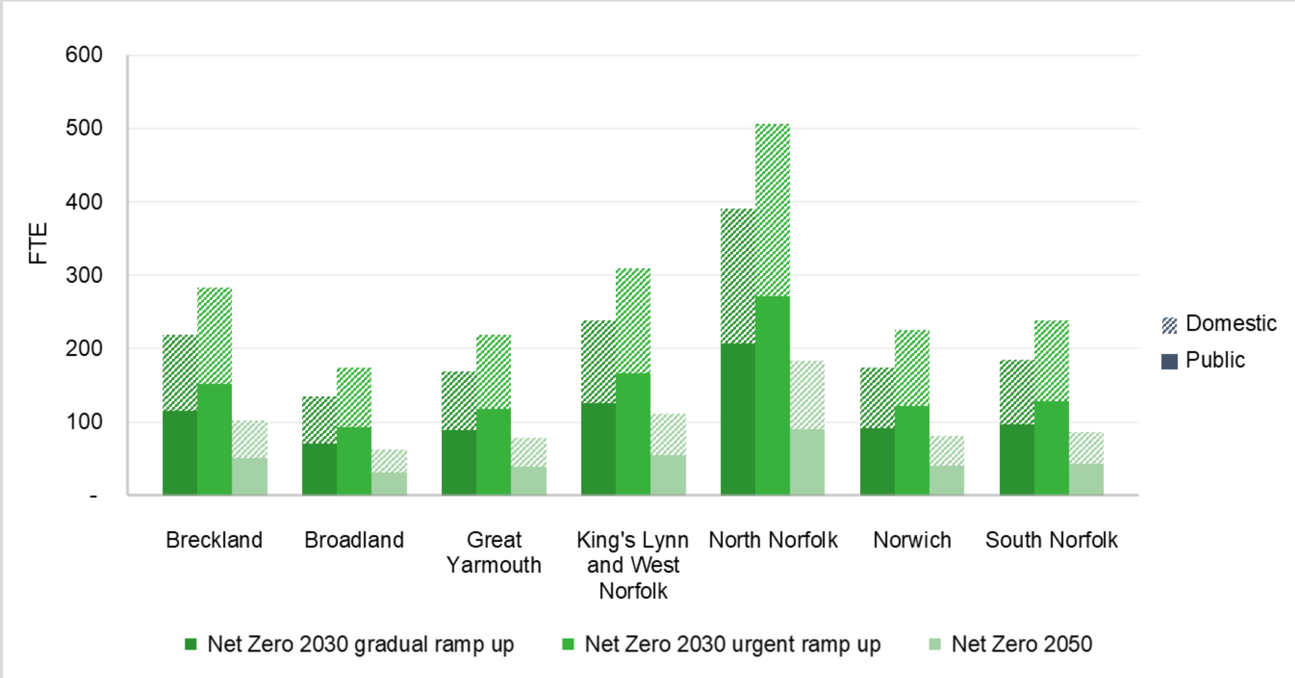


Job creation scenarios in Norfolk

Based on the number of charge points required, we have modelled EV charging job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for EV charge points in different local authorities are in line with those that see the largest increases in numbers of EVs and charge point installations. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in **Figure** Higher peak jobs for given scenarios are associated with faster increases in capacity. Despite the greater number of home charger installations, given the lower kW and easier installation the job creation is evenly distributed between domestic and public charging installation. Public charging installations are typically bulkier more complex devices that require integration into the local infrastructure hence increasing the labour intensity.

Figure 101: Norfolk EV charging peak jobs across the scenarios



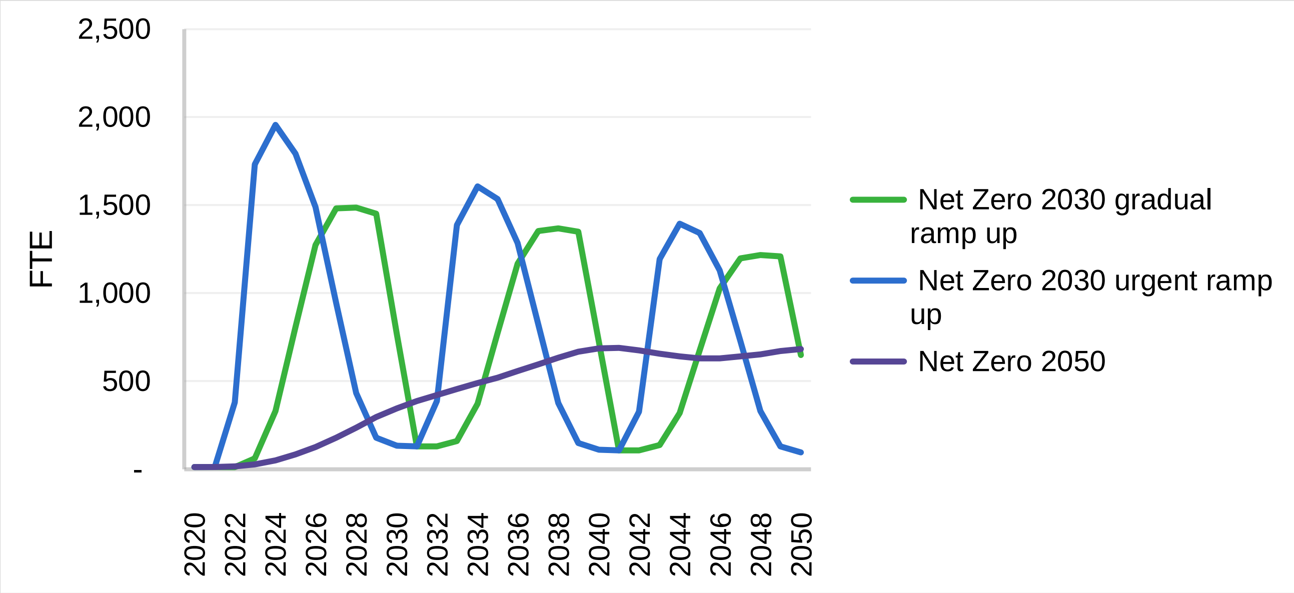
The years in which the peak jobs occur are provided in **Table 34**. More insight into these values is provided by **Figure 102** below, which depicts how the total number of jobs changes over time for each scenario. It should be noted that the urgent ramp up scenario has charging jobs peak in 2024, meaning skills will need to peak very rapidly and will experience a decline.

Table 34: Year in which peak jobs occur for EV charging in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2028	2024	2041

The development of EV charging jobs over time for each of the three scenarios is shown in **Figure 102**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. Where there are repeated peaks in the number of jobs, this is due to decommissioning and replacement of previous concentrated capacity increases. Due to the comparatively short lifetime of EV charge points, three peaks are seen in both Net Zero 2030 scenarios before 2050. The slower rate of EV uptake assumed for the Net Zero 2050 scenario results in a smoother profile without the fluctuation seen in the other scenarios.

Figure 102: Norfolk EV charging FTE over time



Breakdown of job types in Norfolk

Different types of jobs have been modelled that are associated with construction and installation of charge points, maintenance of charge points, and decommissioning of end-of-life charge points. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

Figure 103, **Figure** and

Figure present the number of jobs in each type over time for EV charging, for each scenario. For both the Net Zero 2030 scenarios, we see the pattern of repeated peaks where the capacity increase associated with the previous peak comes to the end of its life, and therefore needs decommissioning and replacing. A gradual decrease in the height of the repeated peaks over time can be seen – this is due to assumed learning rates for EV charging employment – the principle that fewer jobs will be needed in the future to install and maintain the same number of charge points, due to improved efficiencies in processes and technologies.

Figure 103: Norfolk EV charging FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

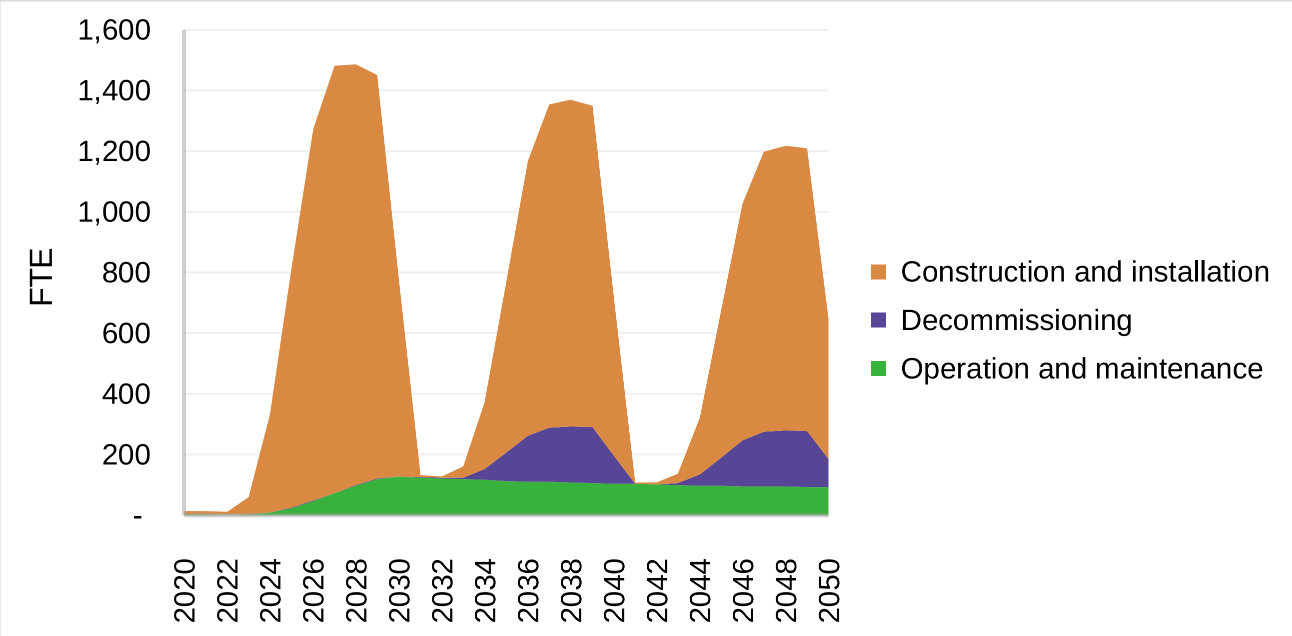


Figure 104: Norfolk EV charging FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

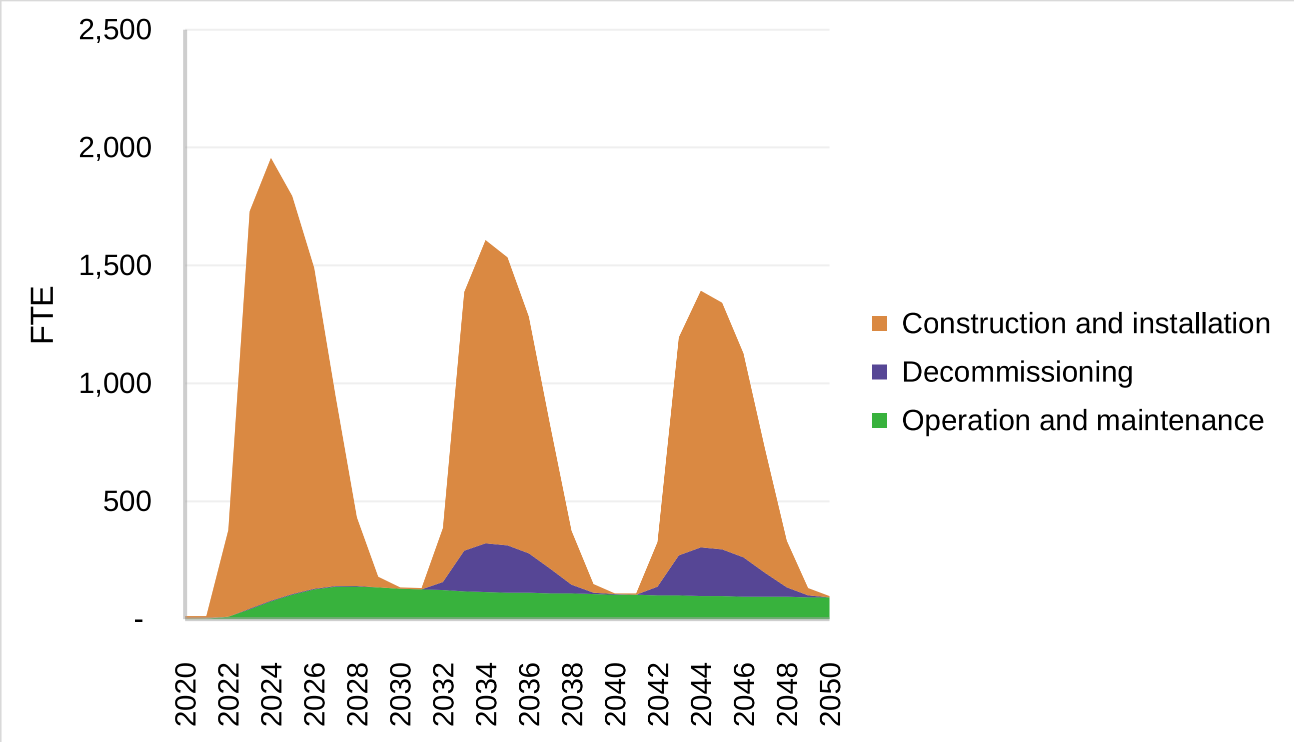
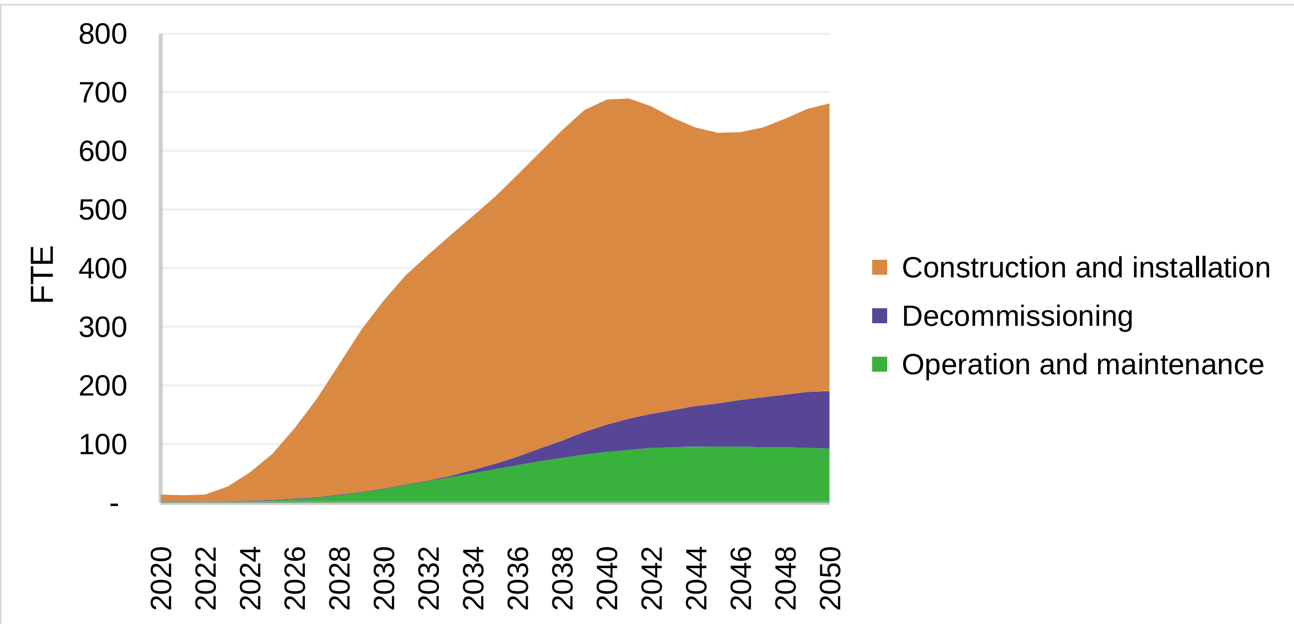


Figure 105: Norfolk EV charging FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Norfolk

Estimated peak GVA that results from EV charging jobs in the categories used above are shown in Table 35. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2028	9	13	99
Urgent ramp up	2024	10	14	130
Net zero 2050	2041	7	7	39

generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios.

Table 35: Norfolk EV charging peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2028	9	13	99
Urgent ramp up	2024	10	14	130
Net zero 2050	2041	7	7	39

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

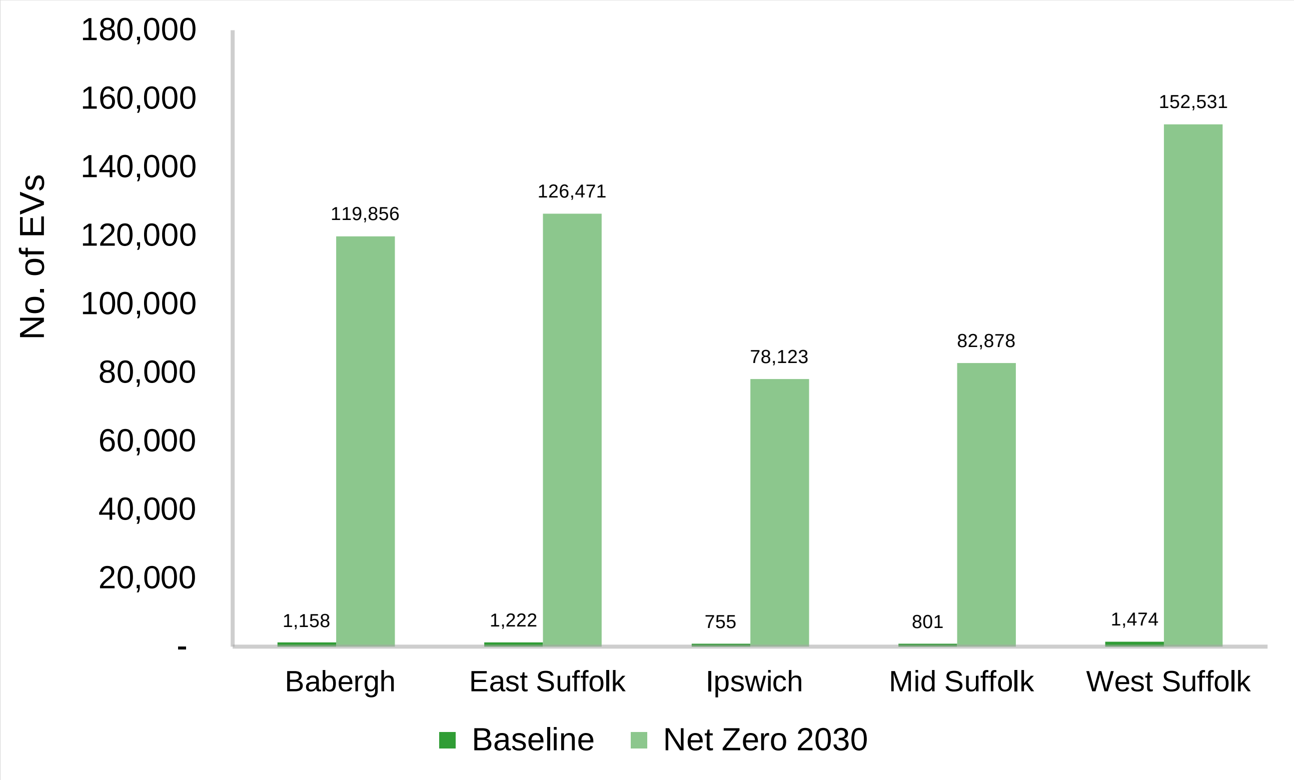
Current and expected capacity in Suffolk

For EV charging capacity we have taken the number of EVs as our indicator for estimating jobs associated with charge points. We include both private domestic and public charge points in our totals, which have an assumed ratio of around 8 domestic chargers for every 1 public charger. Our assumptions for the number of jobs required for installation and maintenance of charge points are roughly 9 times higher for public charge points than domestic. More detail on the methodology is provided in **Appendix 1**. The number of EVs in Suffolk is currently estimated at about 5,400 vehicles (using CCC estimates and government data)[105], increasing to 560,000 for Net Zero, with the highest number in West Suffolk, followed by East Suffolk and Barbergh. **Figure 106** shows the values we assume in our modelling, by local authority.

Figure 106: Number of battery electric vehicles in Suffolk [106]

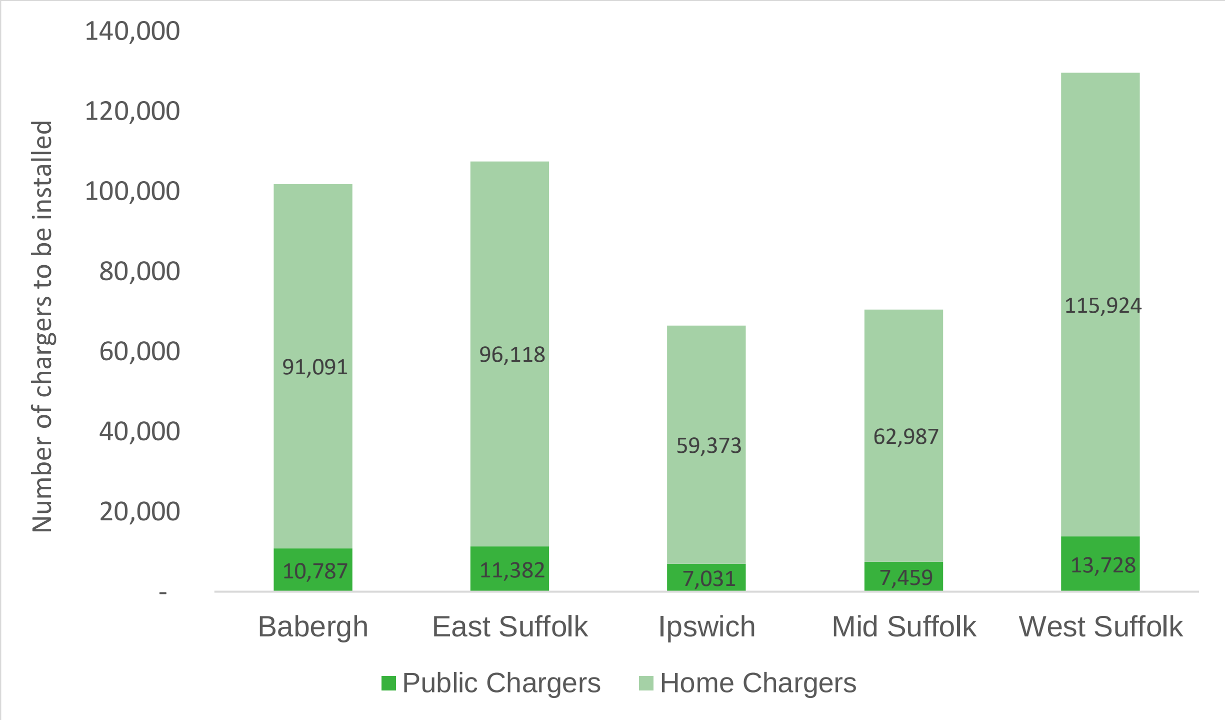
[105] Baseline and projected values taken from CCC Balanced Pathway 2021 and 2050 figures, scaled to local authorities using government data for total number of cars.

[106] Ibid.



Based on the predicted number of EVs in the vehicle parc for Suffolk and the ratio between public and private charge points, **Figure 107** shows the number of charge point installations needed across the different local authorities. As mentioned earlier, the scenario we've used assumes a high penetration of home charger solutions.

Figure 107: Number of public and home charging installations needed in Suffolk



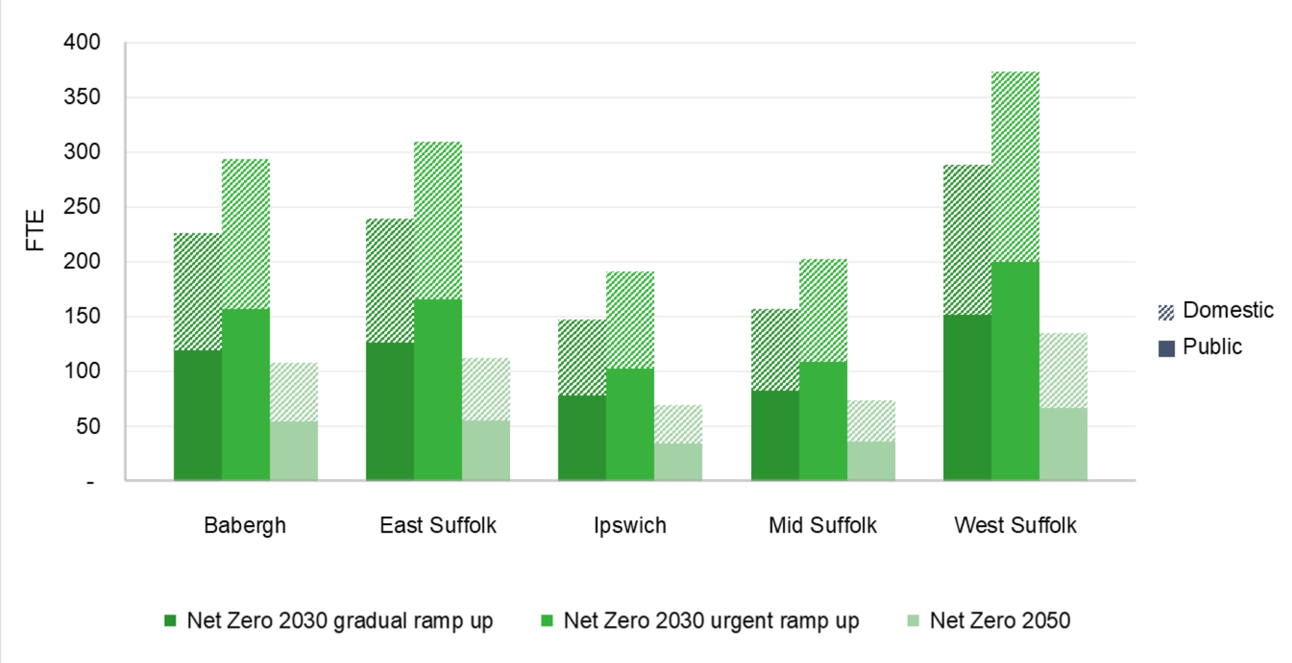
Job creation scenarios in Suffolk

For the increases in charge points shown above, Gemserv have modelled EV charging job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for EV charge points in different local authorities are in line with those that see the largest increases in numbers of EVs – West Suffolk being the highest, followed by East Suffolk and Barbergh. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in

Figure 108. Higher peak jobs for given scenarios are associated with faster increases in capacity. Despite the greater number of home charger installations, given the lower kW and easier installation the job creation is evenly distributed between domestic and public charging installation. Public charging installations are typically bulkier more complex devices that require integration into the local infrastructure hence increasing the labour intensity.

Figure 108: Suffolk EV charging peak jobs across the scenarios



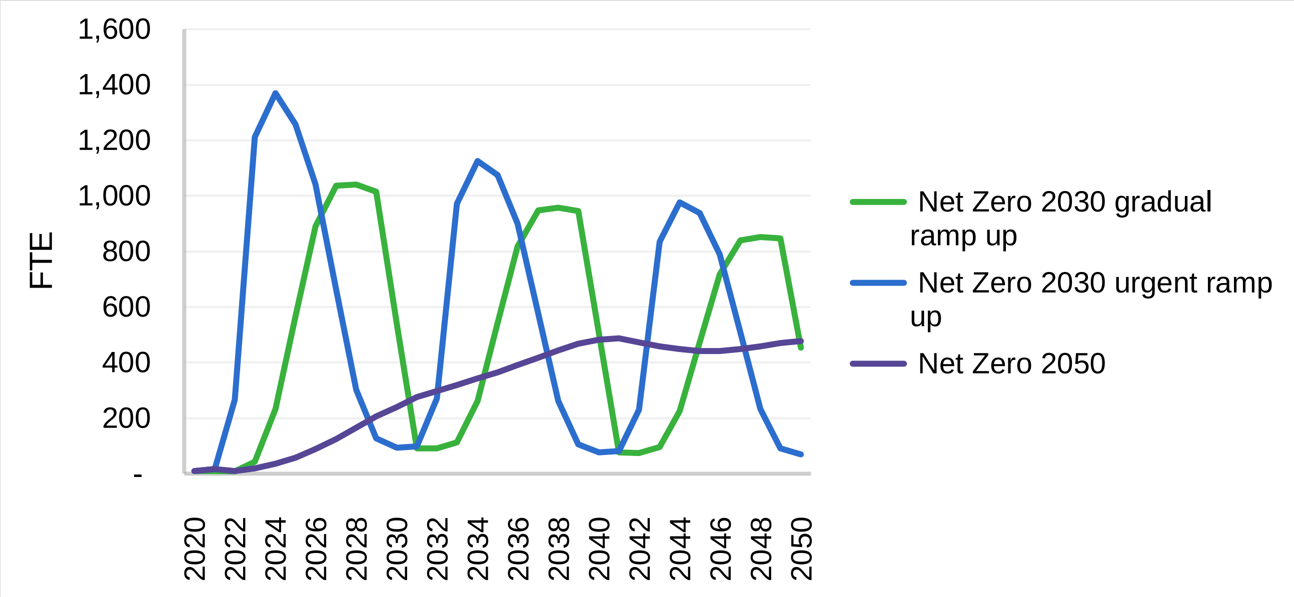
The years in which the peak jobs occur in each scenario are provided in **Table 36**. More insight into these values is provided by **Figure 109** Error! Reference source not found.below, which depicts how the total number of jobs changes over time for each scenario.

Table 36: Year in which peak jobs occur for EV charging in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2028	2024	2041

The development of EV charging jobs over time for each of the three scenarios is shown in **Figure 109.** Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. Where there are repeated peaks in the number of jobs, this is due to decommissioning and replacement of previous concentrated capacity increases. Due to the comparatively short lifetime of EV charge points, three peaks are seen in Net Zero 2030 scenarios before 2050. The slower rate of EV uptake assumed for the Net Zero 2050 scenario results in a smoother profile without the fluctuation seen in the other scenarios.

Figure 109: Suffolk EV charging FTE over time



Breakdown of job types in Suffolk

Different types of jobs have been modelled and are associated with construction and installation of charge points, maintenance of charge points, and decommissioning of end-of-life charge points. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

Figure 110, **Figure 111** and **Figure 112** present the number of jobs in each type over time for EV charging, for each scenario.

For both the Net Zero 2030 scenarios, we see the pattern of repeated peaks where the capacity increase associated with the previous peak comes to the end of its life, and therefore needs decommissioning and replacing. A gradual decrease in the height of the repeated peaks over time can be seen – this is due to assumed learning rates for EV charging employment – the principle that fewer jobs will be needed in the future to install and maintain the same number of charge points, due to improved efficiencies in processes and technologies.

Figure 110: Suffolk EV charging FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

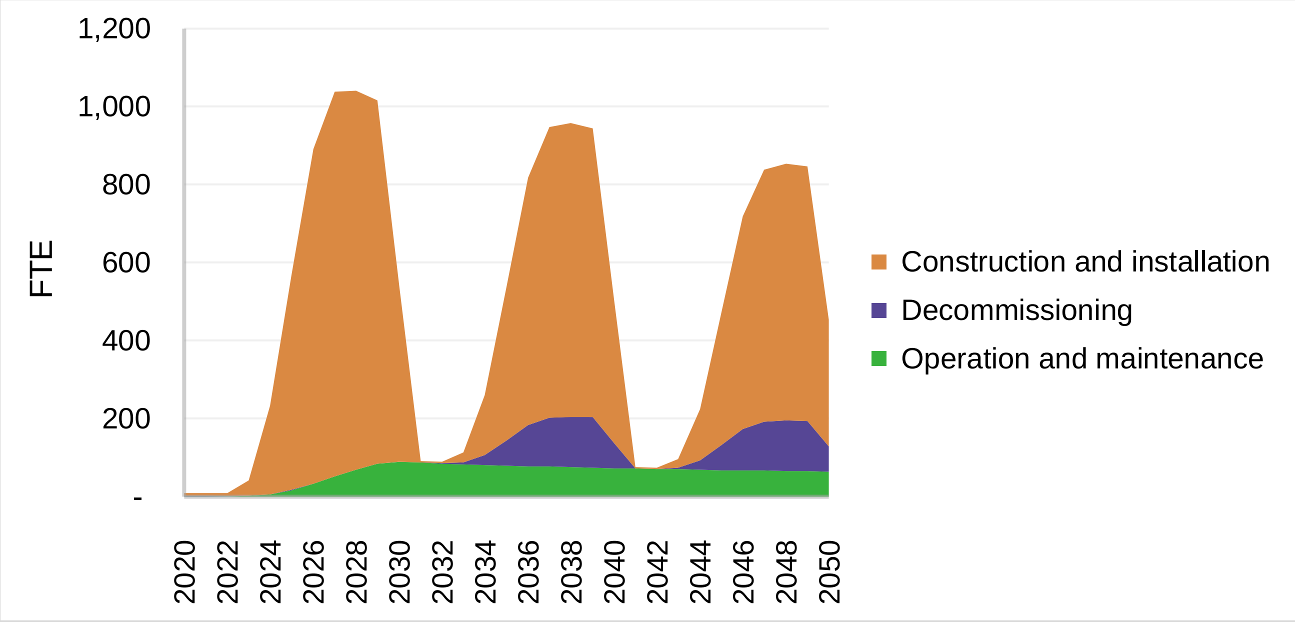


Figure 111: Suffolk EV charging FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

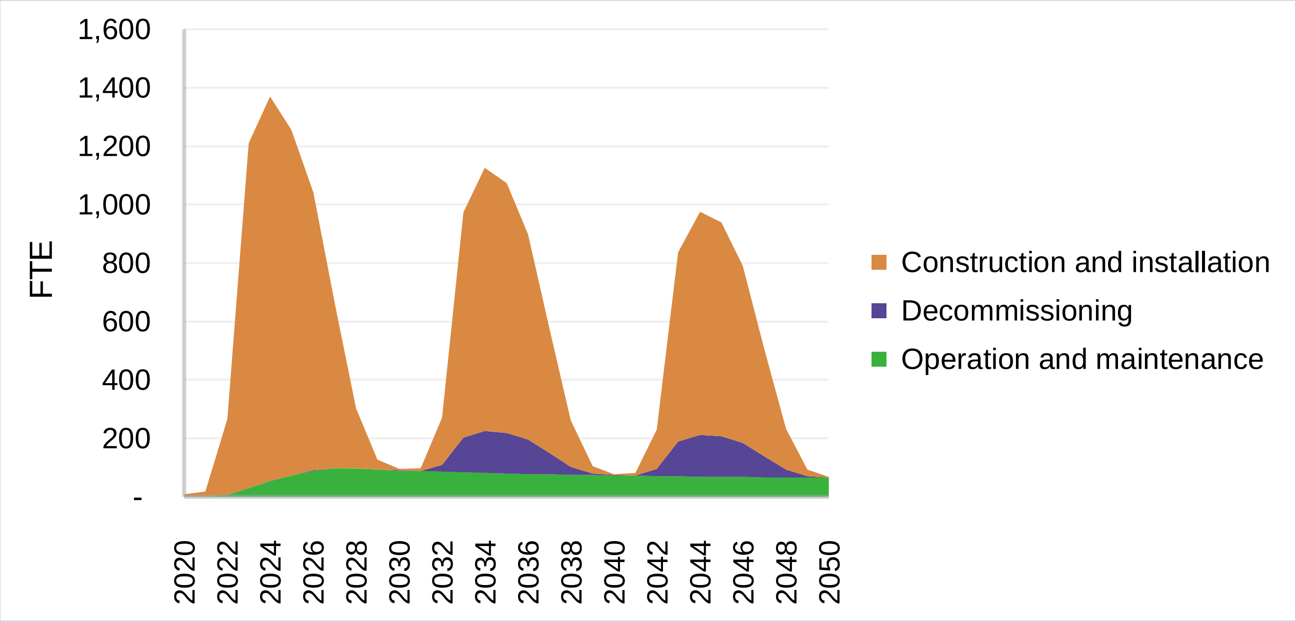
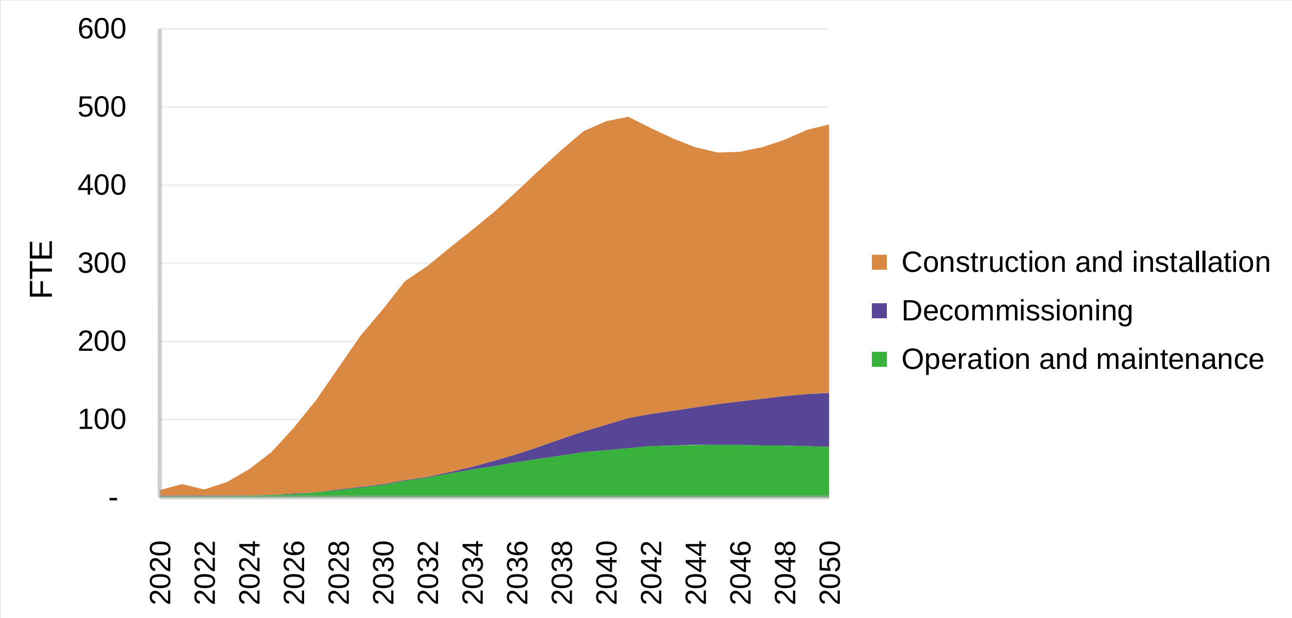


Figure 112: Suffolk EV charging FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Suffolk

Estimated peak GVA that results from EV charging jobs in the categories used above are shown in **Table 37**. Since the urgent ramp up generally has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios.

Table 37: Suffolk EV charging peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2028	6	9	69
Urgent ramp up	2024	7	10	93
Net zero 2050	2041	5	5	27

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Skills requirements and courses related to EV charging

Through the stakeholder engagement process and literature review, insights emerged related to EV charging installations, vehicle manufacturing and maintenance of EVs. Despite the economic modelling only projecting jobs for EV charging, this section will include some observations from vehicle manufacturing and maintenance, but a more detailed exploration is provided in the recommendations.

Work conducted by City and Guilds looking at the skills needs nationally for EV charging paint a stark picture[107]. According to a recent City and Guilds report, 62% of working electricians have not received EV charge point installation specific training, but the vast majority (73%) are likely to seek work in installing or repairing EV charge points[108]. Therefore, a risk of untrained electricians taking on EV charge point installation work presents itself which has implications for installation quality and safety. Nearly a fifth of new residential charge points installed were viewed as having safety or potential safety issues through the Electric Vehicle Home charge Scheme. Therefore, upskilling a competent workforce in EV charge point installation safety will be a key development area. Additionally, as 45% of employers would only hire staff with specific EV charge point qualifications or proof of competence, a properly qualified workforce is required.

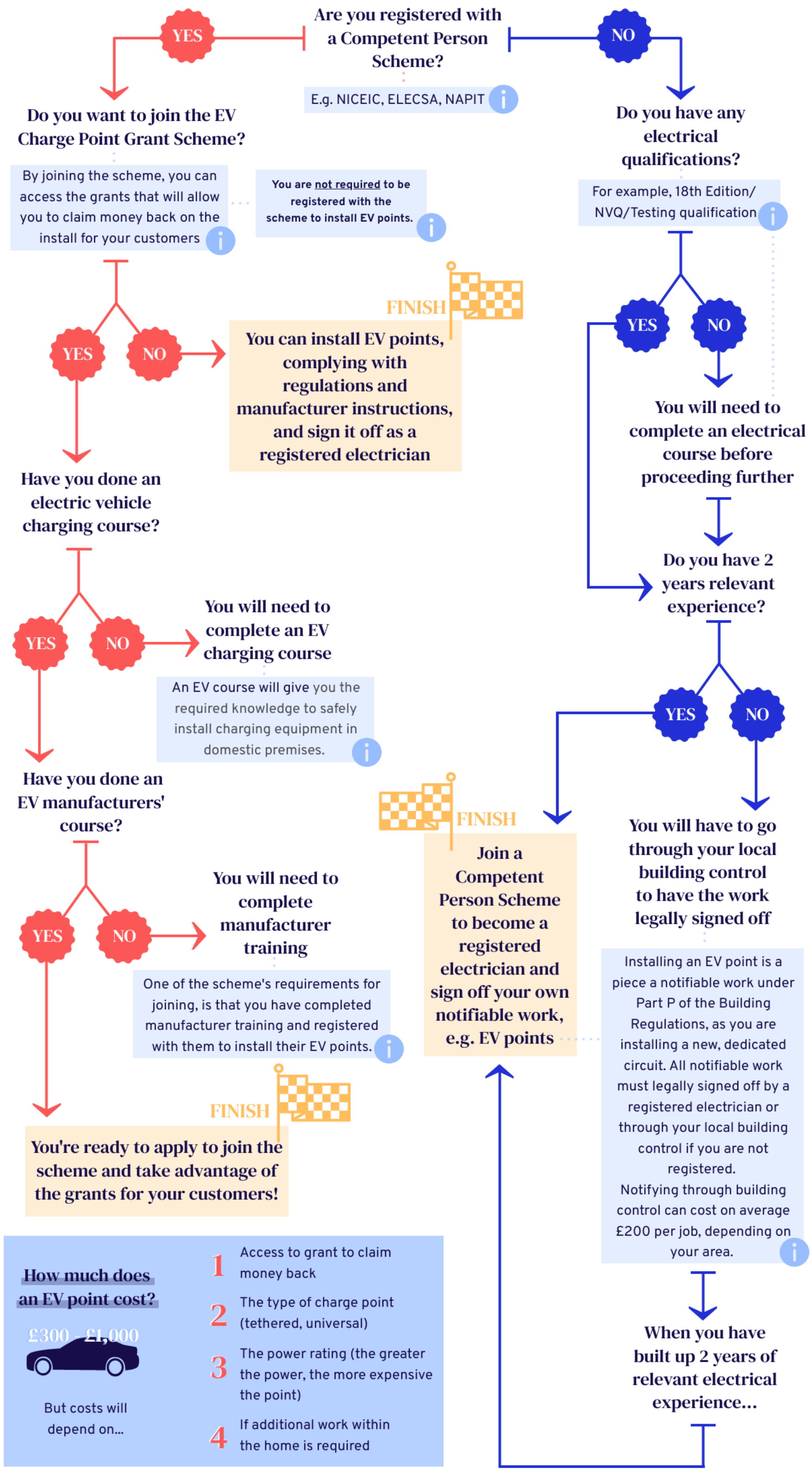
Many jobs for EV charge point installation require design, wiring, installation, fault finding, maintenance, service and repair, testing and inspection, safety and cabling skills. Knowledge and skill differ depending on the type of installation. For example, a 3-7kW AC home charger is a different installation proposition compared to installing a bank of 150kW ultra-rapid public chargers which will need additional grid reinforcement and meets different requirements. The prerequisites needed for EV installation courses include foundational electric / electrotechnical knowledge, which includes being qualified as an electrician and have 18th Edition: City & Guilds (2382-22) IET Wiring Regulations BS 7671 and/or Electrotechnical Certification Scheme (ECS) card.

Both established colleges and private training providers across the region regularly run the 18th Edition Wiring Regulations course. Providing an installer has passed this course and has built up 2 years of experience in the industry, they can join a competent person's scheme to certify their work and install EV charge points. If an installer wishes to join the EV Charge Point Scheme Grant to access government grants, installers need to take an EV charging courses and an EV manufacturers course to install grant funded charge points. The full route to being able to install EV charge points is illustrated in **Figure 113** below.

[107] City and Guilds. (2022). Driving the zero-emission agenda.
[108] Ibid.

Figure 113: Full route to becoming an EV charger installer[109]

[109] Electrician Courses 4U (2023). How to become an electric vehicle (EV) charger installer



An assessment of the local colleges and universities found that West Suffolk College was the only college that provides a dedicated City and Guilds Level 3 qualification in EV charging installation (**Table 38**). Although only West Suffolk College have a course, other colleges in the region are starting to install training hardware or introduce courses in the future. For example, Suffolk New College recently launched their Net Zero Skills Centre which has charging station equipment housed in the Net Zero Electrical Studio. Moving forward, relevant 16-18 learners at West Suffolk College will have green skills embedded into their learning, with the Centre also launching a new programme of Green Skills for Business courses. Moreover, as part of the New Anglia Green Skills initiative, other local colleges such as East Coast College plan on hosting EV charging courses alongside IMI approved EV maintenance courses.

Moreover, all the colleges and universities offer routes into becoming a qualified electrician that can opt to install EV chargers. Almost all the colleges offer Level 2 and 3 courses on electrical testing, electrical maintenance, and installation. In addition to these full-time courses, East Coast College, West Suffolk College, and the College of West Anglia do run the 18th Edition of the Wiring Regulations which provides additional qualifications which are perquisites for being able to install EV chargers. The College of West Anglia also offer bespoke business services such as an Electrical Skills Assessment which audits the electrical knowledge within a company and a refresher course on The Electricity at Work regulations for senior management. City College Norwich were also identified as having strong links to the mobility sector, but their activities mainly related to electric vehicle maintenance.

Other institutions such as the City College Norwich, University of East Anglia and University of Suffolk also offer degree (or equivalent) courses that enable highly skilled routes into electrical engineering, with renewable systems included in modules. The University of East Anglia have also developed an MSc programme in Energy Engineering in partnership with industry and employers through close collaboration with the East of England Energy Group (EEEGR). The aim of the course is to address the national and regional shortage of high-calibre engineering graduates with specialist expertise in energy engineering. This course is professionally accredited by the Institution of Engineering and Technology (IET) on behalf of the Engineering Council.

Table 38 - Colleges and universities in Norfolk and Suffolk offering EV related courses

Institution	Wind specific courses and potentially relevant courses	Address

City College Norwich	Advanced Construction and Engineering Centre opened last month which supports students in hybrid and electric vehicle maintenance Engineering Technician - Technical Support, Level 3 Standard Installation Electrician Apprenticeship Level 3 Standard HNC in Engineering (Electrical, Electronic Engineering) HND Electrical and Electronic Engineering (Top Up) HND Embedded Electronic Systems (Top Up)	Ipswich Rd Norwich Norfolk NR2 2LJ
College of West Anglia	Electrical Skills Assessment The Electricity at Work Regulations 1989 Maintenance Operations Engineering Technician Apprenticeship – Level 3 Installation Electrician and Maintenance Electrician – Level 3 Industrial Electrical Maintenance Skills (Assured by City and Guilds) - for Maintenance Engineers Level 3 Award in the Initial Verification and Certification of Electrical Installations (City & Guilds 2391-50) Level 3 Award in the Periodic Inspection, Testing and Certification of Electrical Installations (City & Guilds 2391-51) Level 3 Award in Inspection & Testing of Electrical Installations City & Guilds 2391-52 18th Edition of the Wiring Regulations	Kings Lynn Campus Tennyson Avenue King's Lynn Norfolk PE30 2QW
East Coast College	Electrical Installation Level 2 Electrical Installation Level 3 T Level in Maintenance, Installation and Repair for Engineering and Manufacturing Level 3 18th Edition of the Wiring Regulations	Great Yarmouth Campus Suffolk Road Great Yarmouth Norfolk NR31 0ED Lowestoft Campus Rotterdam Road Lowestoft Suffolk NR32 2PJ

Suffolk New College	Electrical Installation Level 1 Electrical Installation Level 2 Electrical Installation Level 3 Net Zero Skills Centre[110] Level 2 Engineering (PEO)	Rope Walk Ipswich Suffolk IP4 1LT
University of East Anglia	MSc Energy Engineering BEng (Hons) Engineering	Norwich Research Park Norwich Norfolk NR4 7TJ
University of Suffolk	HND Engineering (General Engineering)	Waterfront Building 19 Neptune Quay Ipswich Suffolk IP4 1QJ
West Suffolk College	Introduction to Electrical Installations (7202-01) Level 1 Electrical Installation Diploma (8202-20) Level 2 Advanced Electrical Installation Diploma (8282-30) Level 3 Installation Electrician/Maintenance Electrician Level 3 Engineering Fitter Level 3 18th Edition of the Wiring Regulations City and Guilds 2919-01 Level 3 Award in Electric Vehicle Charging Equipment Installation	Sixth Form Campus Out Risbygate Bury St Edmunds Suffolk IP33 3RL Built Environment Campus Anglian Lane Bury St Edmunds Suffolk IP32 6SR University and Professional Development Centre 73 Western Way Bury St Edmunds Suffolk IP33 3SP
Colchester Institute (Energy Skills Centre Harwich)	A course to attain CSCS green Labourer's card Level 2 EAL Diploma in Performing Engineering Operations (this is a perquisite for construction, fabricating / welding, and operation & maintenance) City & Guilds 2919-01 Electric Vehicle Charging for Commercial/Industrial & Domestic Dwellings	Hamilton House Foster Road Parkeston Quay Harwich Essex CO12 4QA

[110] Solar PV and thermal installations are in the centre for students to use, but, no solar specific courses are listed on the website

In addition to colleges and universities, several local private training providers also run suitable courses. Most notably, East of England Electrical Training, Electrical Testing and Thompson Training also run a City and Guilds Level 3 EV charging course, with a handful of other electrician skills centres providing the 18th Edition of the Wiring Regulations (**Table 39**).

Table 39 - Private training providers in Norfolk and Suffolk offering EV related courses

Training provider	Courses offered	Address
East of England Electrical Training	City & Guilds 2919-01 Electric Vehicle Charging for Commercial/Industrial & Domestic Dwellings 18th Edition of the Wiring Regulations	9 Mahoney Grn Rackheath Norwich Norfolk NR13 6JY
Ipswich Skills Centre	18th Edition of the Wiring Regulations	Unit 4, The Quadrangle Centre The Drift, Nacton Road Ipswich, Suffolk IP3 9QR.
WS Training	18th Edition of the Wiring Regulations	Manor Barn Church Road, Great Barton Bury St Edmunds, Suffolk IP31 2QR
Electrical Testing	City & Guilds 2919-01 Electric Vehicle Charging for Commercial/Industrial & Domestic Dwellings	The Bridge Acle Norwich NR13 3AT
Thompson Training	18th Edition of the Wiring Regulations City & Guilds 2919-01 Electric Vehicle Charging for Commercial/Industrial & Domestic Dwellings	Unit D1 Thompson Training LTD Sharon Road, Dettingen Way Bury St Edmunds. Suffolk IP33 3TZ

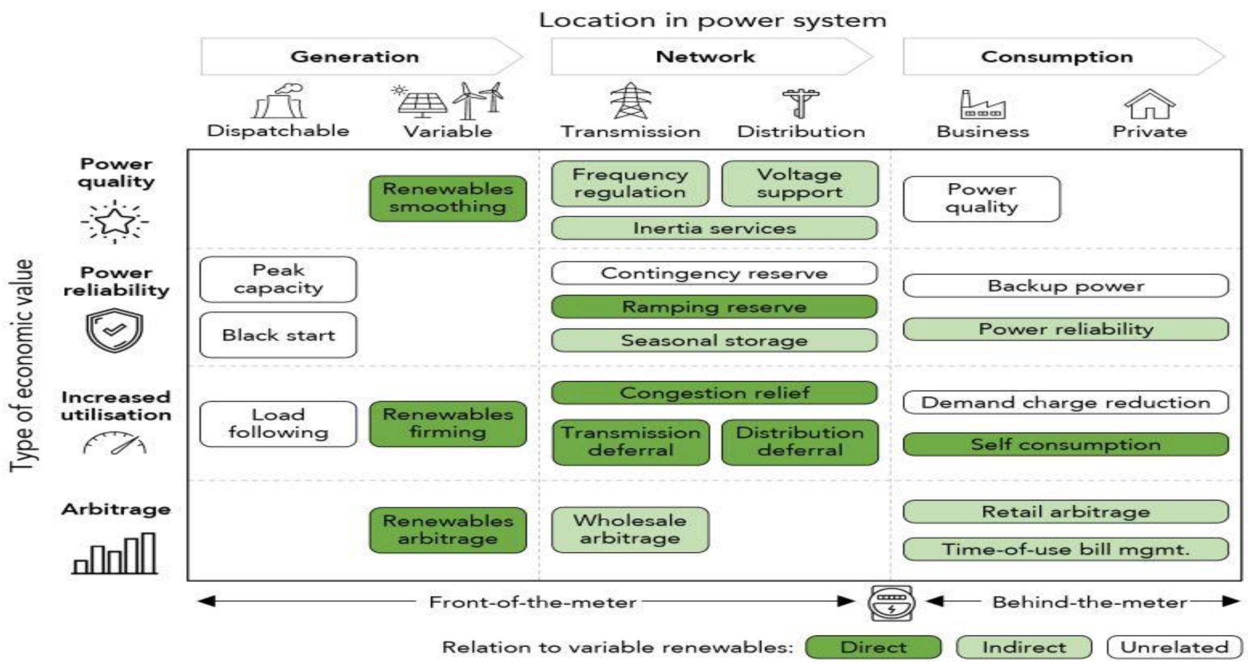
ENERGY STORAGE

This section explores the potential for energy storage across Norfolk and Suffolk. For the energy storage sector, we consider large scale energy storage types as classified by UK Power Networks' Distributed Future Energy Scenario: co-located energy storage and standalone grid-connected storage. Co-located energy storage is installed alongside renewable energy generation sources, and standalone grid-connected storage is for independent load balancing of the grid. Energy storage includes a wide range of technologies from batteries, flywheels, hydrogen, compressed air, or pumped hydro. For this study, the economic analysis assumes both energy storage types are battery storage.

Overview of the energy storage sector in Norfolk & Suffolk

As Norfolk and Suffolk build up more renewable energy capability, the ability to effectively store and manage that energy becomes increasingly important. Since 2017, the UK has witnessed a rise in the amount of energy storage project applications, with both the installed capacities and number of projects increasing significantly[111]. The role of energy storage, both stand-alone and co-located next to renewable generation, is therefore crucial for Norfolk and Suffolk to achieve their net zero aims (see **Figure 114** for the range of services that energy storage systems offer).

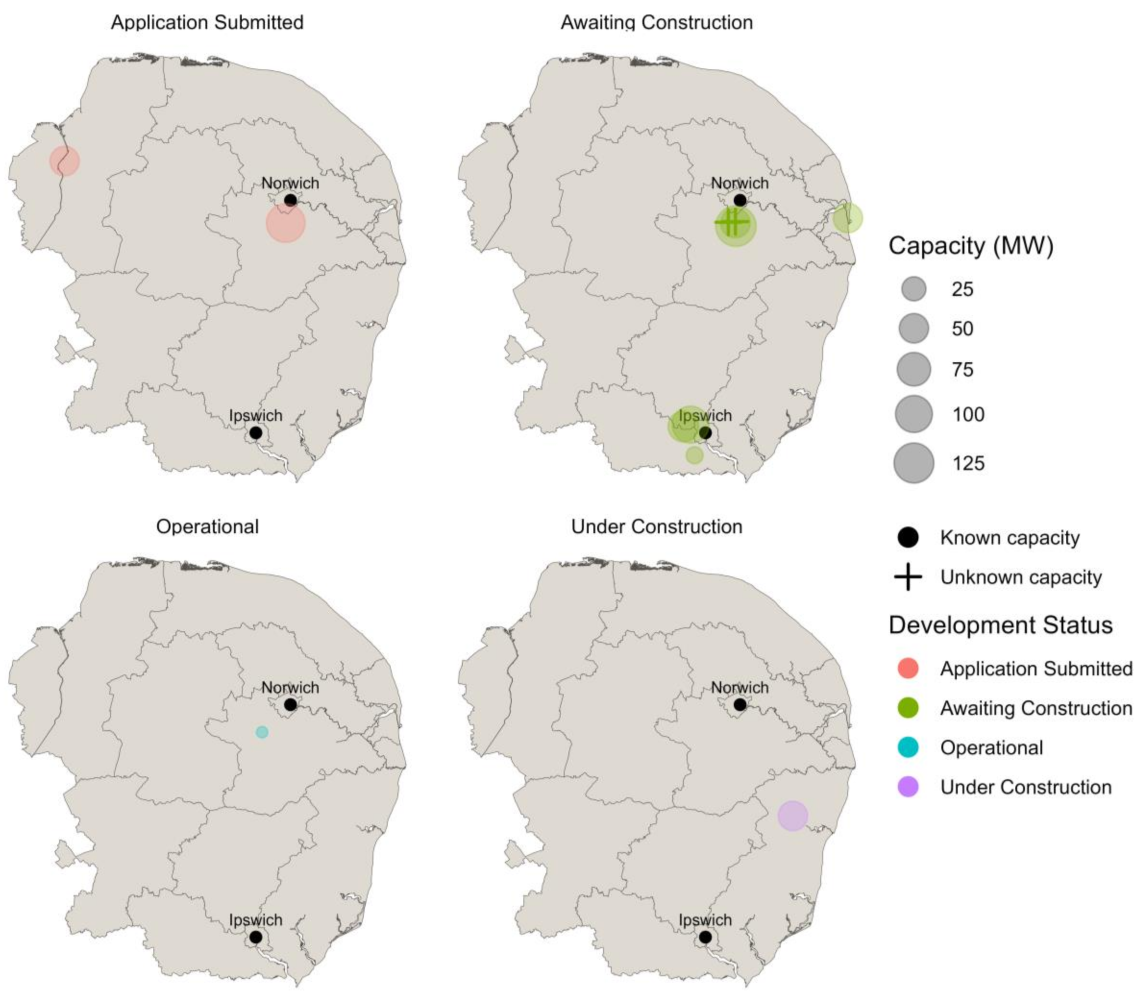
Figure 114: Ways in which energy storage can complement a renewables-based grid[112].



[111] Solar Power Portal. (2023). Record 800MWh of utility-scale storage added in 2022.
[112] Storage Lab. (N.D). Applications

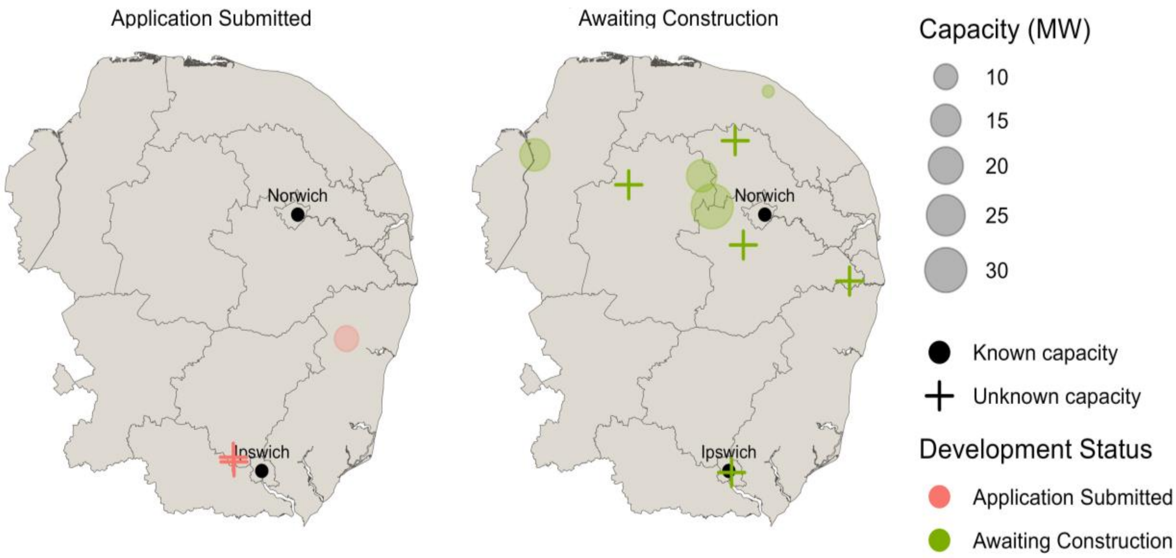
Given the expected increase in solar and wind assets in the region, it seems logical that energy storage will be increasingly installed. However as of May 2023, there is only one operational battery energy storage site across Norfolk and Suffolk. According to the REPD, this is a 0.1 MW system that was installed in 2016 and is operated by local company Connected Energy[113]. **Figure 115** shows the status of stand-alone energy storage systems, which shows the one operational system alongside a handful of systems that are awaiting approval, awaiting construction or under construction. It's notable the size of the planned and awaiting construction systems are considerably larger than the operational and under construction systems highlighting a move towards larger systems. **Figure 116** shows the recent trend of co-located energy storage systems near energy assets. These are typically next to solar installations to store excess energy for higher utilisation and arbitrage purposes but there are a few next to store wind energy (i.e. Orsted's storage system in South Norfolk).

Figure 115: Map of standalone energy storage projects in Norfolk and Suffolk



[113] DESNZ, (2023). Renewable Energy Planning Database: quarterly extract

Figure 116: Map of co-located energy storage projects in Norfolk and Suffolk



Despite the very low existing capacity, battery energy storage planning applications have experienced significant growth in recent years, with most applications being submitted or approved in the last 2 years. According to the REPD, many of the early applications that had been approved are still awaiting construction. A list of the most recent large projects (over 50 MW) is included below in **Table 40**.

Table 40: List of large energy storage projects in Norfolk and Suffolk

Operator	Installed Capacity (MW)	Location	Storage type	Planning stage
Orsted	200	South Norfolk	Stand-alone storage	Planning Permission Granted
FPC Electric Land Limited	130	South Norfolk	Stand-alone storage	Planning Permission Granted
EDF Renewables	114	South Norfolk	Stand-alone storage	Planning Application Submitted
Statkraft	104	Babergh & Mid Suffolk	Co-located with renewables	Planning Application Submitted
Cambridge Power / Pivot Power	100	Babergh & Mid Suffolk	Stand-alone storage	Planning Permission Granted

Eelpower	50	East Suffolk	Stand-alone storage	Under Construction
Lynn Power	50	Kings Lynn and West Norfolk	Stand-alone storage	Planning Application Submitted

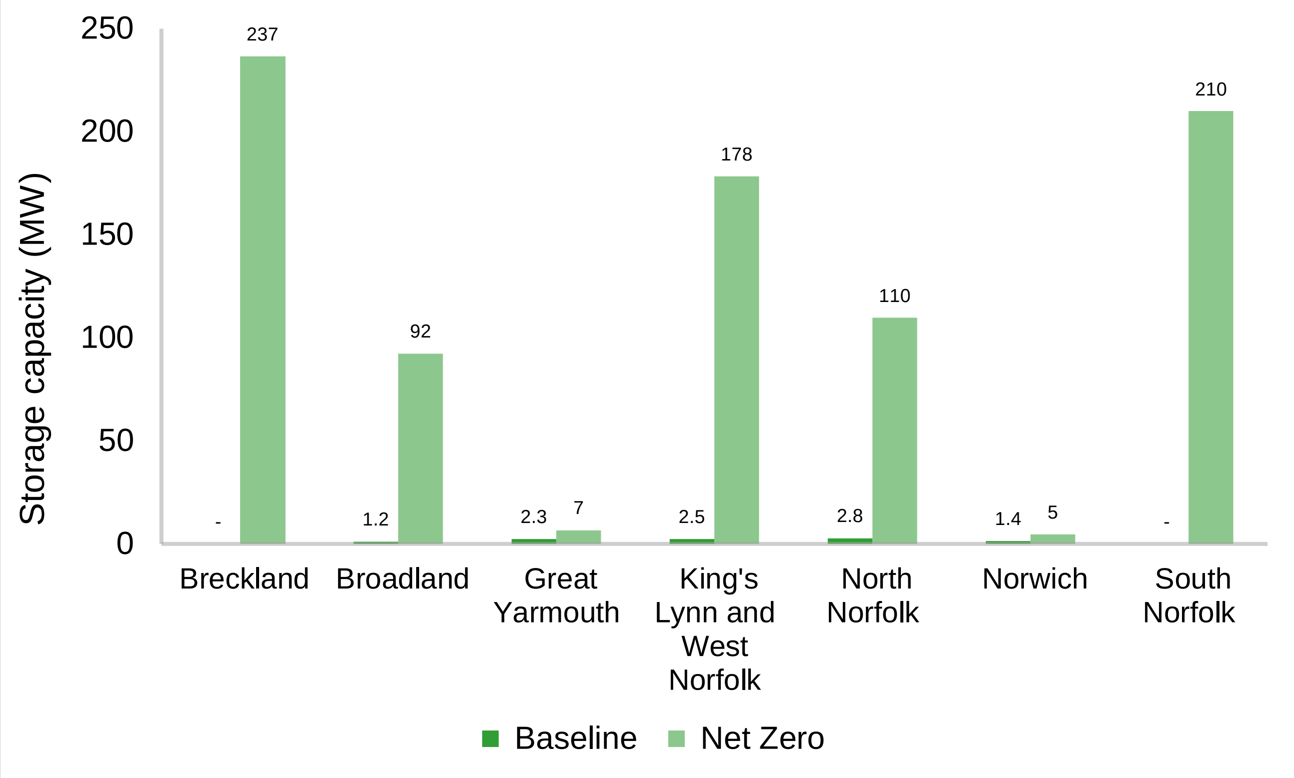
Many of these energy storage applications are using lithium-ion batteries, which have undergone significant cost reductions over the last few years due to the global shift to electric vehicles. In 2013, BNEF estimated the average cost of a battery pack was $732/kWh. Fast forward to 2022 and the average cost of battery packs has dramatically reduced to around $151/kWh, with $100/kWh expected to be reached by the mid-2020s[114]. While stationary energy storage installation costs are usually higher due to more ancillaries, the scale reached by automotives is now turbocharging the deployment of energy storage.

Current and expected capacity in Norfolk

According to the UK Power Networks' Distributed Future Energy Scenarios, co-located energy storage in Norfolk is currently estimated at 10 MW, with North Norfolk having the highest capacity, followed by King's Lynn and West Norfolk and Great Yarmouth[115]. This differs from the REPD database but may be accounted for different methods of calculation. The scenarios project that an 838 MW generation capacity for co-located energy storage in Norfolk is necessary to achieve Net Zero, with Breckland having the highest capacity, followed by South Norfolk and King's Lynn and West Norfolk. **Figure 117**Error! Reference source not found. shows the values we assume in our modelling, by local authority. This aligns with the data from the REPD, especially the dominance of South Norfolk.

[114] Bloomberg. (2022). Lithium-ion Battery Pack Prices Rise for First Time to an Average of $151/kWh.
[115] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.

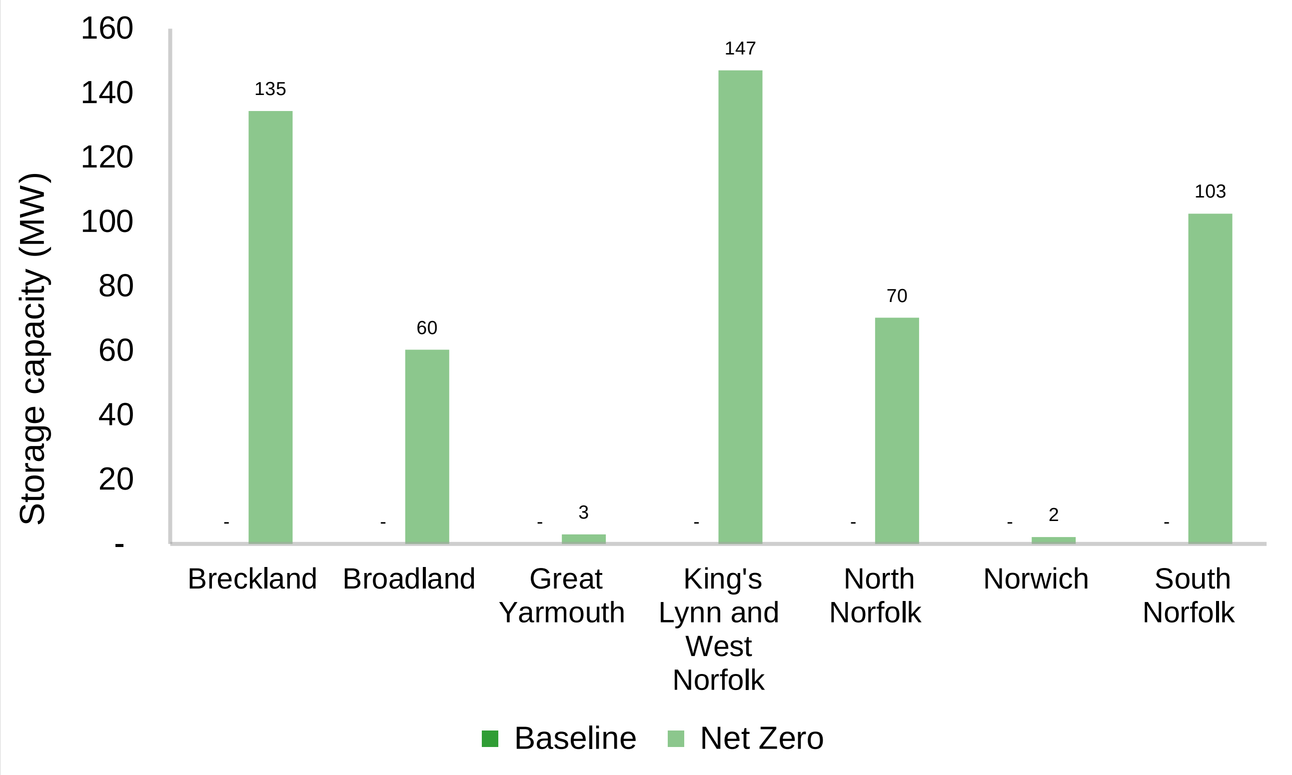
Figure 117: Norfolk co-located energy storage capacity values[116]



Standalone grid-connected energy storage in Norfolk is currently estimated to be zero[117]. UK Power Networks' Distributed Future Energy Scenarios project that a 520 MW generation capacity for standalone grid-connected energy storage in Norfolk will be necessary to achieve Net Zero, with King's Lynn and West Norfolk having the highest capacity, followed by Breckland and South Norfolk. **Figure 118** shows the values we assume in our modelling by local authority.

[116] Values from Distribution Future Energy Scenarios. (2020 and 2050). Distribution Future Energy Scenarios (DFES) 2022.
[117] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.

Figure 118: Norfolk standalone grid-connected energy storage capacity values[118]



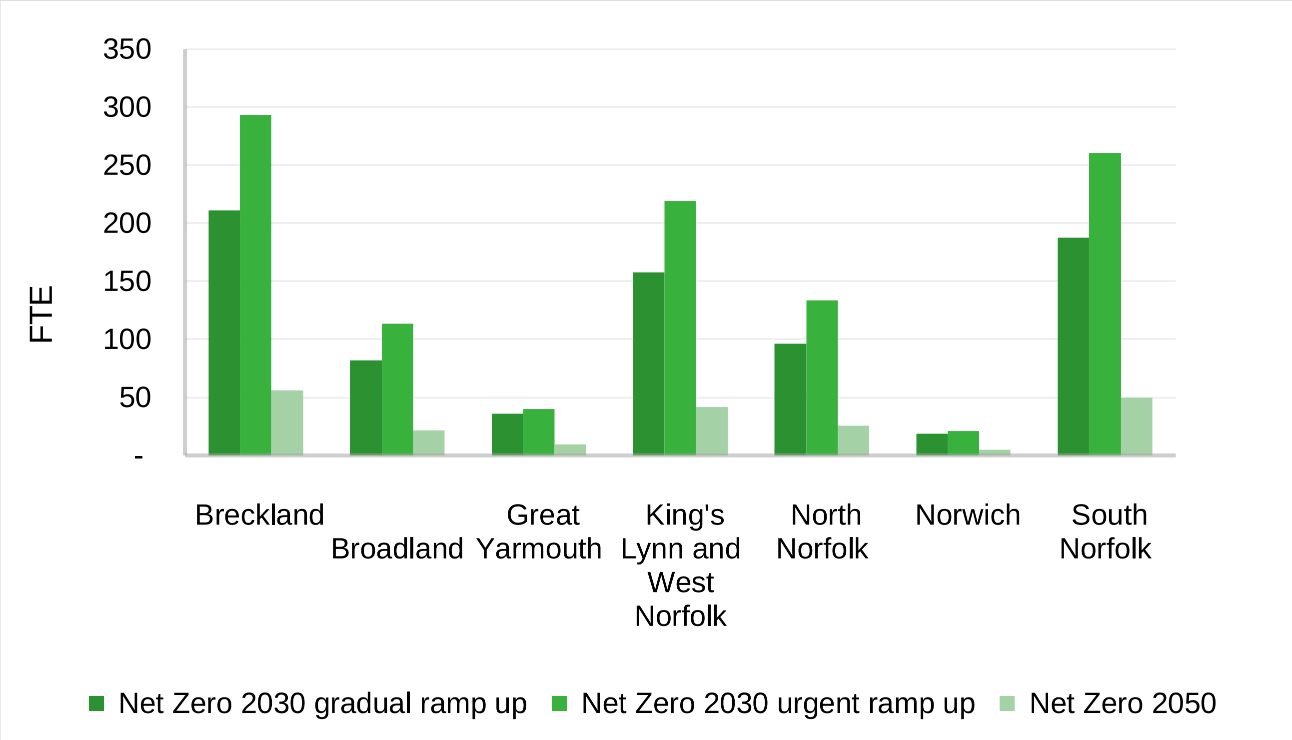
Job creation scenarios in Norfolk

For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for co-located energy storage in different local authorities are in line with those that see the largest increases in generation capacity – Breckland, followed by South Norfolk and King's Lynn and West Norfolk. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario followed by the Net Zero 2030 gradual ramp up, with the Net Zero 2050 scenario having much lower peaks, as shown in **Figure 119**Error! Reference source not found.. Higher peak jobs for given scenarios are associated with faster increases in capacity.

[118] Values from Distribution Future Energy Scenarios. (2020 and 2050). [Distribution Future Energy Scenarios (DFES) 2022](#).

Figure 119: Norfolk co-located energy storage peak jobs across the scenarios



The years in which the peak jobs occur in each scenario are provided in **Table 41**. More insight into these values is provided by

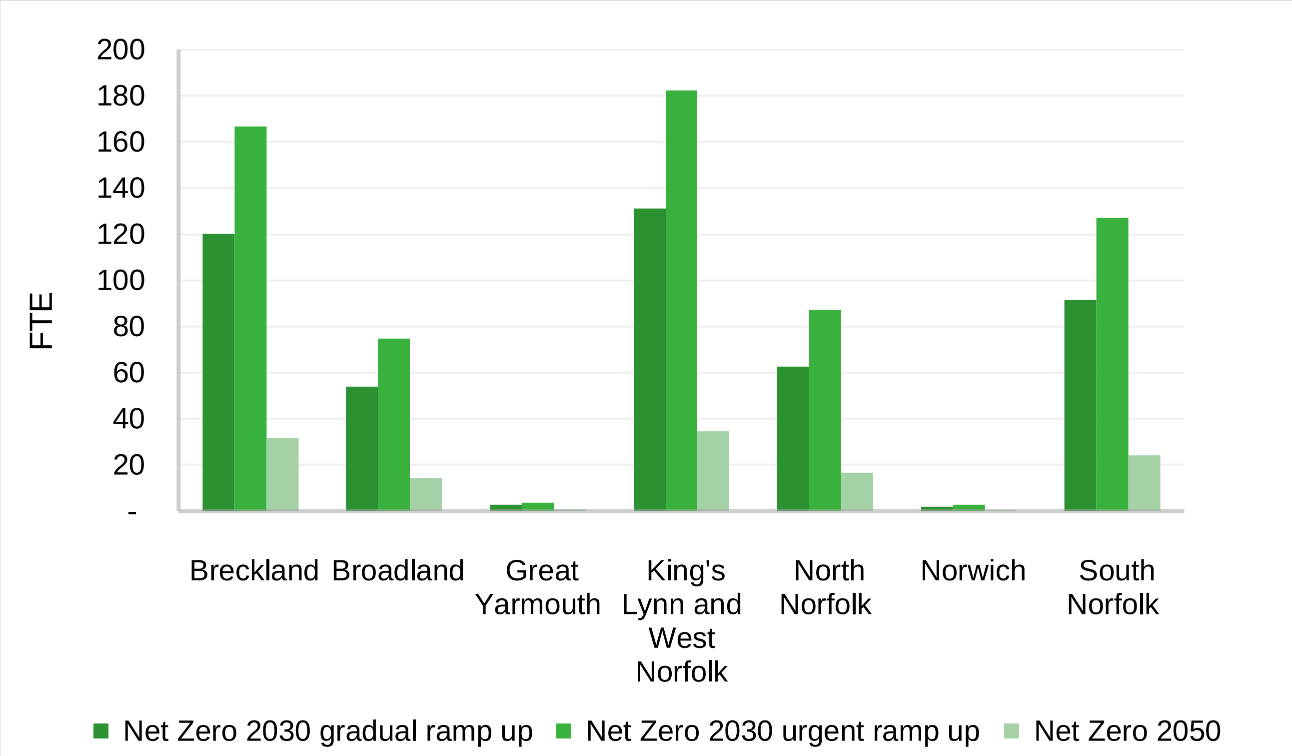
Figure 121Error! Reference source not found. later in this section, which depicts how the total number of jobs changes over time for each scenario.

Table 41: Year in which peak jobs occur for co-located energy storage in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2027	2024	2034

Job creation hotspots for standalone grid-connected energy storage in different local authorities are in line with those that see the largest increases in generation capacity – King's Lynn and West Norfolk, followed by Breckland and South Norfolk. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up, with the Net Zero 2050 scenario having much lower peaks, as shown in **Figure 120**. Higher peak jobs for given scenarios are associated with faster increases in capacity.

Figure 120: Norfolk standalone grid-connected energy storage peak jobs across the scenarios



The years in which the peak jobs shown in **Error! Reference source not found.** occur in each scenario are provided in **Table 42**. More insight into these values is provided by **Figure 122** later in this section, which depicts how the total number of jobs changes over time for each scenario.

Table 42: Year in which peak jobs occur for standalone grid-connected energy storage in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2027	2024	2034

The development of co-located energy storage jobs over time for each of the three scenarios is shown in **Figure 121**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. Where there are repeated peaks in the number of jobs, this is due to decommissioning and replacement of previous concentrated capacity increases.

Figure 121: Norfolk co-located energy storage FTE over time

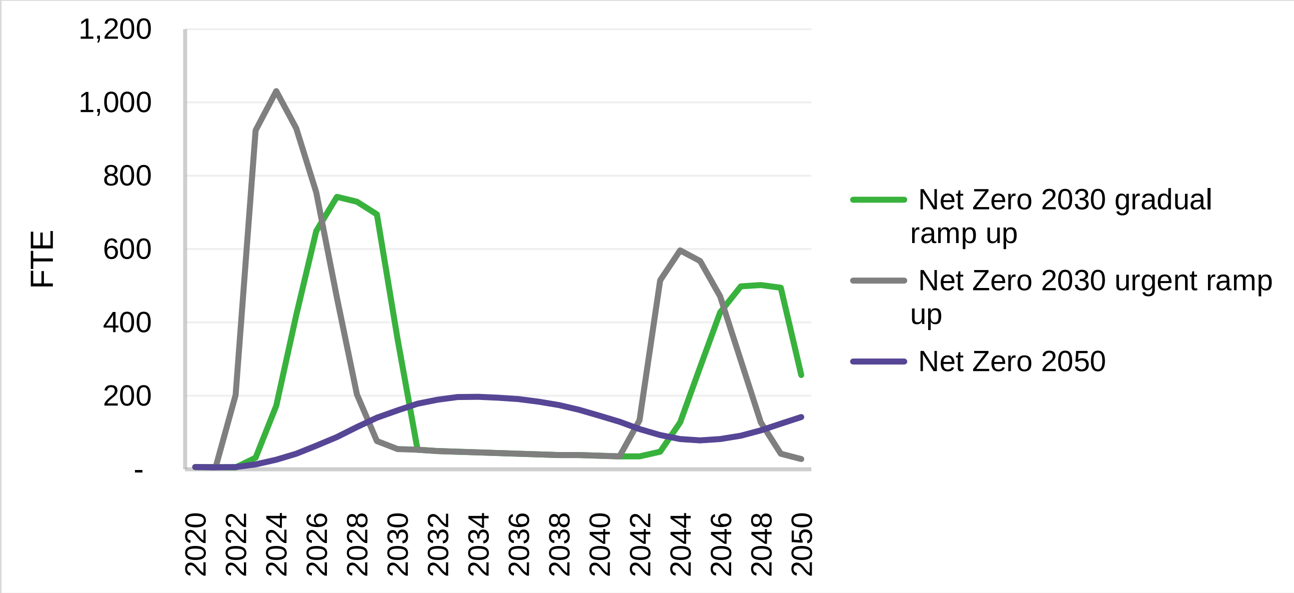
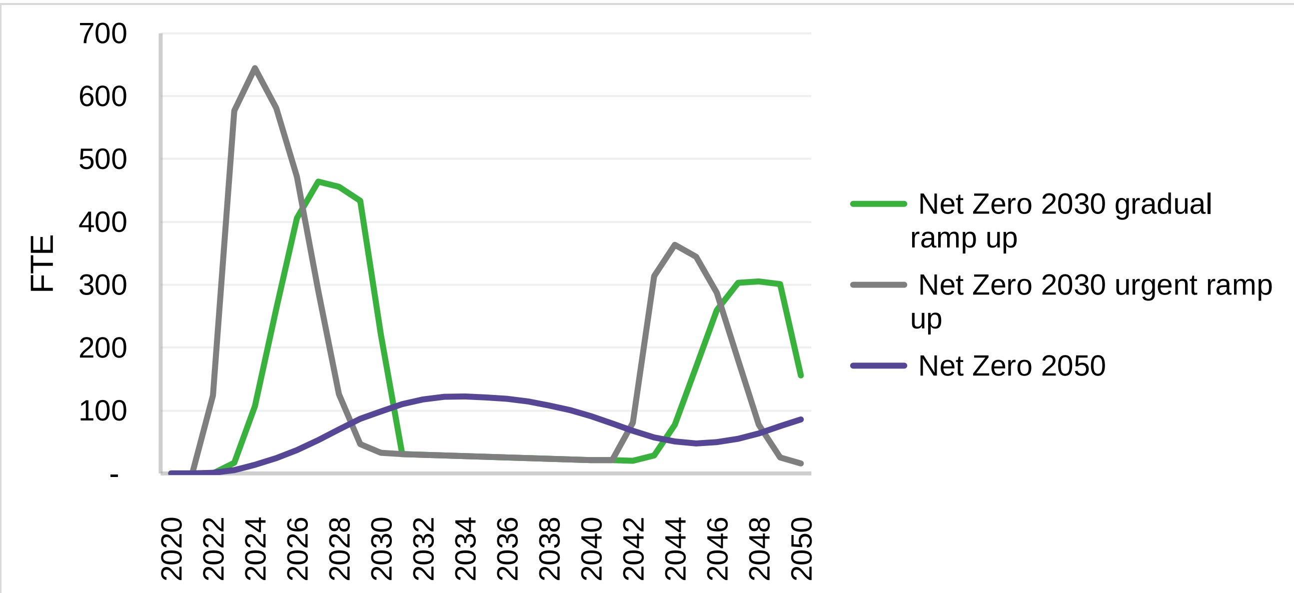


Figure 122 shows the equivalent results for standalone grid-connected energy storage – with lower total increases in capacity than for co-located energy storage, the number of jobs is less significant. As with co-located energy storage, the Net Zero 2030 scenarios have the most pronounced second peaks, but a secondary increase by 2050 is still seen under the Net Zero 2050 scenario.

Figure 122: Norfolk standalone grid-connected energy storage FTE



Breakdown of job types in Norfolk

Different types of jobs have been modelled and fall into three groups: construction and installation of capacity, operation and maintenance of assets, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity. **Figure 123**, **Figure 124** and **Figure 125** present the number of jobs in each type over time for co-located energy storage, for each scenario.

For both the Net Zero 2030 scenarios, we see the pattern of repeated peaks where the capacity increase associated with the previous peak comes to the end of its life, and therefore needs decommissioning and replacing. For the Net Zero 2050 scenario the start of a secondary increase can be seen as we approach 2050. A decrease in the height of the secondary peaks can be seen compared to the first peaks – this is due to assumed learning rates for energy storage employment – the principle that fewer jobs will be needed in the future to construct, install and maintain the same storage capacity, due to improved efficiencies in processes and technologies and some infrastructure being reused.

Figure 123: Norfolk co-located energy storage FTE by job type Net Zero 2030 Gradual Ramp up

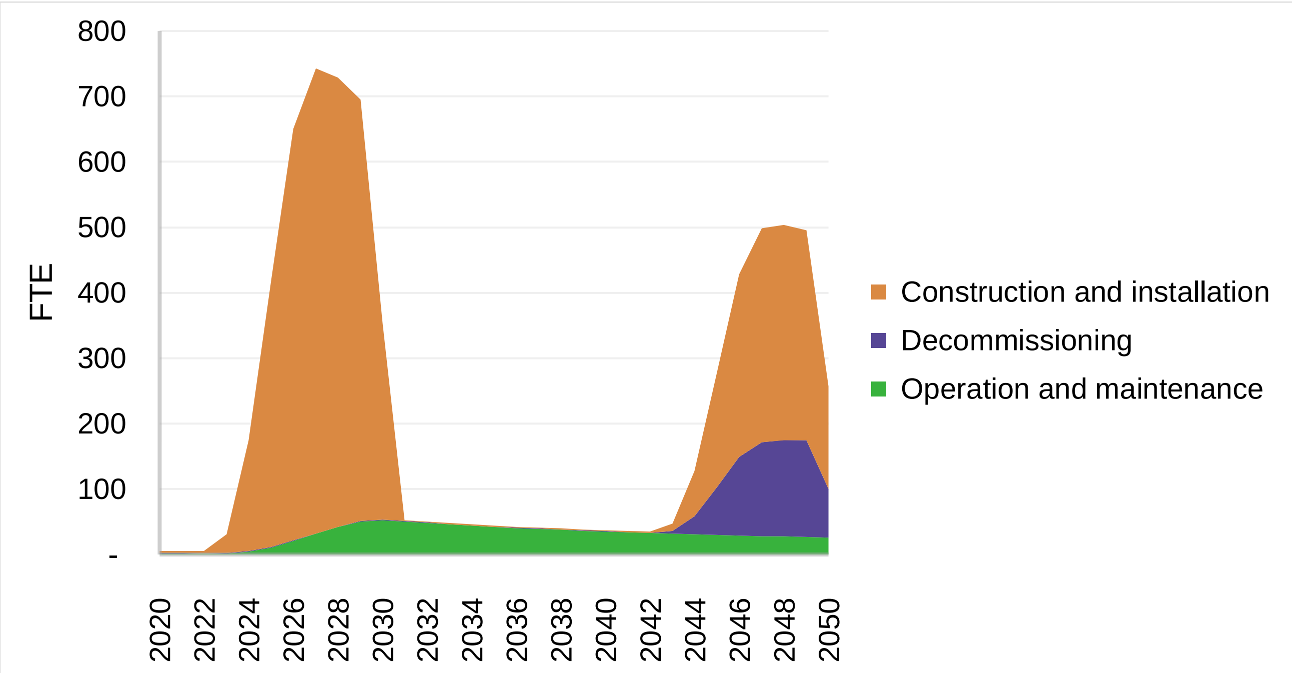


Figure 124: Norfolk co-located energy storage FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

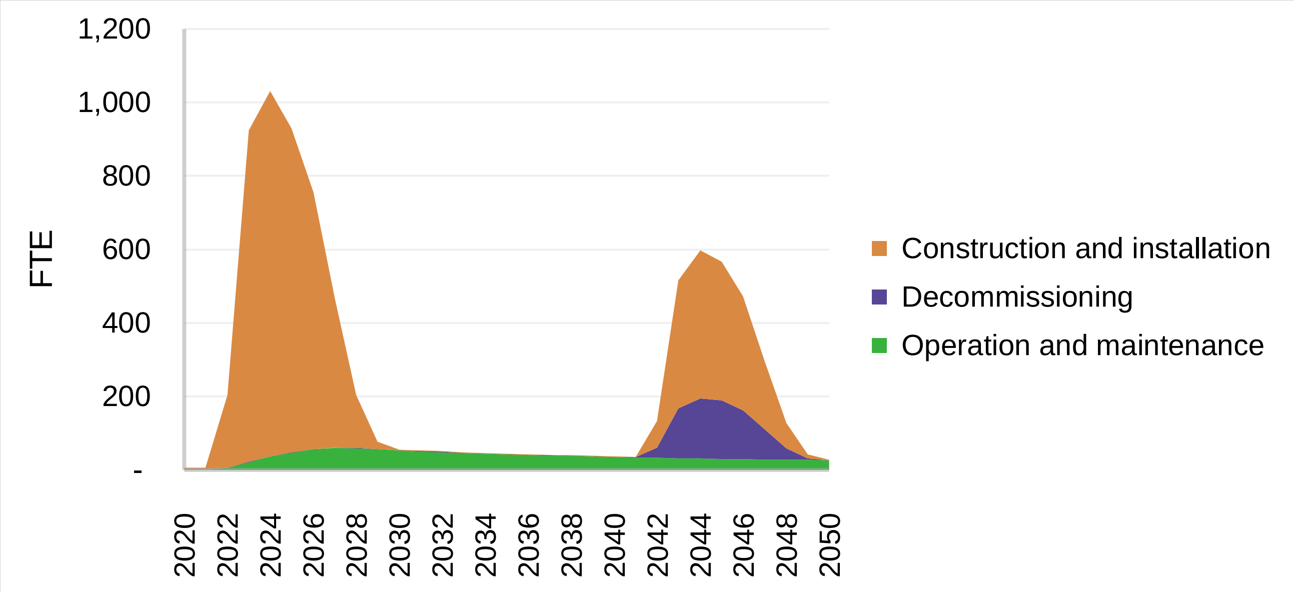


Figure 125: Norfolk co-located energy storage FTE by job type for the Net Zero 2050 Scenario

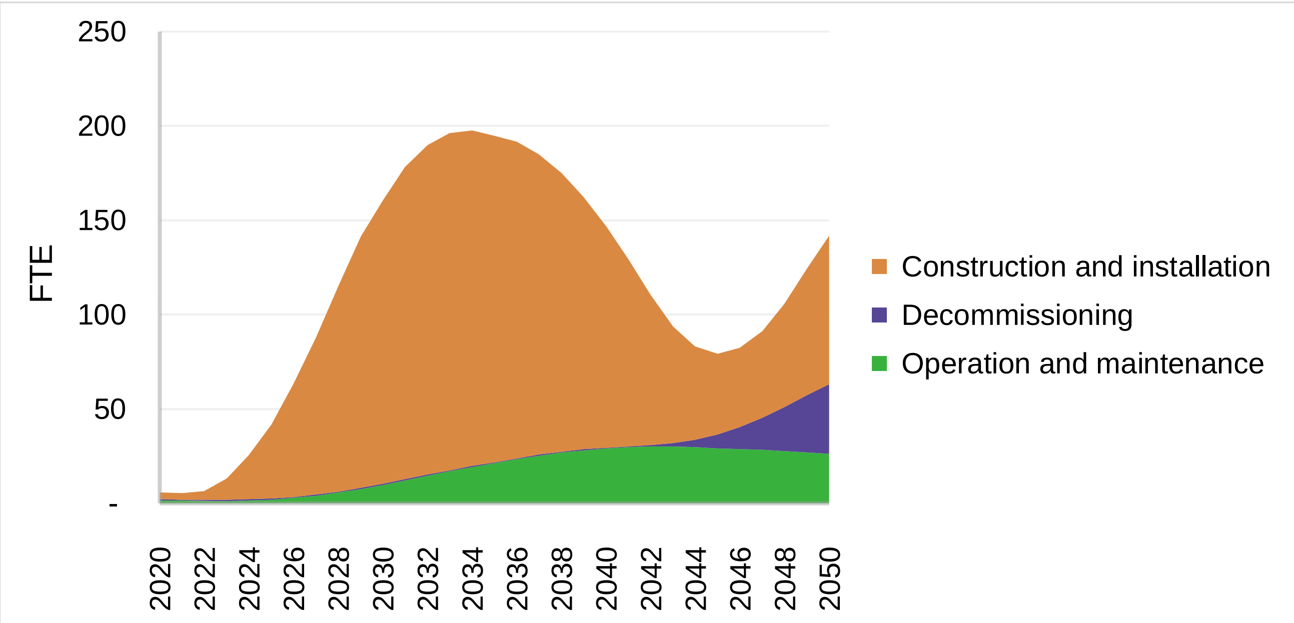


Figure 126, Figure 127 and

Figure 128Error! Reference source not found. present the number of jobs in each type over time for standalone grid-connected energy storage for each scenario. The same pattern of secondary peaks that have a lower height than the first can be seen for standalone grid-connected energy storage as for co-located energy storage under the Net Zero 2030 scenarios, and again we see the start of a secondary peak under the Net Zero 2050 scenario.

Figure 126: Norfolk standalone grid-connected energy storage FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

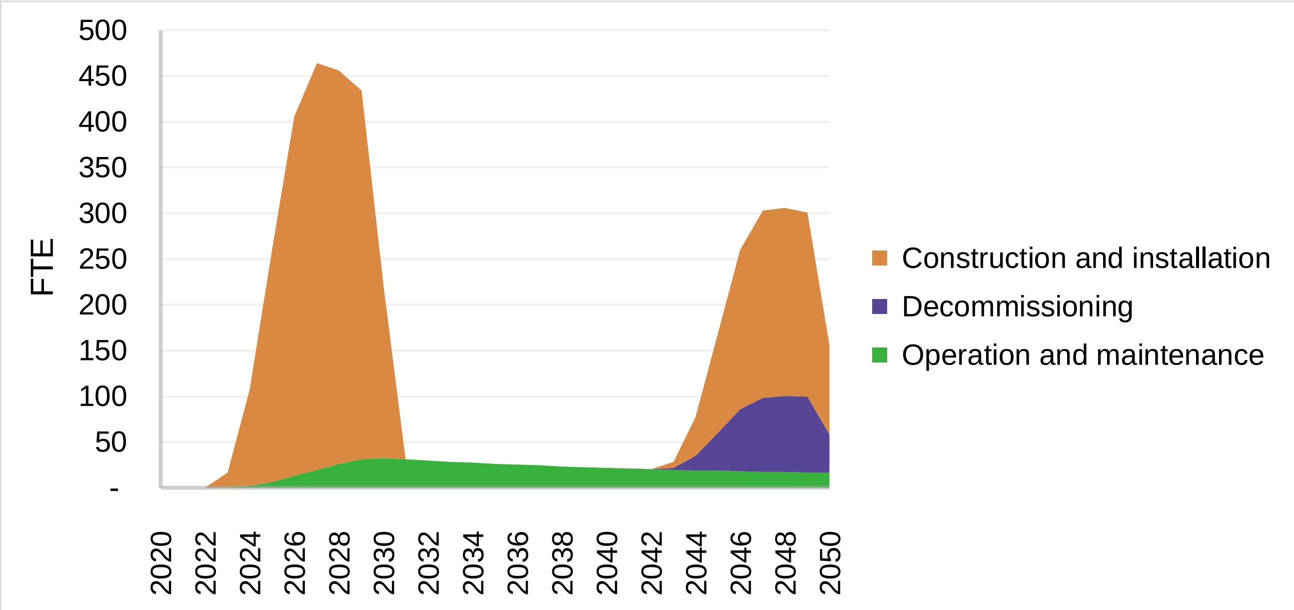


Figure 127: Norfolk standalone grid-connected energy storage FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

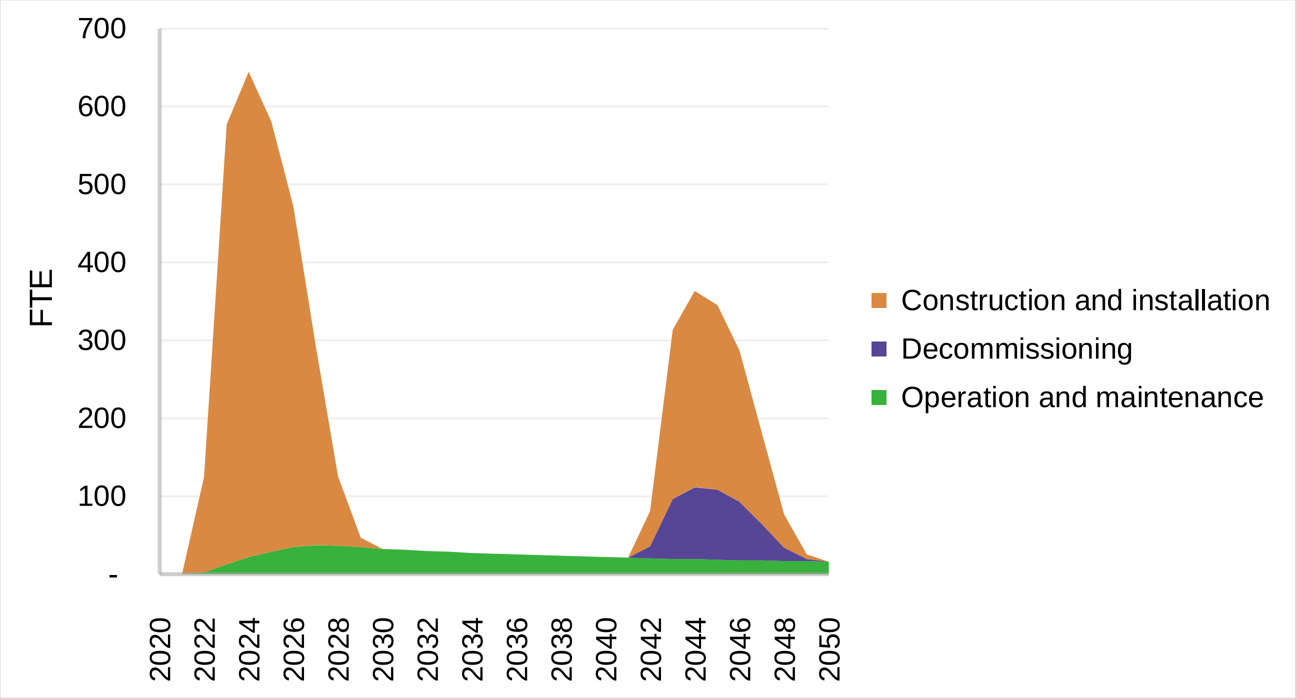
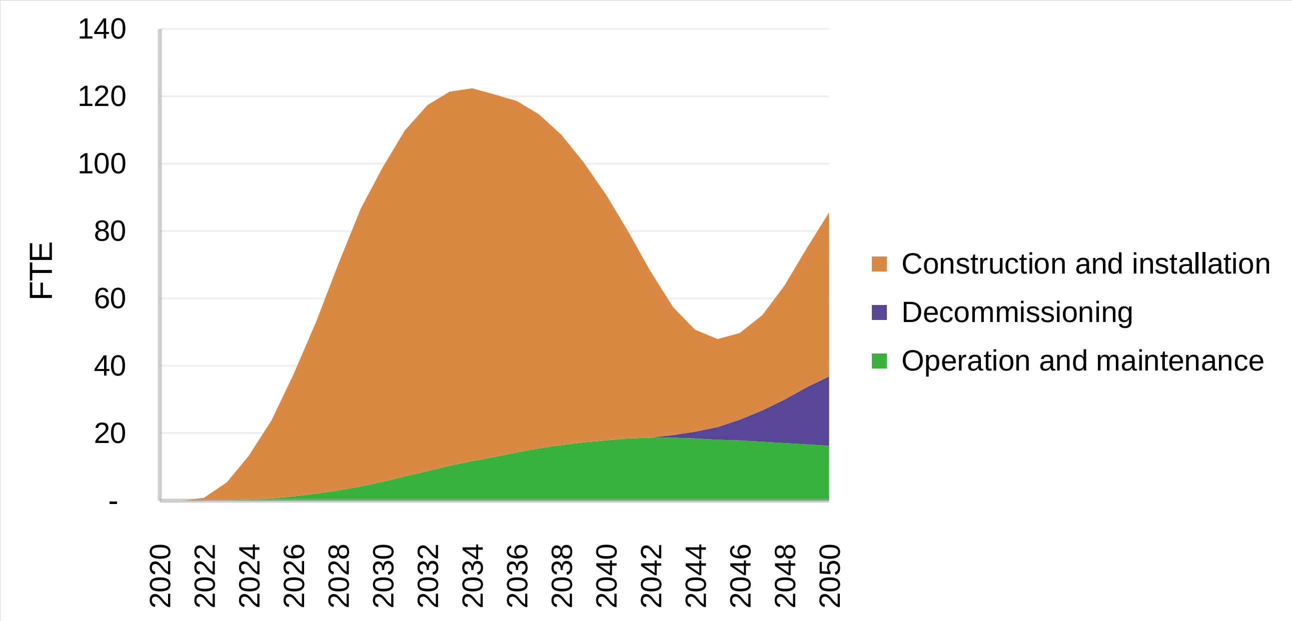

FTE
700
600
500
400
300
200
100
-
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
2048
2050
Construction and installation
Decommissioning
Operation and maintenance

Figure 128: Norfolk standalone grid-connected energy storage FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Norfolk

Estimated peak GVA that results from energy jobs in the categories used above are shown in **Table 43** and **Table 44**, for co-located and standalone grid-connected battery storage respectively. Since the urgent ramp up usually has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios.

Table 43: Norfolk co-located energy storage peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2027	3	10	50
Urgent ramp up	2024	3	12	71
Net zero 2050	2034	2	3	13

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Table 44: Norfolk standalone grid-connected energy storage peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2027	2	6	32
Urgent ramp up	2024	2	7	44
Net zero 2050	2034	1	1	8

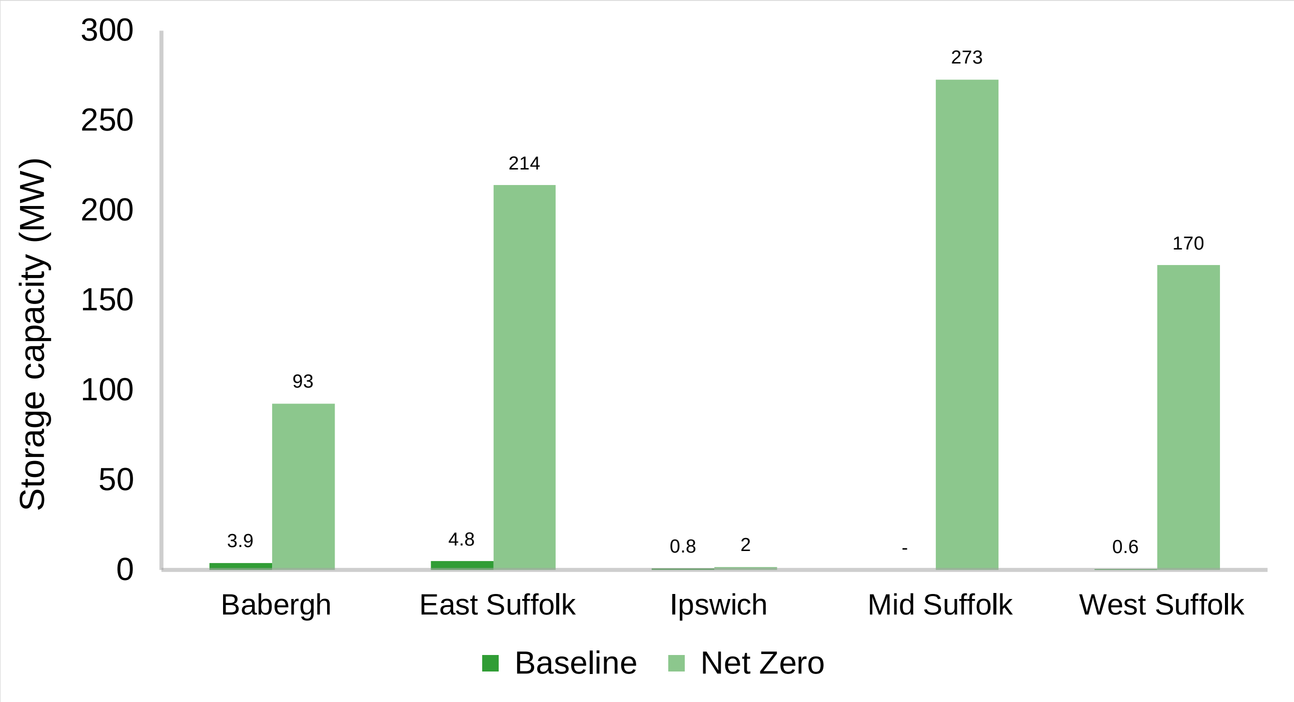
*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Current and expected capacity in Suffolk

Co-located energy storage in Suffolk is currently estimated at 10 MW, with East Suffolk having the highest capacity, followed by Barbergh[119]. UK Power Networks' Distributed Future Energy Scenarios project that a 751 MW generation capacity for co-located energy storage will be needed in Suffolk to achieve Net Zero, with Mid Suffolk having the highest capacity, followed by East Suffolk and West Suffolk. **Figure 129**Error! Reference source not found. shows the values we assume in our modelling, by local authority. This again is inconsistent with the REPD database but highlights the potential inconsistencies between how National Grid and DESNZ calculate baseline capacity generation data.

[119] UK Power Networks. (2022). [Distribution Future Energy Scenarios (DFES) 2022](#).

Figure 129: Suffolk co-located energy storage capacity values[120]

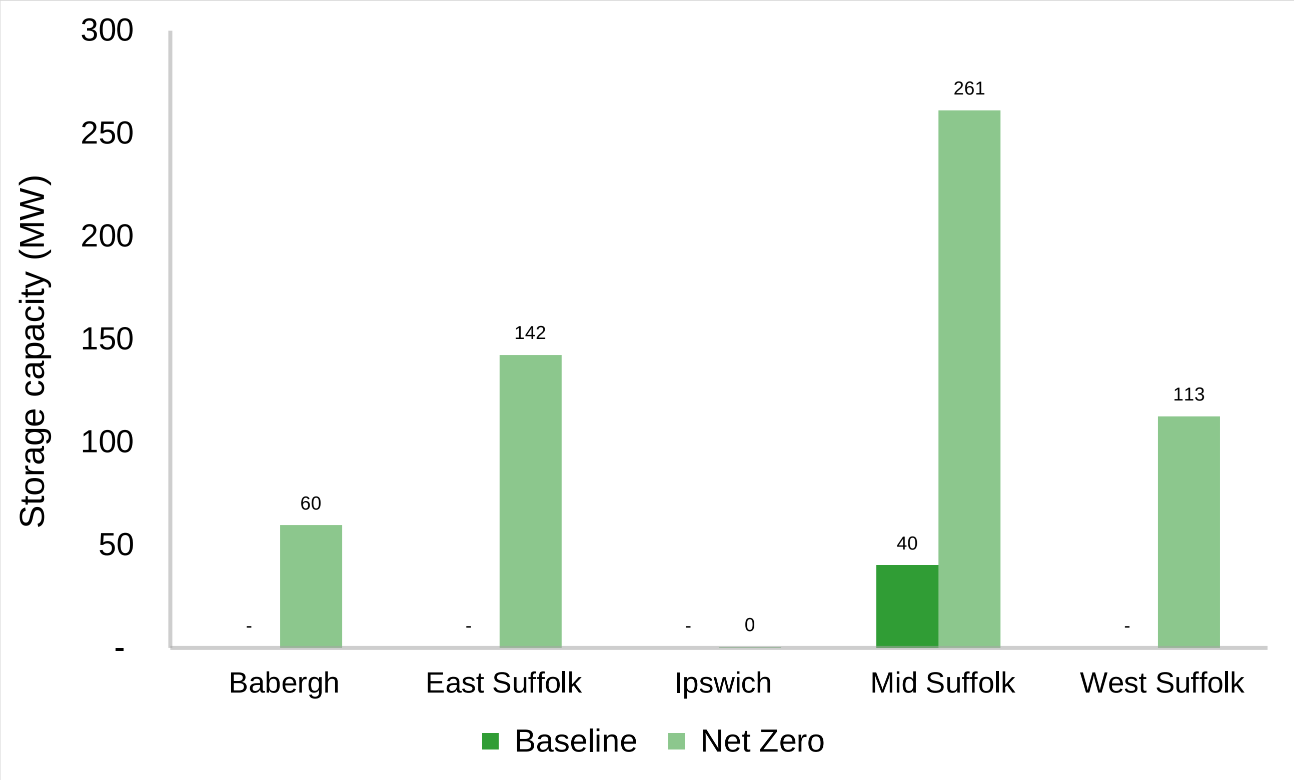


Standalone grid-connected energy storage in Suffolk is currently estimated to be 40 MW, located solely in Mid Suffolk[121]. UK Power Networks' Distributed Future Energy Scenarios project that a 576 MW generation capacity for standalone grid-connected energy storage will be needed in Suffolk to achieve Net Zero, with Mid Suffolk having the highest capacity, followed by East Suffolk and West Suffolk. **Figure 130Error! Reference source not found.** shows the values we assume in our modelling, by local authority.

[120] Values from Distribution Future Energy Scenarios. (2020 and 2050). Distribution Future Energy Scenarios (DFES) 2022.

[121] UK Power Networks. (2022). Distribution Future Energy Scenarios (DFES) 2022.

Figure 130: Suffolk standalone grid-connected energy storage capacity values[122]



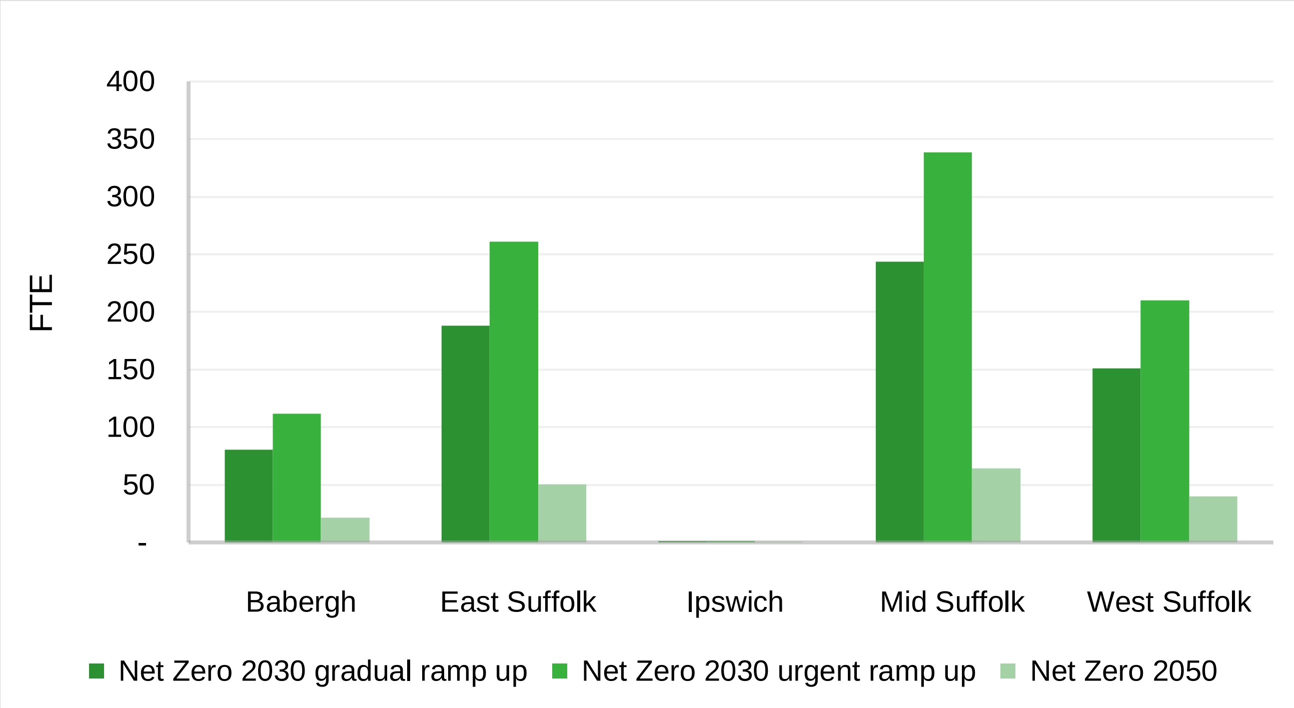
Job creation scenarios in Suffolk

For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for co-located energy storage in different local authorities are in line with those that see the largest increases in generation capacity – Mid Suffolk, followed by East Suffolk and West Suffolk. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up, with the Net Zero 2050 scenario having much lower peaks, as shown in **Figure 131**Error! Reference source not found.. Higher peak jobs for given scenarios are associated with faster increases in capacity.

[122] Values from Distribution Future Energy Scenarios. (2020 and 2050). [Distribution Future Energy Scenarios (DFES) 2022].

Figure 131: Suffolk co-located energy storage peak jobs



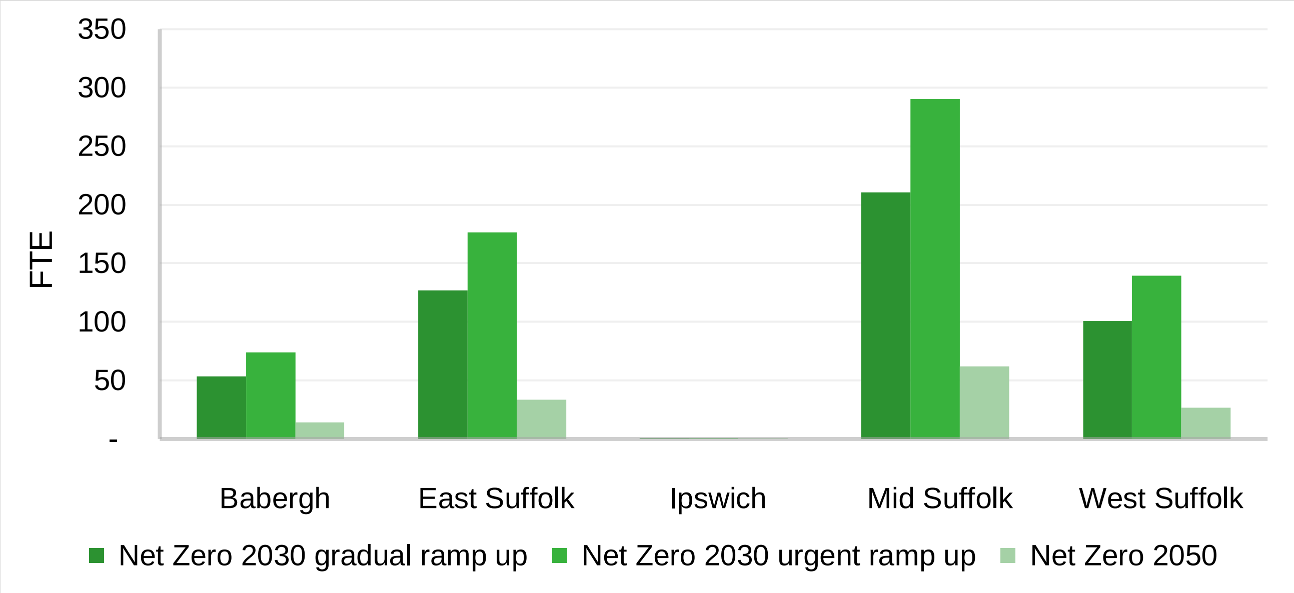
The years in which the peak jobs occur in each scenario are provided in **Table 45**. More insight into these values is provided by **Figure 133** later in this section, which depicts how the total number of jobs changes over time for each scenario.

Table 45: Year in which peak jobs occur for co-located energy storage in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2027	2024	2034

Job creation hotspots for standalone grid-connected energy storage in different local authorities are also in line with those that see the largest increases in generation capacity – Mid Suffolk, followed by East Suffolk and West Suffolk – the same as those for co-located storage. Again, the highest peaks are seen in the Net Zero 2030 urgent ramp up scenario followed by the Net Zero 2030 gradual ramp up scenario, with the Net Zero 2050 scenario having much lower peaks, as shown in **Figure 132**.Error! Reference source not found.

Figure 132: Suffolk standalone grid-connected energy storage peak jobs



The years in which the peak jobs occur in each scenario are provided in **Table 46**. More insight into these values is provided by **Figure 134** later in this section, which depicts how the total number of jobs changes over time for each scenario.

Table 46: Year in which peak jobs occur for standalone grid-connected energy storage in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2027	2024	2034

The development of co-located energy storage jobs over time for each of the three scenarios is shown in **Figure 133**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. Where there are repeated peaks in the number of jobs, this is due to decommissioning and replacement of previous concentrated capacity increases.

Figure 133: Suffolk co-located energy storage FTE over time

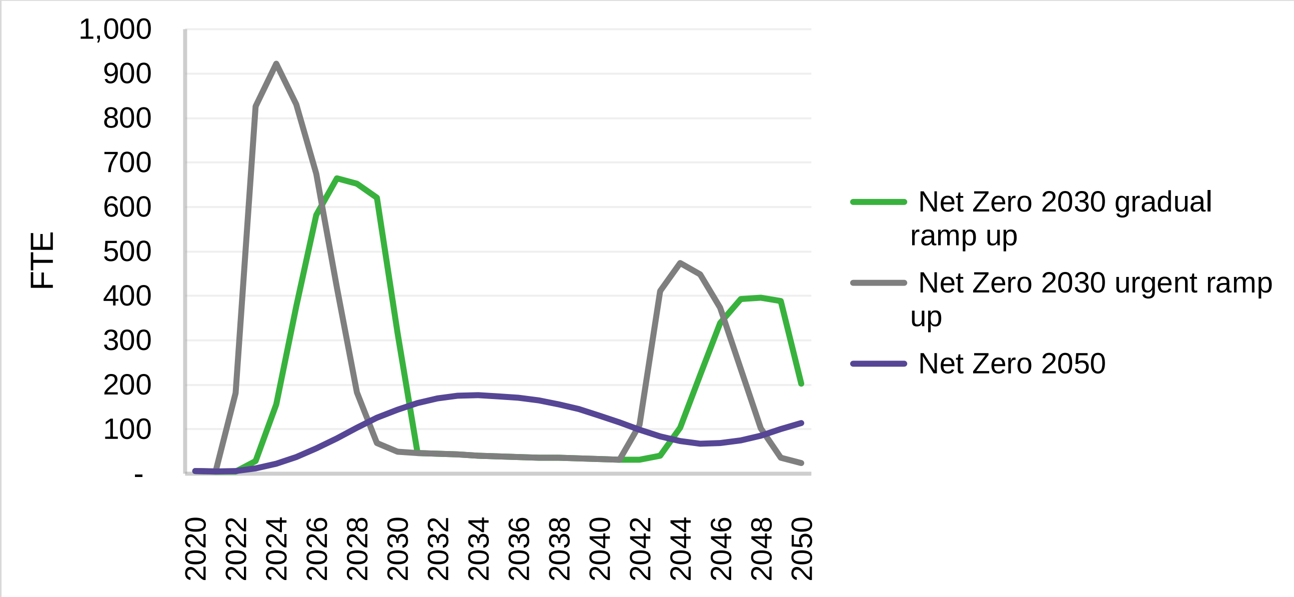
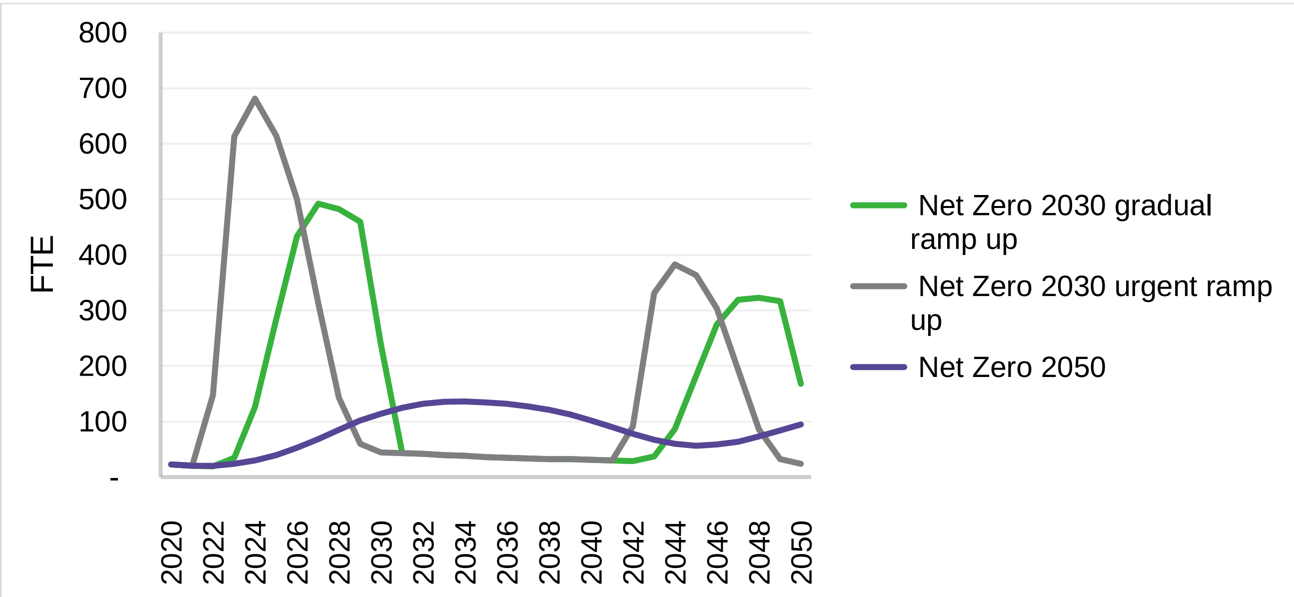


Figure 134 Error! Reference source not found.shows the equivalent results for standalone grid-connected energy storage – with lower total increases in capacity than for co-located energy storage, the number of jobs required is also less significant. As with co-located energy storage, the Net Zero 2030 scenarios have the most pronounced second peaks, but a secondary increase is still seen under the Net Zero 2050 scenario by 2050.

Figure 134: Suffolk standalone grid-connected energy storage FTE over time



Breakdown of job types in Suffolk

Different types of jobs have been modelled, as associated with construction and installation of capacity, operation and maintenance of capacity, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

Figure 135, Figure 136 and **Figure 137** present the number of jobs in each type over time for co-located energy storage, for each scenario. For both the Net Zero 2030 scenarios, we see the pattern of repeated peaks where the capacity increase associated with the previous peak comes to the end of its life, and therefore needs decommissioning and replacing. For the Net Zero 2050 scenario the start of a secondary increase can be seen. A decrease in the height of the secondary peaks can be seen – this is due to assumed learning rates for energy storage employment – the principle that fewer jobs will be needed in the future to construct, install and maintain the same number of charge points, due to improved efficiencies in processes and technologies.

Figure 135: Suffolk co-located energy storage FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

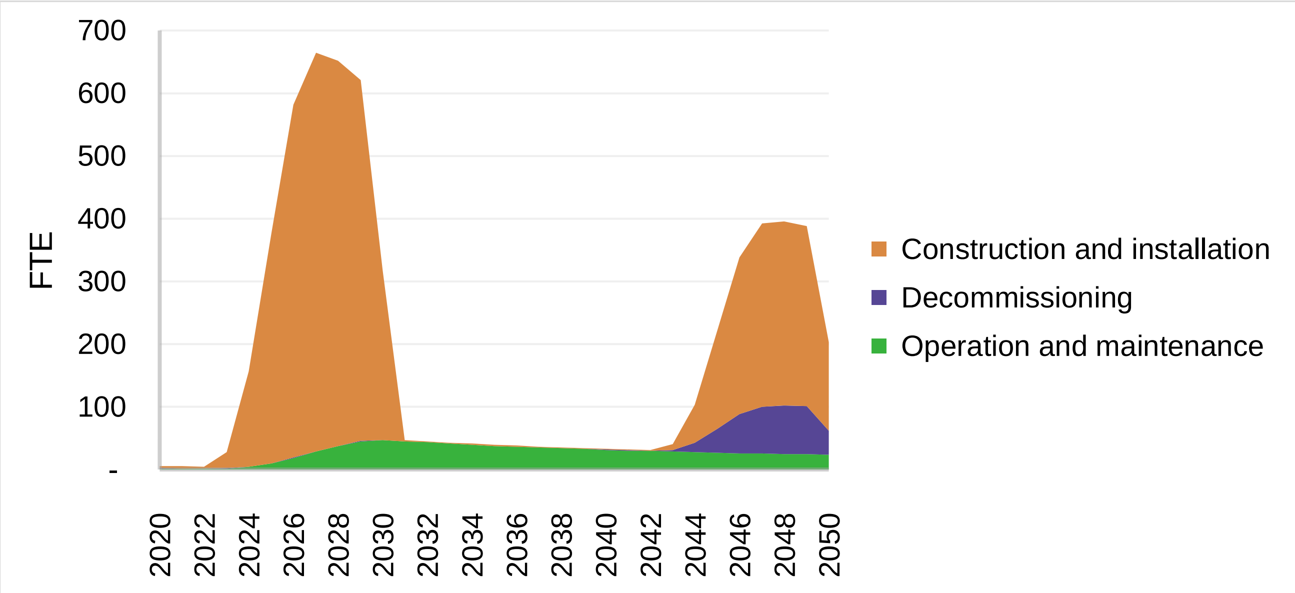


Figure 136: Suffolk co-located energy storage FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

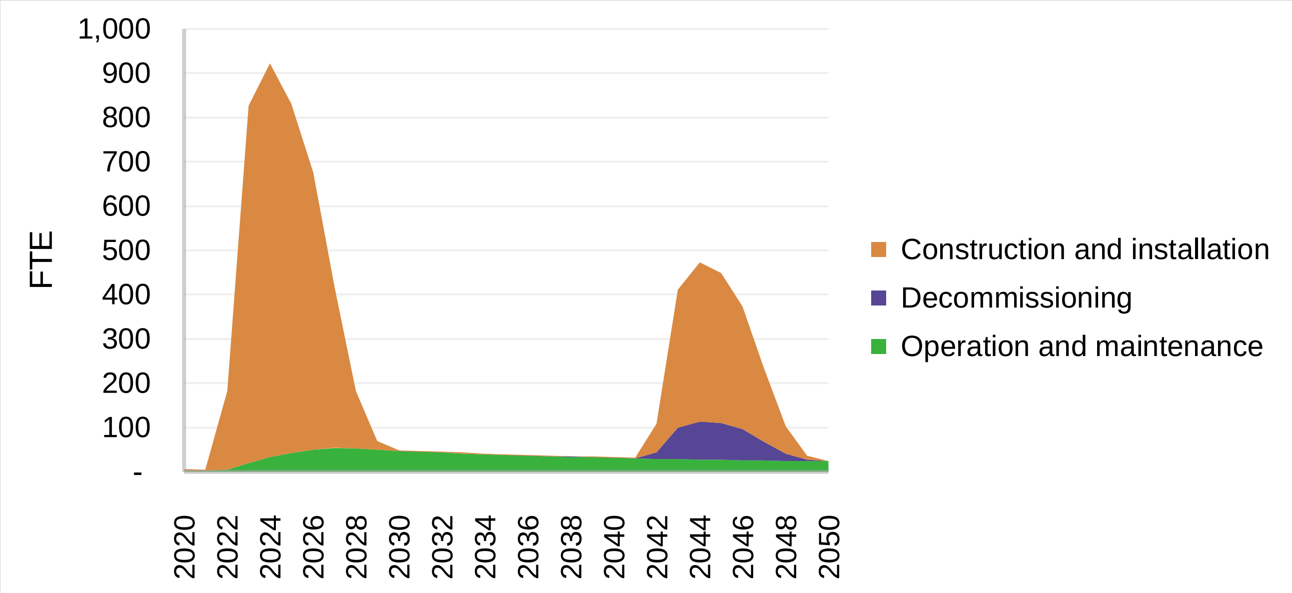


Figure 137: Suffolk co-located energy storage FTE by job type for the Net Zero 2050 Scenario

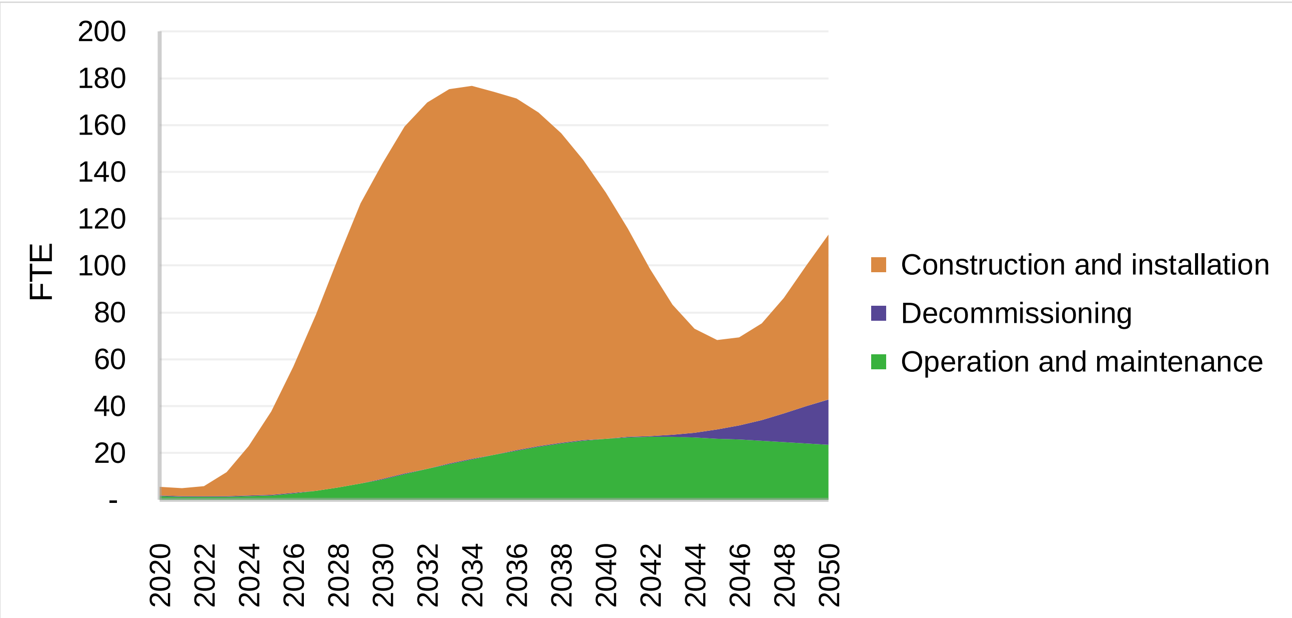


Figure 138, **Figure 139** and **Figure 140** present the number of jobs in each type over time for standalone grid-connected energy storage, for each scenario. The same pattern can be seen for standalone grid-connected energy storage as with co-located energy storage under the Net Zero 2030 scenarios – that of secondary peaks with a lower height than the first. Again, we see the start of a secondary peak under the Net Zero 2050 scenario.

Figure 138: Suffolk standalone grid-connected energy storage FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

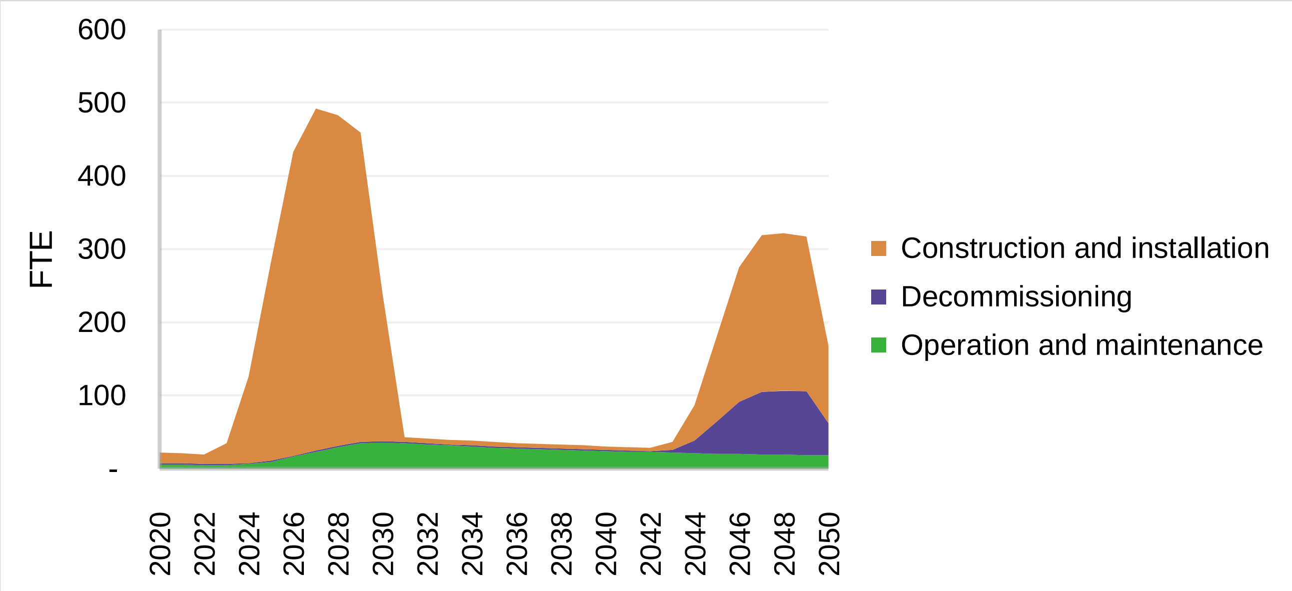


Figure 139: Suffolk standalone grid-connected energy storage FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

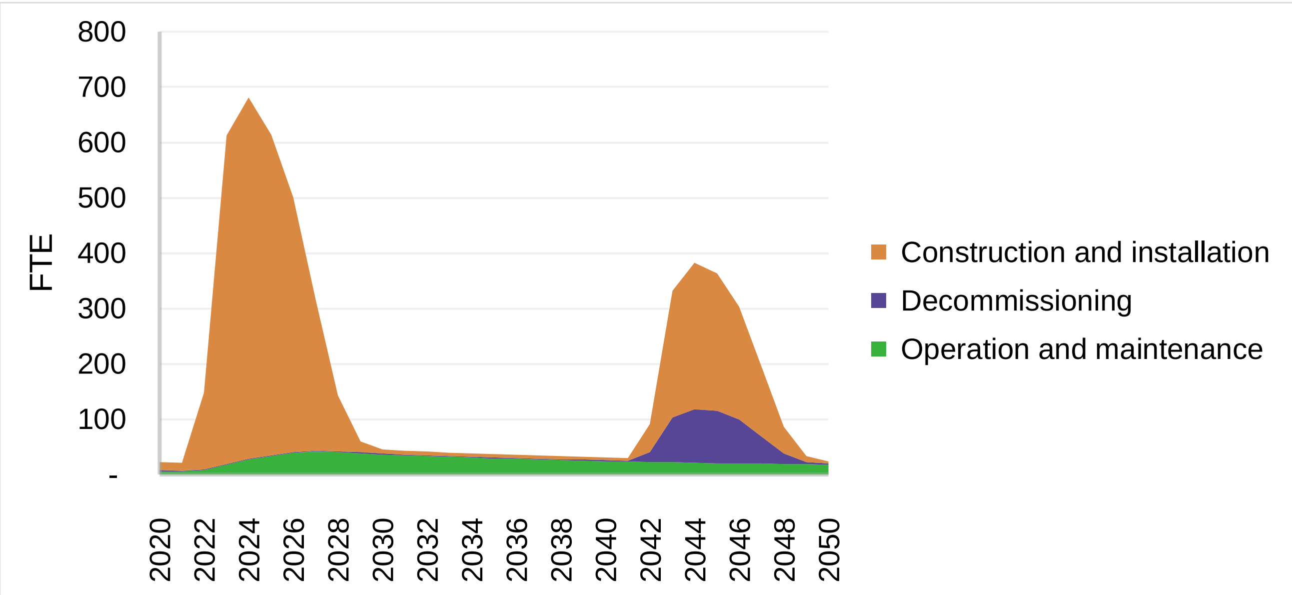
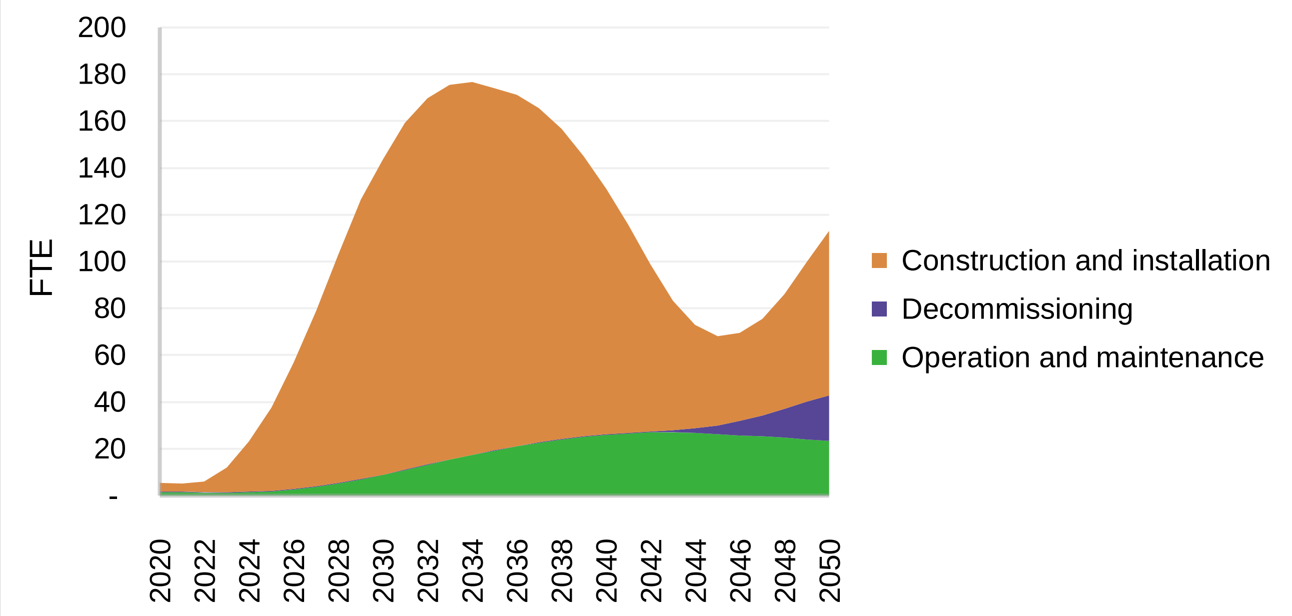


Figure 140: Suffolk standalone grid-connected energy storage FTE by job type for the Net Zero 2050 Scenario



Economic benefits in Suffolk

Estimated peak GVA that results from energy jobs in the categories used above are shown in

Table 47 and

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2027	3	5	45
Urgent ramp up	2024	3	6	63
Net zero 2050	2034	2	1	11

Table 48, for co-located and standalone grid-connected battery storage respectively. Since the urgent ramp up usually has the highest peak number of jobs in each job type, this can generally be seen to create the highest peak GVA, followed by the gradual ramp up and Net Zero 2050 scenarios.

Table 47: Suffolk co-located energy storage peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2027	3	5	45
Urgent ramp up	2024	3	6	63
Net zero 2050	2034	2	1	11

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Table 48: Suffolk standalone grid-connected energy storage peak projected annual GVA values by job types

Scenario	Peak year*	Operation and maintenance GVA (million £s p.a)	Decommissioning GVA (million £s p.a)	Construction and installation GVA (million £s p.a)
Gradual ramp up	2027	2	6	33
Urgent ramp up	2024	2	7	46
Net zero 2050	2034	1	2	9

*year of peak total GVA across job types given – not necessarily the year that each job type has peak GVA.

Skills gap analysis for the energy storage sector in Norfolk and Suffolk

The key point from the stakeholder feedback was the lack of local people to competently install energy storage systems. One respondent mentioned there are more energy storage professionals based in the West Midlands and Northeast compared to Norfolk and Suffolk. Some respondents shared concerns that the lack of electrical and manufacturing skills within Norfolk and Suffolk has prompted discussions around whether to establish manufacturing in locally or enter the region if they operated assets here. However, a few respondents mentioned that skills from adjacent industries, such as maintenance engineers from heating and cooling or other industrial settings, could transfer relatively easily to stationary energy storage systems.

It was also felt in industry that a more concerted, local effort was needed to build up electrical based roles, ranging from highly skilled engineers that can occupy senior roles to operation and maintenance level roles. Respondents highlighted that groups like the East of England Energy Group and University of East Anglia had been proactive in the last few years in promoting electrical related careers. Nevertheless, despite individual efforts, it was felt the council could play a more co-ordinating role in spearheading a campaign to attract electrically orientated skills to the region. Another challenge noted was that for the smaller energy storage installers, their offices are centralised in one location with operations and maintenance staff covering certain regions. Moreover, as lithium-ion batteries require less maintenance than lead acid batteries, the labour intensity required to service large installations decreases[123]. Therefore, to justify energy storage operators working with local training providers, a significant critical mass of energy storage systems would be needed in one area to justify any potential partnership.

An assessment of the local colleges and universities found that no local colleges or universities provide a dedicated energy storage course. Nevertheless, all the colleges and universities offer routes into becoming a qualified electrician that can opt for a career in energy storage. For example, City College Norwich, University of East Anglia and University of Suffolk offer degree (or equivalent) courses that enable highly skilled routes into electrical engineering, with energy storage included in modules. The University of East Anglia have also developed an MSc programme in Energy Engineering in partnership with industry and employers through close collaboration with the East of England Energy Group (EEEGR). The aim of the course is to address the national and regional shortage of high-calibre engineering graduates with specialist expertise in energy engineering. This course is professionally accredited by the Institution of Engineering and Technology (IET) on behalf of the Engineering Council.

Like solar and EV charging points, the necessary prerequisites required to install small scale energy storage installations are being qualified as an electrician and having 18th Edition: City & Guilds (2382-22) IET Wiring Regulations BS 7671 qualifications and/or Electrotechnical Certification Scheme (ECS) card. There are also dedicated Level 3 Awards in the Design, Installation and Commissioning of Electrical Energy Storage Systems offered by EAL and LCL, geared towards smaller household installations. For utility scale energy storage systems (the focus of the analysis), these courses were deemed helpful pre-requisites, with industry feeding back this could be sufficient for installation and maintenance roles. However, it should be noted that utility scale energy storage operates at much higher voltages and are subject to different regulations to lower voltage and residential systems.

Both established colleges and private training providers across the region regularly run the 18th Edition Wiring Regulations courses. However, as the tables below suggest, no training provider has been identified which provides dedicated energy storage training.

[123] Historic England. (2023). Installing Electrical Energy Storage Systems and Batteries in Historic Buildings.

Table 49: Colleges and universities in Norfolk and Suffolk offering energy storage sector related courses

Institution	Wind specific courses and potentially relevant courses	Address
City College Norwich	Advanced Construction and Engineering Centre opened last month which supports students in hybrid and electric vehicle maintenance Engineering Technician - Technical Support, Level 3 Standard Installation Electrician Apprenticeship Level 3 Standard HNC in Engineering (Electrical, Electronic Engineering) HND Electrical and Electronic Engineering (Top Up) HND Embedded Electronic Systems (Top Up)	Ipswich Rd Norwich Norfolk NR2 2LJ
College of West Anglia	Electrical Skills Assessment The Electricity at Work Regulations 1989 Maintenance Operations Engineering Technician Apprenticeship – Level 3 Installation Electrician and Maintenance Electrician – Level 3 Industrial Electrical Maintenance Skills (Assured by City and Guilds) - for Maintenance Engineers Level 3 Award in the Initial Verification and Certification of Electrical Installations (City & Guilds 2391-50) Level 3 Award in the Periodic Inspection, Testing and Certification of Electrical Installations (City & Guilds 2391-51) Level 3 Award in Inspection & Testing of Electrical Installations City & Guilds 2391-52 18th Edition of the Wiring Regulations	Kings Lynn Campus Tennyson Avenue King's Lynn Norfolk PE30 2QW
East Coast College	Electrical Installation Level 2 Electrical Installation Level 3 T Level in Maintenance, Installation and Repair for Engineering and Manufacturing Level 3 18th Edition of the Wiring Regulations	Great Yarmouth Campus Suffolk Road Great Yarmouth Norfolk NR31 0ED Lowestoft Campus Rotterdam Road Lowestoft

		Suffolk NR32 2PJ
Suffolk New College	Electrical Installation Level 1 Electrical Installation Level 2 Electrical Installation Level 3 Net Zero Skills Centre[124] Level 2 Engineering (PEO)	Rope Walk Ipswich Suffolk IP4 1LT
University of East Anglia	MSc Energy Engineering BEng (Hons) Engineering	Norwich Research Park Norwich Norfolk NR4 7TJ
University of Suffolk	HND Engineering (General Engineering)	Waterfront Building 19 Neptune Quay Ipswich Suffolk IP4 1QJ
West Suffolk College	Introduction to Electrical Installations (7202-01) Level 1 Electrical Installation Diploma (8202-20) Level 2 Advanced Electrical Installation Diploma (8282-30) Level 3 Installation Electrician/Maintenance Electrician Level 3 Engineering Fitter Level 3 18th Edition of the Wiring Regulations City and Guilds 2919-01 Level 3 Award in Electric Vehicle Charging Equipment Installation	Sixth Form Campus Out Risbygate Bury St Edmunds Suffolk IP33 3RL Built Environment Campus Anglian Lane Bury St Edmunds Suffolk IP32 6SR University and Professional Development Centre 73 Western Way Bury St Edmunds Suffolk IP33 3SP

[124] Solar PV and thermal installations are in the centre for students to use, but, no solar specific courses are listed on the website

While not running courses in energy storage technologies, colleges and universities have been proactive in other ways through student engagement. For example, as part of the New Anglia Green Skills initiative, City College Norwich and West Suffolk College have installed solar PV and battery storage rigs to give students hands-on experience of managing these systems. In addition to colleges and universities, several local private training providers also run the 18th Edition of the Wiring Regulations.

Table 50: Private training providers in Norfolk and Suffolk offering energy storage sector related courses

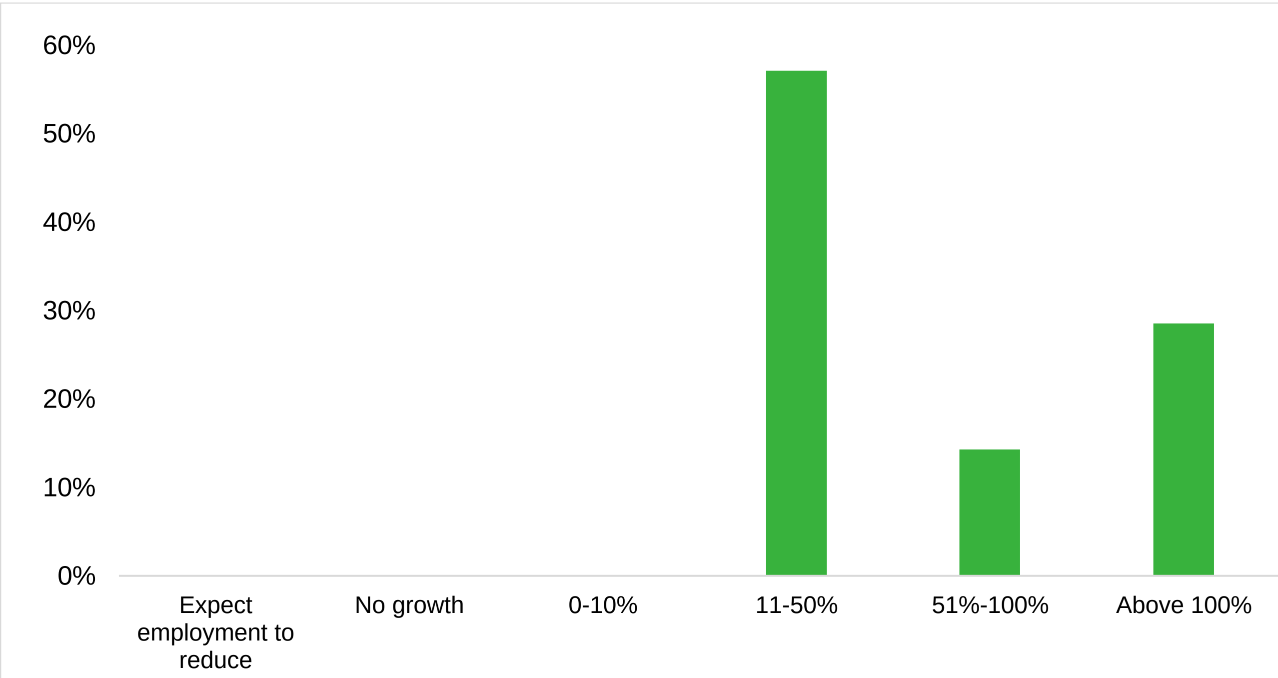
Training provider	Courses offered	Address
East of England Electrical Training	18th Edition of the Wiring Regulations	19 Mahoney Grn Rackheath Norwich NR13 6JY
Ipswich Skills Centre	18th Edition of the Wiring Regulations	Unit 4, The Quadrangle Centre The Drift, Nacton Road Ipswich, Suffolk IP3 9QR.
WS Training	18th Edition of the Wiring Regulations	Manor Barn Church Road, Great Barton Bury St Edmunds, Suffolk IP31 2QR
Thompson Training	18th Edition of the Wiring Regulations	Unit D1 Thompson Training LTD Sharon Road, Dettingen Way Bury St Edmunds. Suffolk IP33 3TZ

CROSS CUTTING STAKEHOLDER ENGAGEMENT FEEDBACK ON GREEN SKILLS

INSIGHTS FROM LOCAL AUTHORITIES

Local authority representatives offer key insights into some of the challenges and opportunities currently facing the transition to net zero within the region, from a wider development perspective to specific local opportunities. Many of the challenges they identified were politically focussed, highlight the need for long term national political commitments to drive investment locally. Local authority representatives recognise the potential scope for clean energy investments in Norfolk and Suffolk, specifically in offshore wind. This can be seen in **Figure 141** below, whereby all the local authority representatives that were surveyed identified that there will be growth needed in green industries to meet net zero by 2030. Without dedicated policies and strategic commitments from the Government, further investments for local clean energy development will be reduced.

Figure 141 - What percentage growth in employment will be needed for the low carbon sector in Norfolk and Suffolk in the next 7 years?



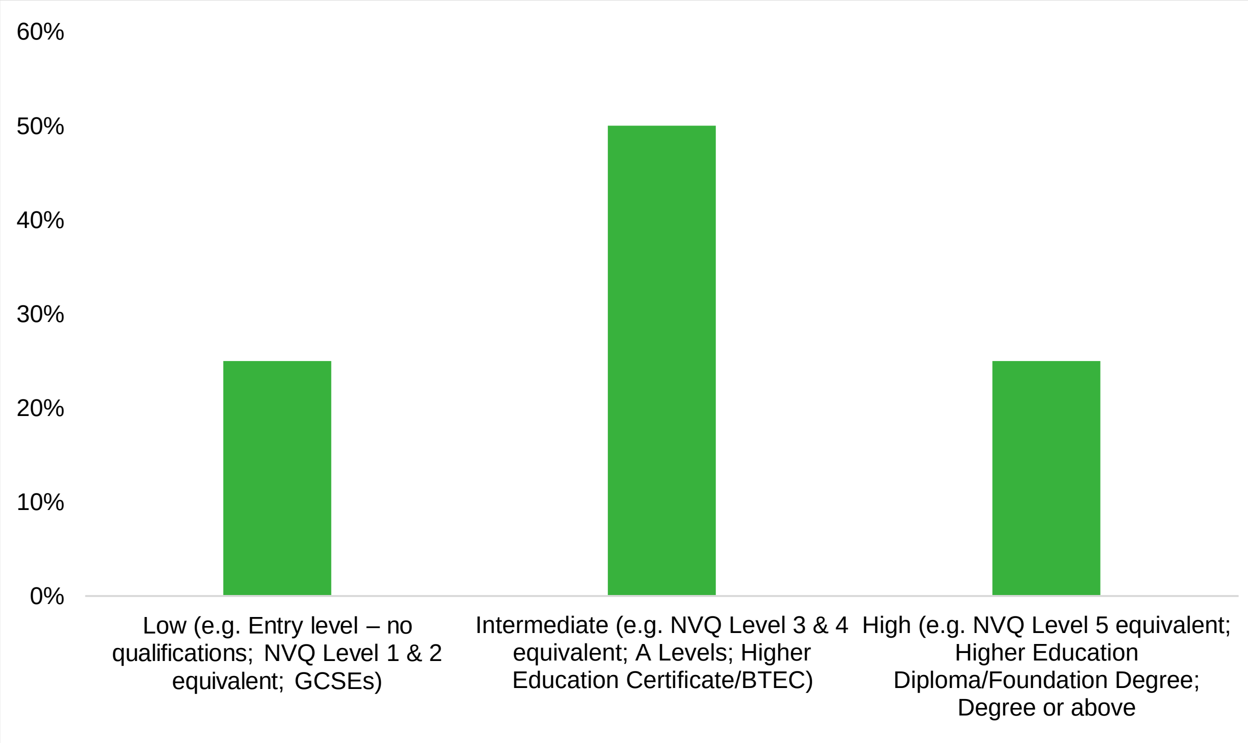
The local authority representatives who engaged with this study identified some needs within the wider green industry to enable to workforce to scale up, including:

- The provision of relevant training courses needs to be incentivised to stimulate the market for the relevant skills. It was felt the Council could provide funding to training centres for an initial period to alleviate the risk of poor course take-up.
- Creating relevant training courses specific to the roles experiencing the biggest shortages, combined with apprenticeships to be delivered at scale.
- Coordination and provision of advice: multiple LA representatives highlight the need for a significant body/organisation coordinating and driving forward the local green agenda.

Following on from this, local authority respondents recognise a local skills shortage in green skills. As demand increases for clean energy production in the UK, labour and skills need to be available to fulfil the needs of the local area from increased energy production and meeting the Government's goal of decarbonising the UK's generated electricity by 2035. For specific green skills, local authority representatives highlighted that intermediate level skills are in the shortest supply, but low- and high-level skills are also needed to grow as seen in **Figure 142**. Further insights from these representatives also recognise that training can be costly for prospective students and employers, limiting the growth of the workforce. A study from the New Anglia LEP supports this, indicating that businesses are unable to invest in training currently whilst the economy is uncertain[125].

[125] New Anglia LEP. (2022). New Anglia Local Enterprise Partnership Skills Advisory Panel's Local Skills Report.

Figure 142 - Where are labour supply or skills shortages within the sector?



Specifically at a council level, representatives recognise that coordination between local authorities is crucial to scale up the low carbon technology workforce. This again highlights the need for a central coordinator that can provide advice, education, and training for the workforce, bringing together district partners, providers, decision-makers, and policy-formulators. Skills interventions can then be widely understood in Norfolk and Suffolk and agreed by providers and businesses, centralising resources in one organisation. Inconsistency between local authorities was also highlighted by industry as an issue during the interviews and survey responses. Working closely with adjacent county councils in this group would ensure wider alignment and consistency in the wider green agenda to reach net zero targets.

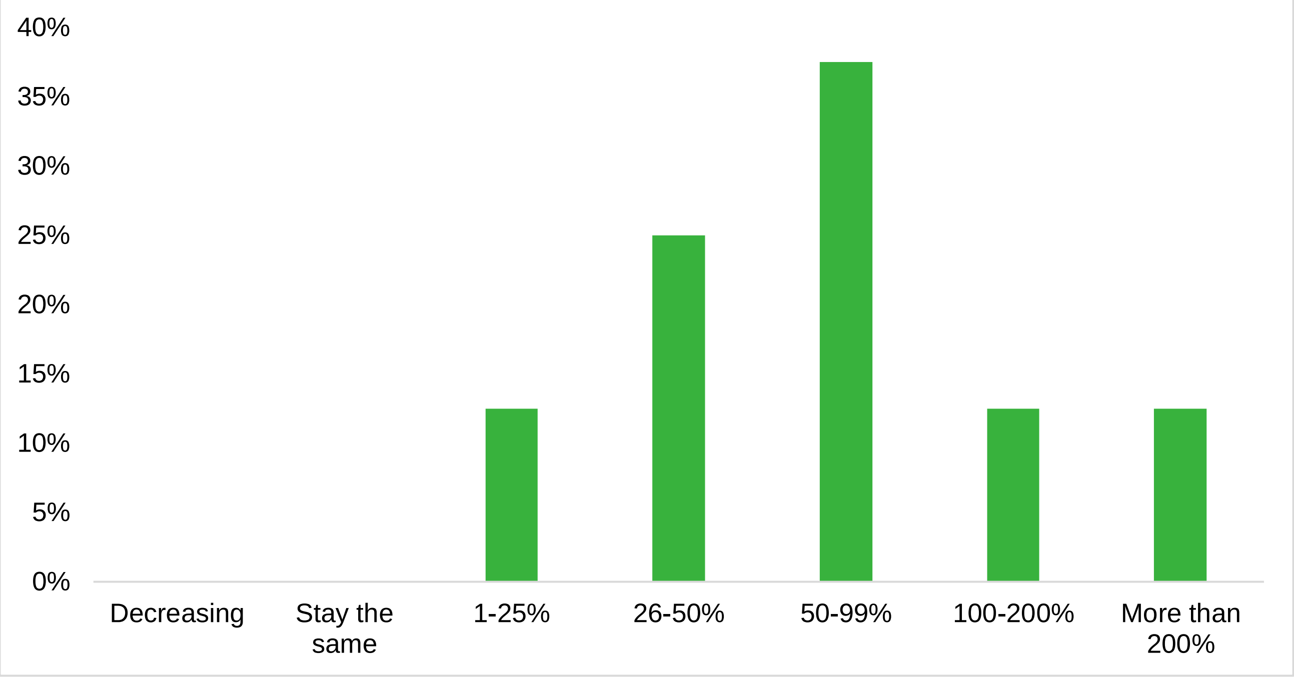
INSIGHTS FROM TRAINING PROVIDERS

The overwhelming message from training providers was the difficulty in finding qualified teaching staff. One reason is that the cost of living is driving more workers into the private sector due to higher wages. A sector specific reason is the most suitable teachers are often those working directly within the industry. Attracting these individuals to much-needed teaching positions, against the prospect of higher private-sector wages, is proving difficult. One training provider also indicated that being an instructor is not a well-paid job and to get a wind safety instructor signed off as competent can take 9-12 months. In addition, the provider also noted some operation and maintenance roles are physically demanding, such as climbing and physical work in offshore wind so these could prove harder to recruit for. A potential solution to using more artificial intelligence-based learning techniques and online learning modules, reducing the pressure on existing staff and enabling a greater cohort of students enrolling on courses year-on-year.

Another challenge is creating courses that match the requirements from industry and ensuring enough places are available. Training providers indicate that there is demand from young people to obtain qualifications, but there is little support for colleges in building a curriculum. As courses become more advanced, a lack of funding is raising difficulties for local training providers to be able to develop new courses. One solution to this, highlighted by a local training provide is encouraging local colleges to form enhanced collaborations to share resources, costs, and facilities to enable greater delivery of courses. It should also be noted that the lack of provision from colleges and universities has also led to several private companies providing training themselves to fill in the gap in the market.

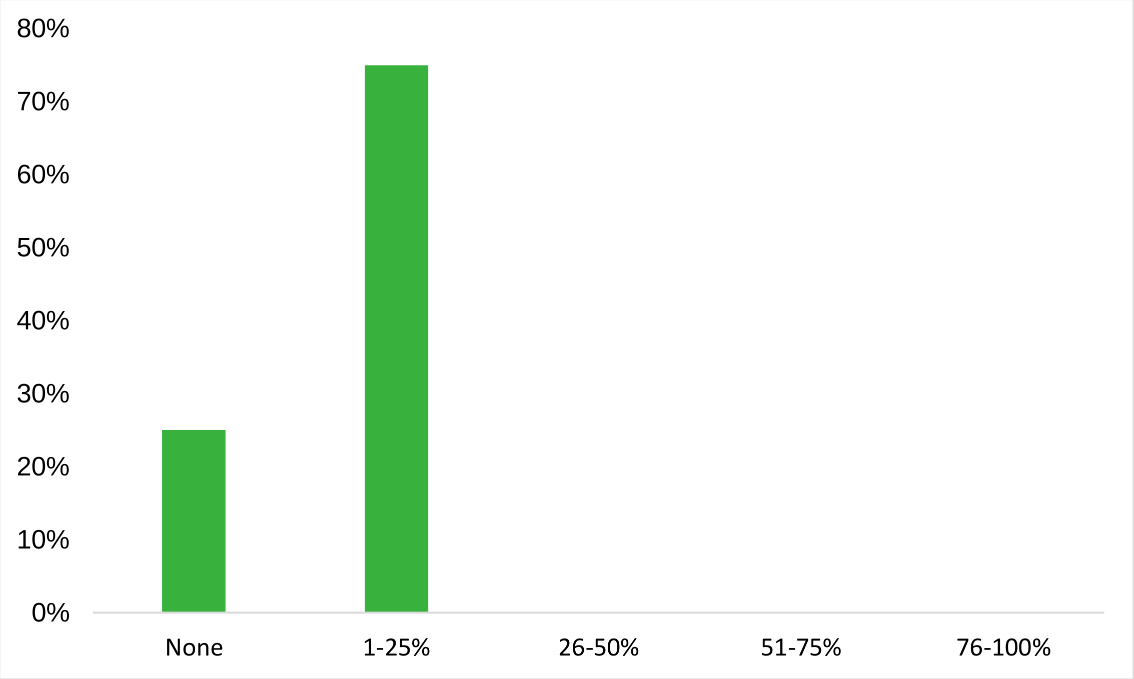
Maintaining demand and interest from students is crucial to scale up the workforce, but some training providers indicate that this needs to increase. **Figure 143** below shows that all the training providers surveyed in this study see the demand for green skill increasing towards Norfolk and Suffolk's net zero target in 2030. Specifically, 25% of training providers see this demand increasing by over 100% compared to current levels. However, there was a concern that training providers reaching the needs of smaller companies, who providers felt weren't as concerned about net zero targets given the difficulties of maintaining profitability. This means they do not have the resources to invest in training in comparison to larger companies that are more open to training providers. Investment for training in colleges is therefore crucial, through long-term financial aid, allowing all businesses to be able to access relevant and specific training courses.

Figure 143 - How do you see demand for green related courses increasing or decreasing over the next 7 years?



Despite these significant challenges, several training providers highlighted the positive things they are doing in terms of investing in green skills provision for the future. Currently up to 25% of local courses in Norfolk and Suffolk are targeted at green jobs, as seen in **Figure 144**, and this will continue to increase through further initiatives from training providers.

Figure 144 - What proportion of the courses that you provide are directly targeted at 'green' jobs?



As part of the New Anglia Green Skills initiative, several colleges have committed to investing in capital equipment, dedicated training facilities and specialised courses to aid the transition. As part of the Ipswich Town Deal, Suffolk New College recently opened a £1 million Net Zero Skills Centre, fitted with the latest capital equipment and training facilities. It includes an electric vehicle and charge point as well as solar panel installation and maintenance equipment. A full list of the capital equipment offerings from local colleges can be seen in

Table 51 below. Over the last year, several other colleges in the area have started invested in skills provision

College	Capital equipment
Suffolk New College	• Hybrid and EV cars in their Net Zero Skills Centre • Outdoor gym with charging bikes for student engagement • Outdoor classroom for green skills learning and Forest Schools • Sustainable land management – sustainable irrigation and circular waste processing systems.
City College Norwich	• Weather station • Air source heat pump rig • PV & battery storage rigs • Energy efficient appliances.
West Suffolk College	• Ground source heat pump training centre in partnership with Vaillant • Renewable energy solutions using a combination of solar panel energy generation and battery storage • Immersive technology investments including a motion systems platform for immersive teaching and learning.
East Coast College	• Robotic welding • Offshore wind turbine rig • Hybrid car charging • Car charging point • VR nuclear and behavioural safety • Renewable plumbing equipment. • Wind turbine generator lifts & cranes • GWO related climbing and sea survival facilities
College of West Anglia	• Ground source heating kits • Thermal solar heat system • Shoebox air source heat pumps • 3D printers • VR headsets • DJI Mavic Drones • 3D imaging cameras • Leica TS07 manual total station.

with City College Norwich investing in Solar PV and battery storage and East Coast College expanding their wind training provision to include EV charging equipment, hydrogen and CCUS courses.

Table 51 - Existing capital equipment investments in local colleges.

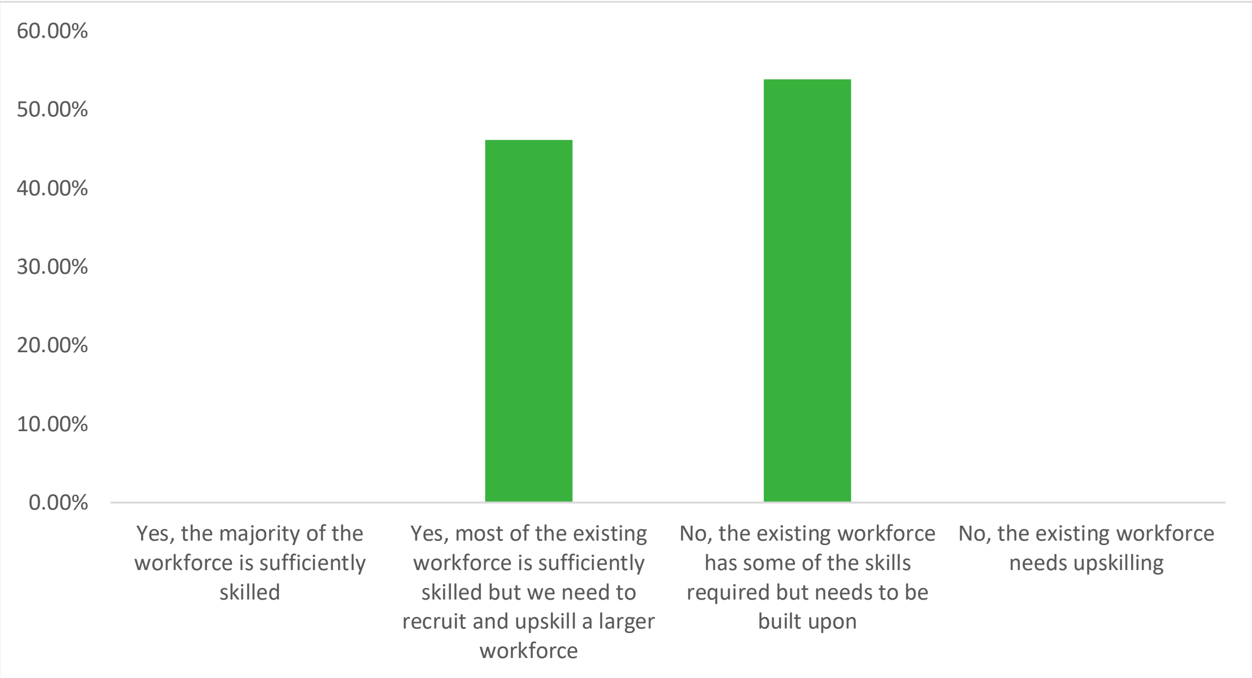
College	Capital equipment
Suffolk New College	• Hybrid and EV cars in their Net Zero Skills Centre • Outdoor gym with charging bikes for student engagement • Outdoor classroom for green skills learning and Forest Schools • Sustainable land management – sustainable irrigation and circular waste processing systems.
City College Norwich	• Weather station • Air source heat pump rig • PV & battery storage rigs • Energy efficient appliances.
West Suffolk College	• Ground source heat pump training centre in partnership with Vaillant • Renewable energy solutions using a combination of solar panel energy generation and battery storage • Immersive technology investments including a motion systems platform for immersive teaching and learning.
East Coast College	• Robotic welding • Offshore wind turbine rig • Hybrid car charging • Car charging point • VR nuclear and behavioural safety • Renewable plumbing equipment. • Wind turbine generator lifts & cranes • GWO related climbing and sea survival facilities
College of West Anglia	• Ground source heating kits • Thermal solar heat system • Shoebox air source heat pumps • 3D printers • VR headsets • DJI Mavic Drones • 3D imaging cameras • Leica TS07 manual total station.

INSIGHT FROM INDUSTRY REPRESENTATIVES

Local businesses were asked via interviews and a survey about the main challenges they see the sector facing currently and in the coming years, and what support would be required to enable business growth and meet the local net zero targets. Lack of sector specific skills in the local area was continuously raised within the interviews as a key barrier for scaling up the workforce. This can be seen in **Figure 145** below, where local industry representatives indicate that the local, green workforce needs to increase and upskill to satisfy a low carbon economy. Local businesses are finding it challenging to recruit individuals with specific skillsets, such as intermediate technicians or maintenance engineers, that are required for these industries with relevant experience.

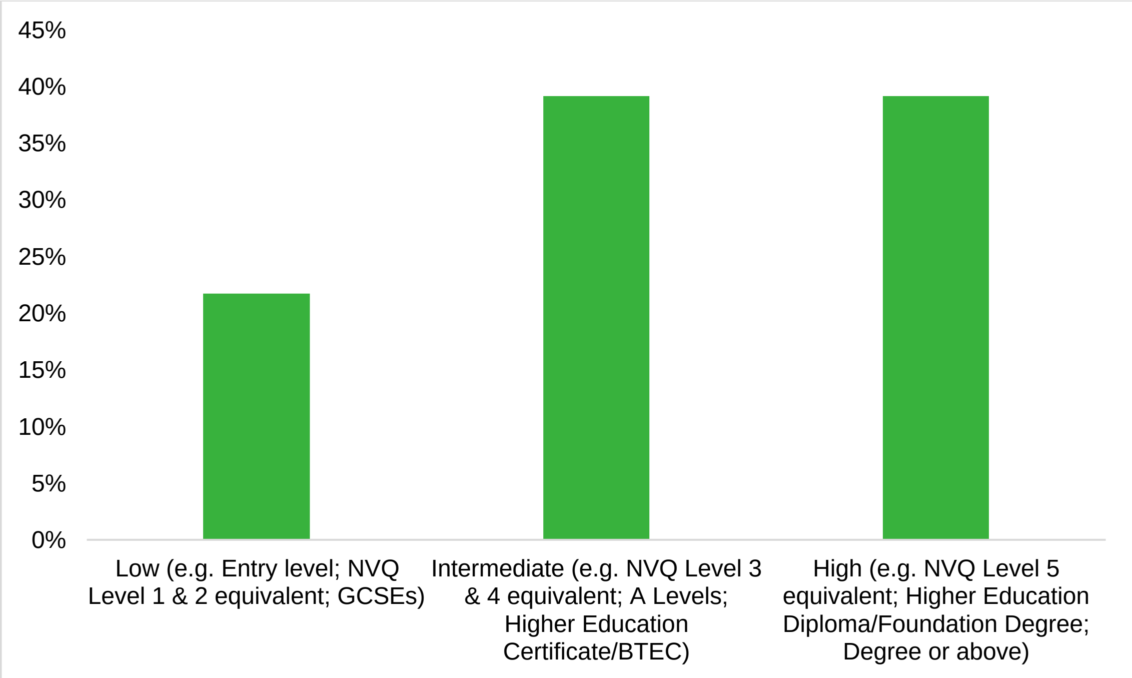
Businesses described having to recruit some of their workforce from other areas of the UK and competing against one another for local people with the available skills. Industry representatives were mixed on the availability of highly skilled workers. Some companies felt that transferrable roles such as management and professional services were lacking locally whereas others felt that given the demographic makeup of Norfolk and Suffolk, attracting management was easier as they are higher skilled workers tend to be more mobile. Interestingly one interviewee noted that, for the renewable sector specifically, local industries are often trying to recognise what skills can be taken from other sides of the business to fill job vacancies.

Figure 145 - Do you think the existing workforce in your sector is sufficiently skilled to deliver the goods and services needed for a low carbon economy?



Several respondents highlighted that engineering-based skills, especially electrical, are not the region's strong point. Although some acknowledged the advances from organisations such as the University of East Anglia and East of England Energy Group, compared to the Northeast or West Midlands, the talent isn't being created. Several companies in energy storage and engineering intimated that as part of their normal business operations, they had considered moving sites elsewhere, citing local skills provision and talent pipeline as a motivation behind those discussions. Nevertheless, many in the wind industry did feel that there was a viable pool of operators and maintenance staff for renewables, given the regions history in energy and early lead in the sector. For specific skill levels, local industry highlighted that the largest shortages are in intermediate and high-level skills as seen in **Figure 146**. The intermediate skill levels that industry observed as lacking align with the engineering and electrical based skills needed in the green industry.

Figure 146 - Where are there labour supply or skills shortages within the sector?



Another pressing issue, especially in the solar and wind sector where developments have been going on for years is local planning and consenting regimes. One respondent commented that uncertainty in consenting is difficult for industry, suggesting that in some cases a 10 year consenting process occurs which is not conducive to investment and harms skills development in the sector. This reflects the national picture where DLUHC highlighted he timespan for Development Consent Orders (DCO) increased by 65% between 2012 and 2021 from 2.6 to 4.2 years[126]. This point has also been highlighted by OFGEM who claim around 10% of these waiting for a grid connection facing a 10 year which is greatly inhbiting the UK's ability to role out a net zero compliant energy system[127]. As part of the solution, industry respondants noted the importance of getting sufficient local stakeholder engagement to get planning approved to speed up these timely regimes.

Local industry representatives also indicated that supply chain volatility is a key issue in energy and when sourcing raw materials. The cost of electrical parts is continuing to increase, resulting in longer lead times for electrical and mechanical parts. This is further exacerbated by limited UK manufacturing, reducing supply chain security, alongside Brexit creating logistical and administration issues. Local businesses indicated that the cost of everything is rising, producing higher costs for businesses, and increasing uncertainty. The most convincing evidence of this having a material impact is Vattenfall deciding to halt Norfolk Boreas citing supply chain costs increasing the total spend by 40%, making the project impractical[128].

[126] DLUHC. (2023). Nationally Significant Infrastructure: action plan for reforms to the planning process.
[127] Ofgem. (2023). Open letter on future reform to the electricity connections process.
[128] Energy Voice. (2023). Vattenfall calls off Norfolk Boreas due to rising costs

Figure 147 - What impact do you believe the cost-of-living crisis is having and will have on your sector?

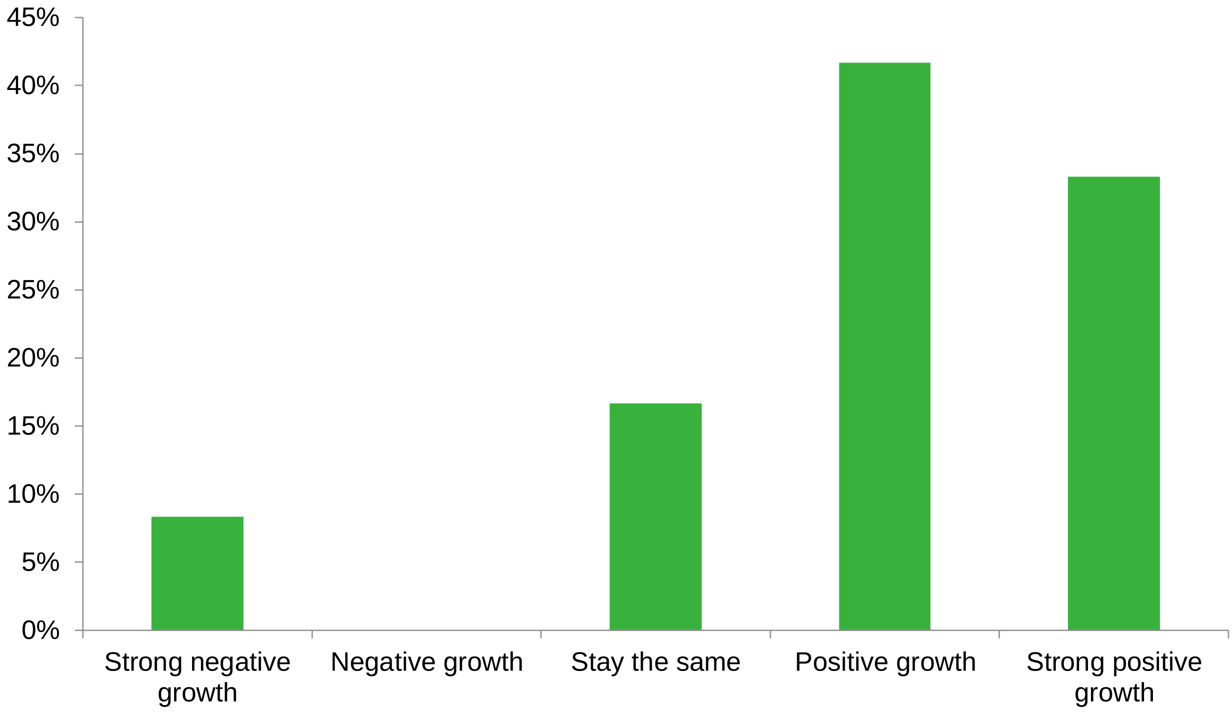


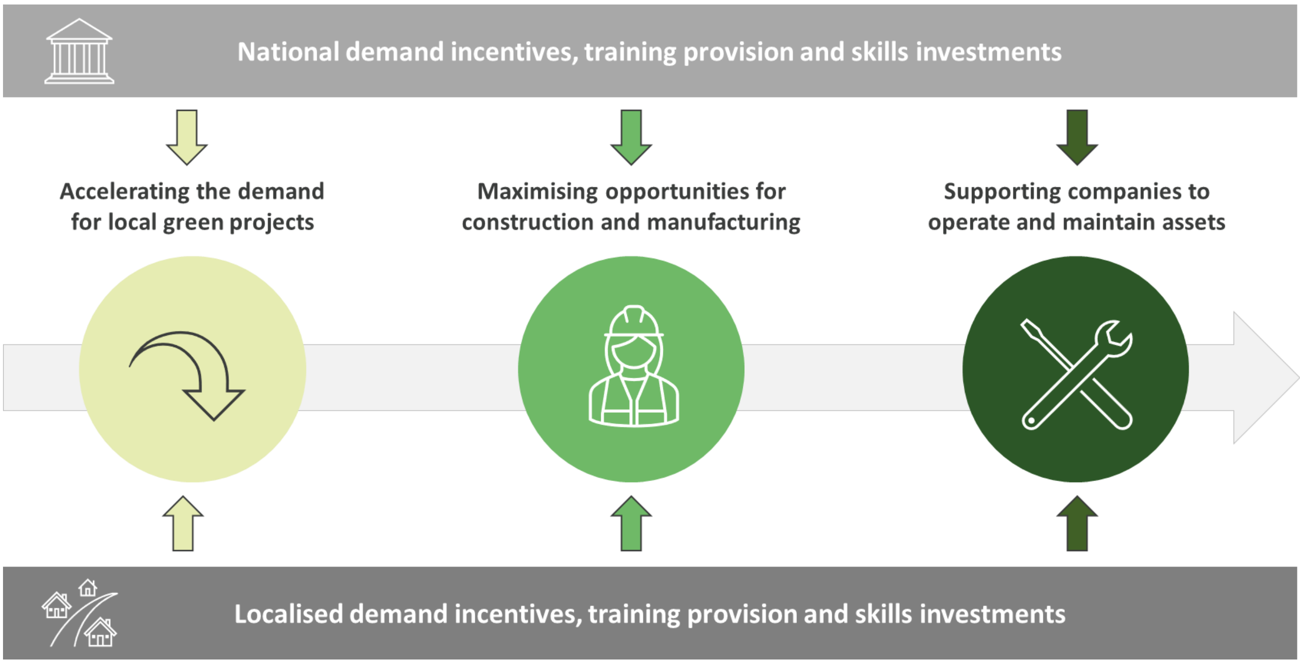
Figure 147 highlights how industry feels the cost-of-living crisis is impacting their business. For most of industry respondents surveyed and interviewed, the cost-of-living crisis was perceived as having a generally positive impact on the sector by promoting growth, with only 8% of respondents indicating it is causing growth to decline. The cost-of-living crisis is associated with Russia's war in Ukraine, causing energy bills to rise because of surging gas prices. Domestic renewable energy generation is therefore being positively impacted by the cost-of-living crisis as the need to secure 'home grown' energy is increasingly important, as well as reaching the Government's target of full electricity decarbonisation by 2035. Additionally, with high energy bills, consumers are choosing to purchase and invest in solar PV and battery storage to reduce their energy bills over time.

However, this positivity was tempered by some feedback that the cost-of-living crisis is affecting local workers and demands on wages. As previously noted, the cost-of-living crisis is increasing the cost of goods, as well as the need to increase employees' wages to increase security in their roles. This impact was less felt in larger companies but more in smaller supply chain or construction companies that are struggling. Several local companies mentioned increasing wages by double digit % to remain competitive and keep talent in the region which had affected profitability.

SEIZING THE OPPORTUNITY IN GREEN SKILLS

To anchor green jobs in Norfolk and Suffolk, several interventions are required from attracting investment into the region to catalyse job creation, right through to supporting companies to operate and maintain their assets**. Figure 148** highlights the elements Norfolk and Suffolk should consider when supporting the wider green skills agenda. As many of the green technologies are significant capital projects rather than small installations (like the retrofit sector), the recommendations are structured to represent a project life cycle.

Figure 148: Elements Norfolk and Suffolk Council should consider generating a green economy



The three stages of the project life cycle are:

- **Accelerating the demand for local green projects** – To generate green jobs, private companies must feel confident that Norfolk and Suffolk have a good business environment. This section focuses on measures that can plant initial demand in emerging technology areas.
- **Enabling the construction of green projects** – This involves ensuring there are enough local workers to build large capital infrastructure projects and encouraging the local manufacturing base to supply into those projects.

- **Supporting companies to operate and maintain assets** – Once the technology has been installed, it requires operation and maintenance so ensuring local people are given the opportunity to work on these projects is important.

Figure 148also underscores there is both a national and local lens to consider as well:

- **National interventions –** Large energy generation projects are of national importance with the UK Government bought in to it being a success. Therefore, there are subsidies and skills investments that flow from the national government into wider green skills.
- **Local interventions –** Local councils should be augmenting in areas where national measures are either missing or are not accommodating Norfolk and Suffolk's needs.

The following section addresses each of the five themes and explores the specific recommendations and sub-recommendations contained within each theme.

ACCELERATING THE DEMAND FOR LOCAL GREEN PROJECTS

Growing the Norfolk and Suffolk green economy necessitates projects being created in the local area to generate job growth. Local councils can take an active role in incentivising and accelerating projects in the local region. This model has been successful with offshore wind, with Scroby Sands in Great Yarmouth being one of the UK's first commercial offshore wind facilities providing the region a strong basis to grow its operation and maintenance workforce. However, to meet the ambitious net zero by 2030, a more holistic approach is needed to build more local industries that tackles issues such as the upfront capital costs, the lengthy planning processes, and the risk to the private sector.

RECOMMENDATION 1	POTENTIAL ACTIONS
Providing access to demand and supply side subsidies for local businesses to adopt green technologies.	Introduce council-administered subsidies that are consistent across local authorities to create a level playing field.
	Signposting local companies to bid in for national subsidies, actively encouraging bids from local companies and supporting their ambitions to national government.

A key theme that emerged from the research was the need for consistent intervention mechanisms for businesses across Norfolk and Suffolk local authorities to provide a level playing field. Respondents indicated the positive impact of schemes like West Suffolk Solar, but highlighted inconsistencies across local authorities that made it difficult to generate a critical mass of installations and projects across the region. Therefore, trying to align subsidies across local authorities as best as possible could help generate a critical mass.

While national mechanisms exist for funding renewables like wind, solar and battery storage there is also a role for local interventions to stimulate the growth. Given the region's strong agricultural community, there could be focused incentives on encouraging farmers to diversify their operations by investing in solar, energy storage or onshore wind. Support packages such as low interest loans or subsidies would also enable farmers to accommodate the loss of income due to reduced agricultural subsidies.

Another issue raised by some respondents was the lack of national profile Norfolk and Suffolk has which affects its ability to attract investment. This challenge was only highlighted in certain sectors. Offshore wind for example has had multiple national commitments and battery energy storage has received a flurry of recent investments so this was not raised as an issue. Nevertheless, several local manufacturing companies that support industries like renewable energy generation and mobility highlighted their difficulty in accessing national funding mechanisms. Respondents cited the lack of engineering expertise in low carbon technologies in the region, compared to other areas like the Northeast or West Midlands. Companies suggested that the local councils could signpost them to national support mechanisms, help local businesses apply for national funding or even help champion the regions' low carbon and engineering sectors more effectively.

RECOMMENDATION 2	POTENTIAL ACTIONS
Helping businesses understand local planning and consenting frameworks to accelerate the deployment of low carbon technologies	Retain robust planning and consenting processes but support businesses to navigate through and meet requirements for solar, wind, hydrogen and energy storage projects. Create an awareness campaign for residents on the benefits of renewable energy developments, including topics like land and food security as well as Best and Most Versatile Land Establish a regular dialogue between local authority consenting officers and local industry to provide an open forum for discussing issues. Feed into the National Policy Frameworks to help guide national policy makers on development and planning requirements for green projects, advocating for greater local powers over planning and consenting.

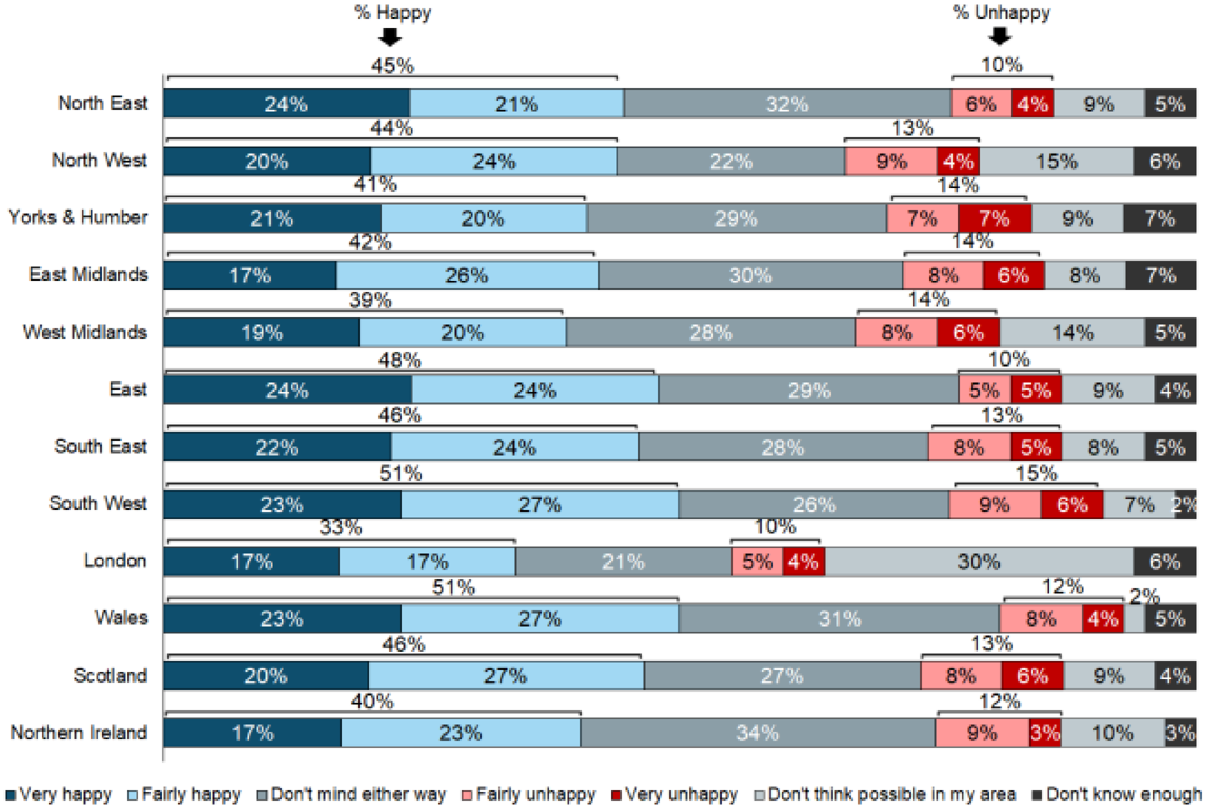
Difficulties in navigating planning and consenting along with extended delays to projects are a key issue across almost all low carbon technologies. As mentioned previously, DLUHC has highlighted the timespan for Development Consent Orders (DCO) increased by 65% between 2012 and 2021 from 2.6 to 4.2 years[129]. This point has also been highlighted by OFGEM who claim around 10% of the projects are facing a 10 year wait for a grid connection which is greatly inhbiting the UK's ability to role out a net zero compliant energy system[130]. Across Norfolk and Suffolk for example, onshore wind developments have been practically halted due to national planning rules with only one onshore wind site under construction. While this is a problem occuring nationally and not specific to Norfolk and Suffolk, many project developers interviewed cited this as a massive barrier to training local people as the timelines for completion are so uncertain.

The delays in consenting new projects is often tied up with local opposition to projects based on safety concerns, noise pollution, environmetal protection grounds or preserving natural aesethtics. For example, West Norfolk Council recently rejected a battery storage site opposite Kings Lynn Power Station[131] and there has been significant opposition to Sunnica's proposed facility in Suffolk[132]. Despite issues with local opposition to new renewable energy projects, it should be noted that national support for solar and on-shore wind are 89% and 79% respectively[133]. In fact, **Figure 149** shows the East of England which incorporates Norfolk and Suffolk, has one of the highest support rates in the UK for onshore wind farms. Localised research from Vattenfall also highlighted a desire for more climate related initiatives, with the largest umprompted comments citing the Norfolk region wanting more investment into energy infrastructure and green jobs to support the growing sector[134].

---

[129] DLUHC. (2023). Nationally significant infrastructure: action plan for reforms in the planning process.
[130] Ofgem. (2023). Open letter on future reform to the electricity connections process.
[131] Eastern Daily Press. (2023). King's Lynn: Industrial battery plan rejected for Saddlebow.
[132] Say No To Sunnica. (N.D.). Say No To Sunnica.
[133] BEIS. (2023). BEIS Public Attitudes Tracker: Energy Infrastructure and Energy Sources, Winter 2022, UK.
[134] Vattenfall. (2022). Community Benefit Fund Meetings – North Norfolk 2022.

Figure 149: Support for onshore wind farms by UK region



All this suggests that more community engagement is needed, not only from industry players on an individual project level but also councils at a macro level. To address this, a range of interventions from the council could be deployed to help mediate this issue. Despite support in general for onshore wind and solar being high, Norfolk and Suffolk council could still support awareness campaigns that show the benefits of local developments. This could take multiple forms such as exploring topics like local land and food security, or, personalised campaigns with local farmers highlighting the benefits to their business of running a solar or wind farm on their land. It was felt that more should also be done to educate the region on Best and Most Versatile Land which was poorly understood. Finally given the capacity projections for technologies such as solar, wind, battery storage and EV charging, both Norfolk and Suffolk Councils could communicate the scale of the challenge and risks of not pursuing low carbon technology to engender support.

Another immediate action could be for the Council to write a detailed planning and consenting best practice guidance for renewable energy projects which explains the process for developers. This guidance would not only explain the national and local legislations, but also offer examples of local "best practice" of projects that have been consented and the reasons why (see case study[135]). This would be the case for smaller

[135] Vattenfall. (2022). Norfolk Offshore Wind Zone scoops award for Best Project at prestigious infrastructure awards

projects under 50MW which come under the threshold of being decided nationally. Establishing a regular forum for businesses and local planning officers to share and explain issues / best practice was also mentioned as another option to establish and maintain relationships between industry and local government.

A longer term route is for Norfolk and Suffolk Council to influence national policy to benefit local communities. For example, as part of the increasing trend towards devolution, greater powers around planning and consenting could be cascaded down to local councils in order to accelerate developments. Another mechanism could also be to feed into the National Policy Frameworks based on experience local planning officers are facing to help iron out inefficiencies in the system.

CASE STUDY: VATTENFALL's NORFOLK OFFSHORE WIND ZONE AWARDED NIPA'S BEST PROJECT AWARD

Despite some local opposition against renewable energy developments across Norfolk and Suffolk, there are examples of good company engagement in the region. Vattenfall were recently awarded the National Infrastructure Planning Association's Best Project for 2022 for their Norfolk Offshore Wind Zone project. This was down to the willingness of engagement team to learn from early challenges, undertake an extensive stakeholder engagement exercise to promote the benefits of wind and explain how the project would protect the local environment. Vattenfall host quarterly drop-in sessions to update residents on progress and have committed £15 million of funding for local communities via the Norfolk Community Benefit Fund.

RECOMMENDATION 3	POTENTIAL ACTIONS
Norfolk and Suffolk Council taking an active lead in creating demand for local green projects.	Seed early demand by Norfolk and Suffolk Council co-funding green projects with the private sector in areas such as energy storage, onshore wind development and solar farms.
	Create a specific, green industries pitch deck for Norfolk and Suffolk that can be used to increase UK and foreign direct investment into the Norfolk and Suffolk region.

As the cost of low carbon technology has reduced, private sector interest across Norfolk and Suffolk in ground mounted solar, offshore wind and battery storage projects has intensified over the last few years. National policies have also contributed to the increase in project developments. For example, contracts for difference have provided energy developers with a consistent price per MWh of energy, giving stability to the market. Despite the positive contribution of the private sector, Norfolk and Suffolk Council could still play a positive role in generating further demand in the region.

One tactic deployed by a range of other councils is investing in low carbon technologies to own and operate the assets themselves (see case study). As well as contributing to local energy generation targets and providing revenue, local governments can also gain further insights into hardware costs, engineering challenges and skills requirements. This gives the councils greater knowledge in assessing private sector applications which also improves the quality of private sector provision. Moreover, council owned assets can also be more readily available for training purposes for local colleges and universities. As most solar, battery and wind installations last well over 20 years, this could provide hands on operating and maintenance training for multiple generations of workers improving the business case.

A final intervention mechanism could be for Norfolk and Suffolk to create a foreign direct investment pitch deck for the region. Norfolk and Suffolk Council could work closely with the Department for Business and Trade to create a regional pitch deck that highlights the benefits of setting up different installations across the region. This document could include a map of the available brownfield sites; different categories of agricultural land across the region; information on local colleges and universities for skills development; local incentives to deploy technology and local infrastructure information such as roads and electricity and gas grid information. The region has promoted its capabilities very well through its recent Energy Prospectus[136]. The document highlights many of the elements indicated above and provides a comprehensive insight into gas and offshore wind. In the next iteration, it's success should be built upon by providing more granularity in other areas such as onshore wind, battery energy storage and solar.

CASE STUDY: COUNCIL'S OWNING & OPERATING RENEWABLE ENERGY ASSETS

Some local councils and authorities are taking a more active role in the energy transition by investing in renewable energy projects. Somerset Council for example have invested in three battery energy storage projects which are returning significant revenue by selling surplus energy back to the National Grid. Cambridgeshire Council also invested in solar arrays which raised significantly more revenue than expected. The operational savings via reduced energy costs have now been redirected to adult social care in the region.

MAXIMISING OPPORTUNITIES FOR CONSTRUCTION AND MANUFACTURING

Once projects have been initiated, there's an opportunity for a workforce in Norfolk and Suffolk to benefit from the creation of projects via two avenues. The first is local construction activity hiring workers across the region to help build the infrastructure required for energy generation, EV charging, hydrogen and energy

[136] Generate. (2021). The Energy Prospectus.

storage. The second opportunity is local manufacturing businesses who could supply hardware for the construction phase. Through the stakeholder engagement process, the research identified there is a big potential in the construction and installation phase and a relatively smaller role for local manufacturing companies. Several factors play into this, but the over-riding factor is that manufacturing for solar, batteries and wind turbines often occurs globally, with very little UK manufacturing capability, with none identified across Norfolk and Suffolk. However, there are engineering and manufacturing companies deeper in the supply chain that can support local projects and would benefit from greater engagement.

RECOMMENDATION 4	POTENTIAL ACTIONS
Enabling a higher proportion of the local workforce help build and deliver local green projects	Enable large infrastructure project developers (wind, hydrogen, large scale solar) to feel comfortable in sharing job projections. This is to enable local demand for construction roles to be aggregated and communicated to local training providers.
	Work with ECITB / CITB to understand the specific construction roles and skills needed across offshore wind, solar, hydrogen and energy storage. Understand the overlaps in timing, skill sets and job roles at a local level to see potential pain points.
	When awarding council infrastructure contracts, score more favourably those tenders that commit to hiring and developing the local skills base in construction skills that could benefit green projects.

As the economic analysis within this report showed, most jobs created in Norfolk and Suffolk's transition to net zero is those in installation and construction. Therefore, trying to upskill and retrain the local construction workforce will be critical for the region to harness the potential of the energy transition. For context, the construction sector across Norfolk and Suffolk contributes just over £3 billion in GVA to the region, making it the fifth largest contributor to local GVA[137]. There are around 7,370 construction businesses across Norfolk and Suffolk with the overwhelming majority (93%) being micro sized companies with less than 10 employees[138]. In terms of training provision, the Construction Industry Training Board (CITB) also host one of their three National Construction Centres in Norfolk, providing around 140 courses in construction related courses. Most local colleges also offer some form of apprenticeships or other courses related to construction, but the take up locally is extremely low compared to other courses. Despite the positive foundations in the region, the New Anglia LEP[139] identified three major challenges for the construction sector that impact skills development:

[137] New Anglia LEP. (2022). Norfolk & Suffolk Economic Strategy.
[138] New Anglia LEP. (2016). New Anglia Sector Skills Plan: Construction.
[139] Ibid.

- **A steady supply of talent:** The image of construction has long been a barrier to attracting young people many of whom associate the industry with insecurity, difficult working conditions, and low pay.
- **Boom and bust:** The construction sector has been more prone to boom and bust cycles that many in the industry accept as an intractable issue. This cyclical nature means that companies may adopt short-term horizons that makes investing in people a difficult choice.
- **Training provision**: The provision of training needs to be of the quantity, quality and type to match the forecast need for skills in the sector. This includes the training made available to the current workforce as well as the training of new entrants for the sector.

Interestingly, the steady supply of talent and concerns around training provision are both issues that emerge from the green skills analysis. Moreover, the economic analysis provided here reinforces the point around boom and bust, especially in the net zero to 2030 scenarios. However, the net zero to 2050 scenario may be preferable to the construction industry, as it provides them a steady growth of skills need and lessens the boom-and-bust cycle. The green skills agenda could also address the lack of young people entering construction if employers can demonstrate a link between their activities and the transition to a low carbon economy.

A key theme from the stakeholder engagement was whether the council could take an active role in co-ordinating the projected demand for construction roles across the different types of regional low carbon projects. This comment came from both training providers and project developers. Both types of respondents felt they needed a regional view on skills demand, especially training providers who cited it would give them the confidence to run courses. Those in industry also felt like they are likely going to be competing for local talent so would like to understand regional demand to plan for what they will need to do to ensure their construction supply chain can be ready to meet their project requirements.

As well the scale, many training providers thought it would be helpful to understand whether construction for low carbon projects require specific skill sets. Norfolk and Suffolk would benefit from a dedicated analysis looking at the types of construction roles required, how similar the skillsets are across the different types of technologies and which courses available are suitable. This would help businesses understand potential bottle necks in their construction supply chains and enable training providers to understand whether existing apprenticeships and other courses are suitable.

Finally, the local council could play an active role in creating demand for local construction roles by favourably scoring council tendered infrastructure projects that use a higher percentage of the local workforce or invest in local construction upskilling. This could help create "background demand" for construction roles that would tangentially benefit the region's low carbon economy.

RECOMMENDATION 5	POTENTIAL ACTIONS
Incentivising local manufacturing based on regional strengths and opportunities provided by the creation of green projects	Provide a "transition advisory service" for local manufacturing businesses to understand how they can support the local green projects, understand their skills gaps, and hire / retrain accordingly.
	Establish a Norfolk and Suffolk supply chain portal where local manufacturers can promote their capabilities and project developers can request regional suppliers to drive up local content in projects.
	Leverage the large demand from energy storage and local, high value vehicle production to position the region for a local battery mega-factory.

Despite the economic analysis not assessing the manufacturing job potential of Norfolk and Suffolk's net zero transition, the stakeholder engagement process and desk research uncovered some valuable insights. The latest statistics from the New Anglia LEP suggest that the wider manufacturing sector contributes over £4.2 billon in GVA and employs around 62,000 people regionally[140]. Most manufacturing activity centres around food with several companies that work across aerospace, automotive and space supply chains. The region also possesses significant capability in composite materials, due to its space and aero capability, as well as pharmaceuticals. Research conducted by the New Anglia LEP in 2018 highlighted the following skills gaps within the engineering and manufacturing sector, highlighted in **Table 52**.

[140] New Anglia LEP. (2022). Norfolk & Suffolk Economic Strategy

Table 52: New Anglia LEP engineering and manufacturing roles gap assessment[141]

Academic discipline	Commentary
Electrical, instrumentation and control engineers	Technicians are hard to find, and experienced engineers (graduate level) are very scarce leading to many companies poaching from each other
Mechanical engineers	Mechanical engineering skills in short supply so it is hard to obtain the skills needed even if you try to sub-contract the work. Many also highlight the lack of skilled welders in the industry which will be required for many of the green manufacturing jobs moving forward
Composites engineers	Short supply in a sub-sector with good growth potential and strong local sector in New Anglia
Embedded software engineers	Enables small devices to support the Internet of Things (IoT) by coding and communications via USB, Ethernet and radio - this requires a combination of engineering and computing skills
Chemical engineers and organic chemists	While there are 'lots of graduate chemists available there are few with knowledge of organic chemistry synthesis
Additive layer manufacturing	The rapid growth in additive manufacturing and 3D printing which will impact across all of manufacturing and potentially in major new markets such as building

Feedback from local manufacturers centred around the areas lack of engineering talent compared to areas like the Northeast or West Midlands. Companies expressed a desire to continue conducting R&D in the area and maintain their bases in the region. However, when local manufacturing was raised, companies had often looked elsewhere due to more active local government and a more capable skills base in terms of engineering capability.

Another strong theme that emerged from the stakeholder engagement was the cumulative impact COVID-19, rising energy prices, supply chain shortages on the ability of smaller businesses to think about a low carbon transition. Those further down the supply chain who occupy older facilities and are trying to keep afloat are particularly affected by the short-term economic disruption. While they recognise the need to transition, they find it difficult to understand how their current business could support the raft of local low carbon projects being announced. One respondent also mentioned that COVID-19 reduced the workforce in

[141] New Anglia LEP. (2018). Enabling Growth in the New Anglia Advanced Manufacturing &Engineering Sector through Skills Development 2018-'25.

the short term with some staff opting for early retirement making it harder to fulfil orders. They cited an example where a wind project approached them for a multimillion-pound quote but could not fulfil it because they could not find the staff and production space to accept the quote.

From the analysis a few key recommendations emerge for Norfolk and Suffolk on how they could support their manufacturing sector. First, providing a "net zero transition advisory" service to small businesses in the region to pivot into growing industries. This could take on the form of subsidised mentorship by trained sustainability strategists, who could help business owners assess their product lines and transition their offering into low carbon projects like solar, wind, batteries or other low carbon projects. The assessment could also include a skills assessment and highlight what roles could be needed and which courses could upskill existing employees.

As shown from the economic analysis, the sheer scale of projects occurring across Norfolk and Suffolk provides an opportunity to aggregate all the activities in the New Anglia region into a singular portal. An example of this is the "Energy Pathfinder" which is part of the North Sea Transition Authority. This portal lists all the construction and decommissioning projects occurring in the region[142]. This could be a useful tool to collate all the projects in the region and provide a central point for the New Anglia and UK supply chain.

CASE STUDY: NORTH SEA TRANSITION AUTHORITY ENERGY PATHFINDER PORTAL

The Energy Pathfinder (previously known as Oil & Gas Pathfinder) provides real-time visibility of activity for new oil and gas field developments, decommissioning and projects to support the energy transition, for example, carbon capture and storage. Information published on the portal gives the supply chain the opportunity to share solutions to aid project delivery. It details contract values, services required and timescales, giving local suppliers full visibility of what is required. Something similar could also be made for local Norfolk and Suffolk low carbon projects. Suppliers could upload their details, explaining the services they offer, and project developers could list their requirements on the portal giving local manufacturers a chance to supply into these projects.

Another potential local manufacturing opportunity identified in the research could be attracting local battery manufacturing to support the stationary storage demand and the local automotive industry. Lotus has a production facility in Norfolk which will require EV batteries alongside Equipmake who manufacture buses. However, the larger demand segment in the region will come from grid storage either co-located next to renewables or standalone. The national strategy of attracting

[142] North Sea Transition Authority. (2023). Energy Pathfinder

large gigafactories has been moderately successful in anchoring Jaguar Land Rover and Nissan, but it does not service more niche automotive players or stationary energy storage. Therefore, the council could create a campaign (like the West Midlands Gigafactory bid[143]) that highlights the strong demand from grid storage and automotive as well as the favourable access to renewable energy. This would target a smaller facility where the capital outlay would be much smaller compared to other UK investments and would play into the UK's manufacturing strengths of niche, high value manufacturing.

SUPPORTING COMPANIES TO OPERATE AND MAINTAIN ASSETS

Another important element of green skills is operation and maintenance roles to ensure the assets perform efficiently. Across all technologies identified, this required less labour compared to the construction phase as most monitoring can be done remotely via remote sensing using digital technologies. Nevertheless, the sheer increase in number of projects and assets growing in Norfolk and Suffolk means there will still be substantial job growth in operation and maintenance roles. While these roles ramp us less severely compared to construction and installation roles, there is still a need for policies to ensure a local pipeline of maintenance staff.

RECOMMENDATION 6	POTENTIAL ACTIONS
Encourage maintenance and operation staff to come from the local area	Encourage local green industries to form closer relationships with local training providers, or, link their national training facilities with a Norfolk or Suffolk college, university or private provider.
	Enable large infrastructure project developers (wind, hydrogen, large scale solar) to feel comfortable in sharing job projections. This is to enable local demand for skills to be aggregated and communicated to training providers.
	Provide easier routes for those working in the oil and gas sector to transition into operation and maintenance roles for green industries.
	Stipulate that a % of the Community Fund spending for large green projects is invested into operator and maintenance training.

As mentioned in previous sections, the stakeholder feedback was positive regarding the activities of local maintenance and operation training for offshore wind. East Coast College and other private training

143 WMCA. (2023). West Midlands Gigafactory.

providers were well regarded in offering bespoke offshore wind training, with consistent support from the local authorities and council also recognised. This has led to Norfolk and Suffolk having a good stock of operation and maintenance staff with RWE and Vattenfall having their offshore win operation bases in Great Yarmouth. However, there was also a realisation that the existing training capability is not enough to service the increase in offshore wind. Moreover, the desk research and stakeholder engagement revealed that the training provision also isn't geared for other technologies. Over the last year, the local colleges have made significant progress in installing capital equipment (see **Table 51**) such as battery storage, EV charging points and solar arrays as part of the New Anglia Green Skills initiative. Colleges now need to start offering bespoke courses, or tweaking their existing courses, to provide formal qualifications to students in operation and maintenance.

A key observation from the literature review was that local training providers should be forming strategic partnerships with the national training centres of large companies. For example, RWE have their operation and maintenance centre for their Suffolk based Galloper Wind farm in Essex. However, their national training centre is based in Wales, with students in their third year given the opportunity to work at the maintenance facilities. The opportunity to attract local talent to these roles is limited as it requires Norfolk and Suffolk based learners to travel to Wales which limits the attractiveness of the scheme. However, the stakeholder engagement highlighted that for large companies to locate training facilities in an area, they need to see a consistent demand to justify the costs. To maximise local training opportunities, industry, training providers and local authorities need to continue to explore all opportunities to form strategic partnerships.

Another observation raised during the stakeholder engagement was providing easier routes for those in the oil and gas sector to transition into operation and maintenance roles, especially in technologies like offshore wind, hydrogen and CCUS which have similar skill sets. Some local training providers are already moving in this space with East Coast College planning to introduce an OPITO Level 3 transitionary course on Hydrogen, Wind, Carbon Capture and Nuclear to help reskill the existing work force. More initiatives like this are needed across the region to ensure those working in local oil and gas installations can transition.

There's also an opportunity for those large investments in generation capacity that contain community development funds to redirect a proportion of these funds towards operation and maintenance training. While the community development funds in offshore wind farms have made significant impact on local communities, more could be done in providing training opportunities and using these local communities as a workforce base. Not only does this directly benefit the project owners, but this could also generate more local support for low carbon projects, especially in areas where opposition occurs.

NATIONAL MEASURES TO ENHANCE SKILLS PROVISION

Unlike the retrofit sector, wider green jobs are influenced more by national politics and interventions given their strategic importance to energy system security and resilience. While funding is available nationally for insulation and heat pumps, the installation and maintenance is often carried out by local businesses. Wider green jobs on the other hand have multiple national mechanisms with the installation and maintenance carried out by multinational companies with both national and international training facilities. The retrofit sectors scope of activity is also very local, with installation occurring in people's homes with adoption challenges being more consumer based. The technologies explored in wider green skills however are large capital projects that often need to be consented by Ministers, span multiple local authority boundaries, and can attract a workforce from across the world. The recommendations in this section explore how Norfolk and Suffolk could influence skills policy nationally to help deliver a skilled local workforce.

RECOMMENDATION 7	POTENTIAL ACTIONS
Leveraging national training centres and development of courses to locally develop skills	Facilitate local training providers to establish closer ties to national centres of excellence (like UKBIC and WMG for energy storage or the BRE National Solar Centre)
	Monitor the national landscape on courses and occupational standards for emerging technology areas like batteries, alternative fuels, hydrogen and CCUS and incentivise local training providers to introduce the courses.

One recommendation to emerge from the desk research was Norfolk and Suffolk could utilise the national training facilities, especially for technologies such as batteries and solar. For example, Warwick Manufacturing Group (WMG) and the UK Battery Industrialisation Centre (UKBIC) in Coventry are national leaders in energy storage research and upskilling. Similarly, BRE's National Solar Centre in Cornwall is a centre of excellence for solar training and research. Instead of duplicating effort and investing in large amounts of capital equipment, it was felt the council could encourage stronger relationships between these national centres of excellence. This could involve sending students out for a few weeks to train, or, have these national centres advise on what training elements the local training providers could conduct cost effectively.

A final observation from respondents was that for some areas like batteries, hydrogen, CCUS and alternative fuels (especially sustainable aviation fuels) the occupational standards are still emerging with new courses being announced. Therefore, Norfolk and Suffolk could encourage organisations like the New Anglia Green Skills programme to actively monitor the landscape for new courses and share new courses and occupational standards between local training providers.

RECOMMENDATION 8	POTENTIAL ACTIONS
Utilise national skills programmes and funding to enhance local skills provision	Prioritise green skills provision in bids for innovation and levelling up funding such as the UK Shared Prosperity Fund (UKSPF), Skills Bootcamps and the Strategic Development Fund.
	To help skills development in the immediate term, apply for additional national skills funding to set up dedicated Solar Installation and Energy Storage Skills Bootcamps across Norfolk and Suffolk to increase the installer base.

Another way Norfolk and Suffolk can leverage national policies is through skills funding mechanisms. Using national routes to support local skills development will be a crucial short to medium term measures for both Norfolk and Suffolk council while they negotiate greater control of education funding via their devolution deals. Last year, both Norfolk and Suffolk based colleges benefited from the Department for Education's Strategic Development Fund (SDF). The SDF invests in colleges across England to reshape their teaching and training provision and update their facilities in preparation for the rollout of Local Skills Improvement Plans. As part of this fund, Norfolk and Suffolk colleges[144] were awarded £2,735,357 to enhance training provision in green construction, green energy and waste management. In addition to Norfolk and Suffolk specific funding, the College of West Anglia and West Suffolk College were also awarded a portion of the Cambridgeshire and Peterborough investment of £1,999,000 to develop capability in electric vehicles, green energy, green construction and advanced manufacturing. As well as leveraging any other future rounds of funding by the SDF, Norfolk and Suffolk Council should embed green skills provision when allocating future UKSPF investment.

Based on the economic analysis and assessment of local training provision, both Norfolk and Suffolk should place more focus on upskilling the workforce in solar, energy storage and onshore wind. While there are many institutions providing foundational electrician courses, specific courses for the installation and

[144] The colleges that were awarded funding were City College Norwich, College of West Anglia, East Coast College, Suffolk New College, West Suffolk College.

operation of energy storage and solar arrays are not present across the region. In April 2023, the UK Government reinforced its commitment to Skills Bootcamps by investing a further £34 million from 2024 to 2025 and aim to help adults with career profession and better pay. A concerted effort across both councils should be made to apply for more Skills Bootcamps focusing on large scale solar and energy storage installations.

LOCAL ACTIONS TO PROMOTE GREEN SKILLS DEVELOPMENT

As Norfolk and Suffolk start taking greater control of local skills policy, it provides an opportunity to intervene more effectively in green skills provision. While local devolution deals are still maturing, there are things councils and local authorities can do with their current powers that can bring about change. This final set of recommendations explores how Norfolk and Suffolk council can directly influence skills development within their current powers and if the adult education budget is brought within Norfolk and Suffolk's remit.

RECOMMENDATION 9	POTENTIAL ACTIONS
Prioritise bringing through the next generation of green skilled workers, leveraging Norfolk's & Suffolk's network of colleges and universities	Promote a local "pool" of lecturers and teachers all training providers can access to help stagger training to ensure enough people are trained across multiple areas. Stipulate that companies awarded large council contracts for green projects must dedicate a certain amount of staff time to give training to local colleges and universities. Actively encourage more electrical engineers into local universities and identify, create, and promote more flexible electrical based apprenticeship that are relevant solar, energy storage and the wind industry. More local provision of Level 2 and 3 courses for the manufacturing sector that directly supports the EV sector and the supply chains for wind, hydrogen, and other sectors. Develop a low-carbon careers campaign to inspire and motivate people into low-carbon qualifications & training pathways. This can include marketing, information sharing, and careers guidance. Bringing industry and local colleges together to understand whether existing engineering, construction, and maintenance courses and apprenticeships suit the local industry needs. Regularly review these courses to ensure they align to local demand.

Upskilling and transitioning the existing workforce are an important component of the low carbon transition but it won't be enough to cater for the massive uptake in low carbon technologies. Incentivising the next generation of talent is crucial to ensure projects get built on time, there is enough operation and maintenance staff and that there is a workforce that can competently decommission these technologies at end of life.

The main concern expressed by training providers was the lack of people to become instructors and trainers, with those suitable to teach often in the private sector. Attracting the right talent into teaching is often difficult, with many citing the salary is not attractive enough and the profession not being valued as much as other roles. As more low carbon technology gets deployed across the region, the problem could exacerbate as more colleges start introducing courses and bidding for the small pool of talent. Several solutions to this issue were offered during the stakeholder engagement process. The first solution, which was also offered in Phase One retrofit report, is for Norfolk and Suffolk Council to promote a local “pool” of trainers all the colleges in the region can access. This would help manage training requirements across the colleges and help stagger training to ensure the optimum number of learners are trained. A second solution was to actively target degree apprenticeship graduates across a range of disciplines and incentivise them to become teachers. The rationale is that degree apprenticeship graduates often have the equivalent degree to transition into teaching alongside years of practical experience in leading companies. This overcomes issues expressed by industry that typical graduates often lack practical experience. The issue is attracting these students into teaching which may require the form of loan or grant to encourage them into that profession. A third solution was offered by a training provider who stated that those companies developing projects in Norfolk and Suffolk should dedicate a certain percentage of their staff time to teaching in colleges or other training facilities. This was also reinforced by industry representatives who mentioned some of the more experienced staff members who may want reduced hours could dedicate a portion of their time to training a new generation of workforce.

Another issue raised during the stakeholder engagement and literature review is the lack of electrical engineering talent being created across Norfolk and Suffolk. While it was noted this is a national phenomenon, Norfolk and Suffolk are particularly affected by a lack of skilled engineering talent in the area. This lack of engineering talent was cited as a major reason why some engineering and manufacturing companies had considered whether Norfolk and Suffolk were suitable as a base for their operations. However, it was noted by some in the industry that certain institutions had made significant progress on this issue. One example was the University of East Anglia that had introduced an Energy Engineering MSc which provided learners with a good coverage of renewable and non-renewable engineering knowledge. This course was developed in conjunction with the IET and EEEGR so reflected what industry felt engineering student should be learning.

While higher skill level courses are starting to be addressed, it was felt that low and intermediate skills shortages in general engineering, manufacturing, electrical engineering still needed focus. This follows a more national trend of Level 2 and 3 apprenticeships declining in popularity which needs to be addressed nationally[145]. However, one suggestion was for training providers and industry to jointly assess the existing Level 2 and 3 apprenticeships in engineering, construction, and maintenance and look how to incorporate more green skills. This includes ensuring any electrical apprenticeships offer the opportunities for students to learn about battery energy storage, solar installations, and wind turbines to maximise the relevance of existing courses.

RECOMMENDATION 10	POTENTIAL ACTIONS
Using local powers and funding mechanisms to reskill the oil and gas workforce into green jobs	Ringfence a portion of Suffolk's Adult Education Budget to retrain the existing oil and gas workforce into offshore wind, given the large job creation potential in the region Ensure a clear qualification route and interview opportunity with industry is made available on completion. Ringfence a portion of Norfolk's Adult Education Budget to retrain the existing oil and gas workforce into hydrogen and offshore wind, given the large job creation potential in the region. Ensure a clear qualification route and interview opportunity with industry is made available on completion.

The role of oil and gas in the UK's energy system is set to decline with the UK's target of full decarbonisation of electricity by 2035. As Norfolk and Suffolk has a long history of oil and gas businesses operating the region, there is an opportunity to retrain a portion of workers into new roles. Feedback from training providers suggested that while there are transitional skills and familiarity with offshore and energy environments, there is still a level of training required as there are differences in approach.

[145] Science Industry Partnership. (2021). Building tomorrow's workforce: Insights into the adoption of apprenticeships in the science sector.

If Norfolk and Suffolk are awarded control over the Adult Education Budget from September 2025, this coincides with the time where oil and gas assets will start ramping down quickly in the area. Therefore, Norfolk and Suffolk could run dedicated transition skills bootcamps offering oil and gas workers the chance to work in renewables. In Scotland, OPITO are offering Energy Skills Passports which enable oil and gas workers a digital passport that lists their relevant skills and enables them to transition into low carbon technologies more easily. East Coast College is planning on hosting one of their courses so this could be one option for Norfolk and Suffolk to explore for their workers. Sectors which are most transferable with the oil and gas sector is hydrogen and offshore wind. One issue identified with reskilling the existing oil and gas workforce however was wage expectation and incentives to transition given the older nature of the oil and gas workforce. On wage expectation, training providers with experience in upskilling oil and gas workers noted that transitioned oil and gas workers often enter low carbon roles at lower levels than they are used to. This often reduces the appeal of going into new technology areas. Therefore, finding ways to encourage oil and gas workers into these training schemes could prove to be a challenge and will require more dedicated work to understand factors that could stimulate upskilling in that workforce.

CASE STUDY: OPITO PROVIDING THE ENERGY SKILLS PASSPORT IN SCOTLAND

Awarded via the Scottish Government's Just Transition Fund, OPITO were awarded £5 million to deliver an energy skills passport. The aim is to streamline the transfer of skills and address the lack of recognition of cross-sector skills. If successful, the scheme will support oil and gas workers specifically. The Energy Skills Passport will display an individual worker's current qualifications and the required credentials to transition into another energy sector. It will allow users to prove that they have the recognised qualifications and training needed to access worksites.

RECOMMENDATION 11	POTENTIAL ACTIONS
Strengthen partnerships between local businesses and training providers to promote the creation of business led training provision.	Broker partnerships between large solar PV installers and operators and training providers to establish technology specific courses to upskill installers to improve installation quality. Broker partnerships with EV charging point operators and manufacturers and local training centres to upskill local workforce and provide an accreditation pathway to being OZEV approved. Encourage local onshore and offshore wind developers to strengthen ties with more local training providers. This can take the form of increasing the number of places at existing centres, building dedicated training facilities to train local operators and host more short courses for oil and gas workers to transition. Encourage national energy storage companies to set up regional maintenance centres and training facilities the Norfolk and Suffolk area. Use these centres as a springboard to locally train energy storage installers. Norfolk and Suffolk Council should convene a quarterly “Energy Generation”, “Mobility”, “Alternative Fuels & Hydrogen” & “Energy Storage” action groups. These should include training providers, local authorities and industry.

Colleges and universities are an established part the skills system, but specialist training providers are also an important part of the solution. In fact, one specialist training provider commented that they have greater bandwidth in offering more specialised and bespoke courses given the greater financial freedoms. In fact, near East Coast College several private training providers operate offshore wind training facilities, demonstrating the crowding in effect of industry choosing to centralise activity in a local area. Through the desk research, only a few training providers were identified during the desk research, with the vast majority focusing on offshore wind. There were no specialist training providers (or colleges) hosting courses on large scale solar, energy storage, hydrogen so there could be an opportunity to increase local training provision via closer industry collaboration.

Following the positive model pioneered in the offshore wind sector, a local college could become a regional centre for a particular technology and then crowd in other private sector investment. This could then allow private training providers to co-locate and provide specific health and safety or technical courses the college may not be best placed to run. To maximise the impact of this approach, setting up regional centres could be done in conjunction with a national centre to avoid duplication of facilities and focus on areas that need investment. The key for most industry partners in setting up local training facilities in these areas is critical mass. A respondent in the energy storage sector stated that unless volumes of energy storage systems are sufficiently high enough, it wouldn’t justify setting up regional operation and maintenance centres and the associated training infrastructure. This sentiment was echoed by other respondents in offshore wind and solar as well.

The methods for local government to attract a critical mass differ. For EV charging, it would easier to attract a local charge point operator or manufacturer to form a partnership with a training provider if they have a local contract to install EV charging points. So, any companies that have been awarded LEVI based funding in conjunction with Norfolk and Suffolk local authorities would be a natural candidate to explore setting up a partnership with a college or private training centre (see case study[146]). In areas like solar and energy storage, the private sector investment is more fluid. However, as energy storage assets can often be co-located next to offshore wind and solar, perhaps having co-located offshore wind or solar training with energy storage could be attractive to project developers and operators.

CASE STUDY: LOCAL EV ENHANCES TRAINING IN LOCAL AUTHORITY

Through the Local Electric Vehicle Infrastructure fund, local councils bid into a central pot of funds to install electric vehicle charge points. This grant provided both support for capital expenditure such as installation and hardware and training provision. Local authorities such as West Suffolk and West Berkshire for example, opted for ubitricity to be their delivery partner. As part of the agreement ubitricity committed to training a local workforce of electricians to install their charge points.

Finally, a consistent theme from the Norfolk and Suffolk stakeholder engagement activity was the need for closer collaboration between organisations involved in training provision. In the surveys, local authority respondents consistently expressed the need for Norfolk and Suffolk Councils to play a co-ordinating role in green skills development. To address these concerns, Norfolk and Suffolk Council could convene a quarterly action group for the region centred around “Energy Generation”, “Mobility”, “Alternative Fuels” and “Energy Storage”. The aim would be to bring together developers, manufacturers, training providers and local authorities to share best practices. This enables developers to communicate their evolving training needs, training providers to share best practices amongst colleagues and local government to be responsive to the community’s needs. Norfolk and Suffolk Council could also communicate priorities in terms of local sensitivities to new developments, training needs, location priorities and course types as well as communicating national policy changes around technical competencies.

[146] Ubitricity. (2023). ubitricity to roll out 250 EV charge points across West Berkshire

RECOMMENDATION 12	POTENTIAL ACTIONS
Incentivise innovative models of training either through hybrid online courses, shorter and part time courses or training provision via trade associations.	Increase the amount of dedicated short courses specifically focused at upskilling the oil and gas sector to transition to the offshore wind, hydrogen and CCS. Work with colleges and other training providers to accelerate the use of AI and online learning to maximise the use of face-to-face learning. Increase the amount of alternative training provision either through a relevant trade association or local industry body.

The existing training providers across Norfolk and Suffolk are integral to upskilling the existing workforce and training a new workforce. In the last few years, colleges have begun investing in capital equipment to prepare learners for careers in green jobs. However, as well as new equipment, innovative models of training will be needed. New ways of teaching not only enable Suffolk and Norfolk to ramp up training but can encourage training options that are more suited to the local demographics. Through the stakeholder engagement process various suggestions were offered to improve training provision.

A common theme was the need for more short courses. Apprenticeships were viewed positively but were often too long and not the most effective tool for upskilling professionals closer to retirement or those with experience in the existing oil and gas industries. Some stakeholders highlighted a few local courses available to oil and gas workers that introduce renewable energy and offshore wind health and safety. Although some respondents raised concerns around the visibility of these courses to employers and confusion around which course to enrol on. Many respondents commented on the validity of uncertified courses and the sheer number of courses made it overwhelming to understand which ones were worth unrolling on. Unlike the retrofit sector, it was felt large energy companies are committed to upskilling their workforce so finding the time to allocate for training was not deemed an issue.

Another mechanism to encourage training is promoting the use of hybrid online courses. One interviewee from a local college highlighted the importance of e-learning and exploring new artificial intelligence (AI) aided tools to help deliver courses. While this was deemed a longer-term development, the college felt it could reduce pressure on them to find suitably trained staff while also assisting in getting more students trained in the relevant courses. Another training provider suggested providing more online courses was one of the tactics to reduce their Scope 3 emissions as part of their business plans. While final testing must be conducted in person, they felt other training providers will be under pressure to provide online alternatives which means training in wider green skills must adapt to this reality.

An interesting business model that emerged from reviewing the skills practices of industrial clusters is delivering training via a trade associations and member organisations. These are dedicated forums where industry leaders often meet regularly and discuss issues. Skills and training are often big concerns across industry, with local colleges either unable to justify putting on the courses due to lack of demand or not providing flexible enough training. Trade associations through a combination of member contributions and government funding can deliver apprenticeship or short course training. It also gives learners greater access to those in industry as members have a vested interest and concrete link to the apprenticeships as they are bespoke to the industry need. An example of this business model is CATCH, a trade association representing businesses in the Humber area[147]. They provide several engineering, process and operational technician apprenticeships and short courses which service their local oil and gas, chemical and renewable energy industries. CATCH also provide a direct line of sight to employers for their apprenticeships raising the likelihood of future employment. Supporting local trade associations like East of England Energy Group (EEEGR) in Norfolk and Suffolk could be one route to create a diversity of training routes. Several private companies also expressed an interest in setting up training facilities during the stakeholder engagement process. The reasons given were because existing training provision didn't reflect industry practice and that offering training represents a new opportunity to service some clients needs and gain revenue.

[147] CATCH. (2023). CATCH Apprenticeships.

CONCLUDING REMARKS

Gemserv's wider green skills analysis has demonstrated a cross section of different technologies are needed across Norfolk and Suffolk to reach net zero by 2030. The region is a national leader in offshore wind with local training providers adapting to the needs of the wind sector. However, a significant deployment effort is needed across other technologies like onshore wind, large scale solar, EV charging and battery storage if the region is to successfully transition away from fossil fuels.

It's evident that the rapid increase in technology required to meet the 2030 target requires a concerted effort to attract a wider variety of existing and new skills. In the two scenarios where net zero is achieved by 2030, the job creation forecasts show three distinct phases of job creation. In the first phase, construction jobs increase rapidly to ensure all the technologies are installed by 2030. This generates a sharp peak around the late 2020s and a large decline by 2030 which, if net zero is implemented like this, could contribute to the boom-and-bust cycle of the construction industry. In the second phase, operation and maintenance roles dominate but the activities are less labour-intensive vs construction so there is a "trough" of jobs vs the peaks of the construction phase. The only exception to this is EV charging installations which have a relatively short life of 10 years so create some increased construction roles. In the third phase, certain technologies like energy storage, EV charging and offshore wind reach the end of life and need replacing. This occurs in the late 2040s and generates another spike in demand for jobs. In the urgent ramp up, this spike is more pronounced than the original peaks of the late 2020s given how compact the decommissioning of assets occurs and the baseline of maintenance roles.

An initial analysis of the local training provision across Norfolk and Suffolk indicated that the level of training provision is mixed. Given the history of offshore wind in the area, local colleges and training providers had tailored existing apprenticeships to the wind sector, with good links to the private sector. In addition to colleges, private training providers had entered the market, providing bespoke and niche courses on safety and maintenance and inspection. For other areas such as solar, energy storage and EV charging the outlook was less favourable. In EV charging, many colleges offered the foundational electrical qualifications and short courses to become a qualified electrician (a perquisite to installing charge points). A few private training providers and colleges also ran a dedicated City and Guilds EV charge point installation course which is preferred in the industry and to access grants. However solar and battery storage courses, while having the foundational electrical qualifications on offer, lacked specific solar or battery storage courses in the region.

Based on the findings presented in this report, the set of recommendations listed reflect the biggest challenges that face the region in achieving net zero by 2030. These include:

- Attracting enough projects into the region and getting these projects consented by local communities and authorities.
- Ensuring the construction workforce is ready and large enough to meet the challenge of building enough green energy projects across the region. This requires managing competition for resources across different projects, companies, and regions.
- Training enough operation and maintenance staff locally. Forging relationships with local project developers early on and ensuring private companies use regional training providers as much as possible
- Utilise the range of local funding, incentives and skills initatives to train the local workforce
- Augment national skills initiatives and funding mechanisms with tailored localised support to fill the gaps.

This report has established the wider green skills challenges facing Norfolk and Suffolk are considerable. Despite this, the analysis and recommendations also provides concrete evidence on the key barriers and a set of tangible actions to help overcome those barriers.

APPENDIX 1 – METHODOLOGY NOTES

OVERVIEW OF STUDY METHODOLOGY

The study methodology is detailed in **Figure 150**. The analysis is separated into two parallel streams: low carbon heating and retrofit (Phase 1 report) and wider green jobs (Phase 2 report). Both streams follow the same methodology which consists of four key steps:

1) Assessing the baseline number of jobs and low carbon technology deployment in Suffolk and Norfolk
2) Produce scenarios on the number of jobs needed by 2030 based on Gemserv's technology uptake models
3) Conduct a skills gap analysis, using surveys and interviews, that underline the challenges in achieving future skills growth
4) Create a visual roadmap that articulates the actions Norfolk and Suffolk should take to ensure the necessary skills growth

Figure 150: Study methodology

	Sector	1 Baseline number of jobs	2 Projected number of jobs	3 Conduct a skills gap analysis	4 Develop a skills roadmap
PHASE ONE	Low Carbon Heating & Retrofit	Estimate the baseline number of jobs in the retrofit and low carbon heating sector	Project the future number of jobs needed in the retrofit and low carbon heating sector	Assess the skills gap and recommend tangible actions for Norfolk and Suffolk to implement	Develop a visual roadmap to communicate the key recommendations to stakeholders
PHASE TWO	Wider Green Jobs	Estimate the baseline number of jobs in the wider green industries	Project the future number of jobs needed in the wider green industries	Assess the skills gap and recommend tangible actions for Norfolk and Suffolk to implement	Develop a visual roadmap to communicate the key recommendations to stakeholders

Steps 1 and 2 use economic modelling to assess the skills demand for the green jobs market in the future. Using illustrative scenarios developed by Gemserv, the analysis shows different technology adoption rates to 2030 and how that impacts future job creation. Step 3 uses online surveys, interviews, and a literature review to provide a better understanding of the sector specific issues in Norfolk and Suffolk. The aim was to collect feedback on the challenges faced by installers, training providers and local authorities and give respondents the chance to voice their opinions on how gaps could be addressed.

ECONOMIC MODELLING METHODOLOGY

In this section we provide notes on some key aspects of the methodology used for this report. **Table 53** provides more detail on the economic modelling approach.

Table 53: Overview of approach to economic modelling

Analysis	Brief description of approach
Current and future capacities, by local authority	Public data projections have been used to estimate current and Net Zero capacity levels for each sector. Where these were not available at local authority level, we developed methodologies to estimate these values. **Table 54** provides detail on sources and methodologies by sector. Capacity projections are taken from scenarios that are aimed at the requirements to reach Net Zero by 2050, such as those given in UK Power Networks' Distribution Future Energy Scenarios. For our scenarios that require Norfolk and Suffolk to reach Net Zero by 2030, these 2050 values have therefore been applied to 2030 as opposed to 2050, under the assumption that they provide an appropriate level of capacity for Net Zero.
Job factors	Job intensity factors were applied to changes in capacity or cumulative capacity to provide the number of associated jobs. Public sources were used to provide data points or the basis for estimates of job intensities for different sectors, and different job types within sectors. Sources used are as follows: Job creation during the global energy transition towards 100% renewable power system by 2050, The economic benefits of carbon capture and storage in the UK, Green job creation, quality and skills: A review of the evidence on low carbon energy. Some estimation was made for certain missing sectors that were deemed similar enough to others. Learning rates were sourced from Job creation during the global energy transition towards 100% renewable power system by 2050. Sectors that required alternative methodologies were EV charging and low carbon services, due to lack of public sources. EV charging utilised install times from The potential for green jobs in Cumbria, and estimates for

	different maintenance times between public and private charging points and the number of households with off-street parking. Low carbon services utilised CCC industrial decarbonisation CO2e projections and ONS Low Carbon and Renewable Energy Economy regional employment estimates. The economic analysis assumes all jobs are created in local authority where generation capacity / installations occur. This methodology is a fairly accurate proxy for construction and decommissioning jobs. However, operation and maintenance jobs across the council may be in one local authority and not be distributed across local authorities to maximise efficiency. A good example of this is offshore wind in Norfolk where the majority maintenance and operation jobs are in Great Yarmouth.
GVA and turnover	GVA was estimated from the number of jobs using a wide range of sources collected by Gemserv, including the Annual Business Survey. The relation of turnover to GVA was estimated using the Annual Business Survey regional reference tables for similar sectors in the East of England.

LOCAL AUTHORITY CAPACITY PROJECTIONS

Table 54 below provides the methodology and key data sources for each sector analysed, to reach current and Net Zero capacity estimates by local authority for Norfolk and Suffolk.

Table 54: Overview of methodology and key data sources by sector

SECTOR	CURRENT VALUE – SOURCE	CURRENT VALUE – NOTES	PROJECTED VALUE - SOURCE	PROJECTED VALUE - NOTES
Offshore wind	Regional Renewable Statistics	Capacities available by local authority	The Sixth Carbon Budget: Electricity generation, scaled to East of England using ONS Low Carbon and Renewable Energy Economy regional employment estimates	Scaled to East of England using ONS Low Carbon and Renewable Energy Economy regional employment estimates, scaled to local authorities by current value source
Onshore wind	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority
Large solar PV	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority

Renewable CHP	National Grid Future Energy Scenarios (2021 and 2050), scaled to local authorities using current government data on renewables generation.	Capacities at UK level, scaled to local authorities in line with current renewable gas (sewage/landfill) generation capacities (from regional renewables data source)	National Grid Future Energy Scenarios (2021 and 2050), scaled to local authorities using current government data on renewables generation.	Capacities at UK level, scaled to local authorities in line with current renewable gas (sewage/landfill) generation capacities (from regional renewables data source)
Bioenergy	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority
Hydrogen	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority
EV charging	Sixth Carbon Budget, scaled to local authorities using Vehicle licensing statistics: July to September 2022	CCC EV projections at UK level, scaled to local authorities using government data for total number of cars	Sixth Carbon Budget, scaled to local authorities using Vehicle licensing statistics: July to September 2022	CCC EV projections at UK level, scaled to local authorities using government data for current total number of cars
Co-located energy storage	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority
Standalone grid-connected energy storage	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority	Distribution Future Energy Scenarios (DFES) 2022	Capacities available by local authority
CCS	National Grid Future Energy Scenarios (2021 and 2050)	Capacities at UK level (zero current capacity)	National Grid Future Energy Scenarios (2021 and 2050), scaled to local authorities using current government data on renewables generation.	Capacities at UK level, scaled to local authorities in line with current renewable gas (sewage/landfill) generation capacities (from regional renewables data source)
Low carbon services	UK local authority and regional greenhouse	Values available by local authority	Deep-Decarbonisation Pathways for UK	Percentage reduction from CCC industrial

	gas emissions national statistics	Industry (Element Energy)	decarbonisation CO2e projections at UK level applied to baseline local authority figures

OTHER NOTES ON ECONOMIC MODELLING

No manufacturing

Jobs considered are those limited to the construction/installation and operation/maintenance of low carbon technology – and services, for the low carbon services sector. This means that, for example, potential jobs in manufacture and design are not included. This was deemed to be a valid assumption as a review of industry in the area did not show any significant manufacturing capacity amongst the sectors within scope. This is partly due to these sectors being largely reliant on imports from abroad. For example, three quarters of the manufacturing capacity for solar photovoltaics is in China, with an additional 20.3% in other countries in Asia[148]. This is largely due to access to many of the precious metals required in their production, which makes production in nations like China followed by export to the UK far more cost competitive than domestic production. Additional to this is the assumption that in the future, manufacture will not be on-shored – deemed to be a fair assumption when considering the uncertainty in this area. However, it should be noted that because of these assumptions, job creation estimates may be conservative. It is true that a Norfolk and Suffolk's local manufacturing could capitalise on the transition, and this was reflected in the stakeholder engagement and recommendations. However, quantifying how much of the Norfolk and Suffolk manufacturing sector could contribute local capacity building is a prolonged exercise and deemed out of scope for this work.

Zero current capacity cases

When estimating the capacity required by local authority in our projections, it was assumed that future capacity would remain at zero where current capacity was estimated to be zero and future technology deployment projections, used as basis for our estimates, were not given at local authority level. This follows from the methodology given above. For example, for offshore wind, current data showed that there is no installed capacity for offshore wind associated with Babergh[149] (understandable given the coastline). We use national CCC projections[150] for future capacity and use the same proportions of capacity between local

[148] Statista. (2022). Distribution of solar photovoltaic module production worldwide in 2021, by country.
[149] BEIS. (2022). Regional Renewable Statistics.
[150] CCC. (2020). Sixth Carbon Budget.

authorities as current levels, and as such, Babergh remains as zero capacity in our assumed future capacity levels.

For some sectors, current capacity is at zero across the whole of Norfolk and Suffolk, in addition to there being no projections for future capacity at local authority level. This applies to Carbon Capture and Storage, with National Grid's Future Energy Scenarios[151] indicating zero current capacity. Therefore, to scale down estimates for required CCS capacity to each local authority, non-bio renewable gas capacity was used as a proxy, as given in BEIS Regional Renewable Statistics[152].

Additional notes on capacity projections

It should be noted that the capacity projections used as a benchmark were selected according to scenarios that best matched the assumptions used the Phase One report, looking at skills requirements in the low carbon heat and retrofit sectors. Most importantly, due to the prevalence of a high penetration of heat pumps in Phase One, high electrification scenarios were used in this report, as opposed to those that assumed a higher penetration of other energy sectors such as hydrogen and biomass. The total energy generation requirement may be achieved with a different balance of energy sources than those assumed in this analysis. The generation capacity values used in this analysis are shown in **Figure 1** and **Figure 2**.

A challenge of using FES data is the allocation of some generation capacity towards national values only – which is not represented in regional projections. The FES electricity supply data table gives some insight on the level of UK capacity that is categorised as decentralised or transmission for different sectors – but this is not provided at more regional levels. This means it is difficult to capture all the generation capacity that will be present in a particular local authority, since the amount of capacity in the area projected to contribute to national generation values is unknown. This issue was particularly evident for the offshore wind sector, with current "transmission" generation 18 times higher than current "decentralised" generation and increasing to 148 times higher by 2050. For offshore wind capacity values, we therefore utilised an alternative methodology, given in the table above. Some other sectors out of those we include in this report had equivalent discrepancies of 1-2 times by 2050: onshore wind and hydrogen. For these sectors we have not adjusted the methodologies due to the comparatively lower impact, but it is important to note that the capacity values for these sectors are likely to be conservative, since they only include the local-contributing capacity, rather than national-contributing as well.

[151] National Grid. (2022). FES Documents.
[152] BEIS. (2022). Regional Renewable Statistics.

Marginal construction labour intensities

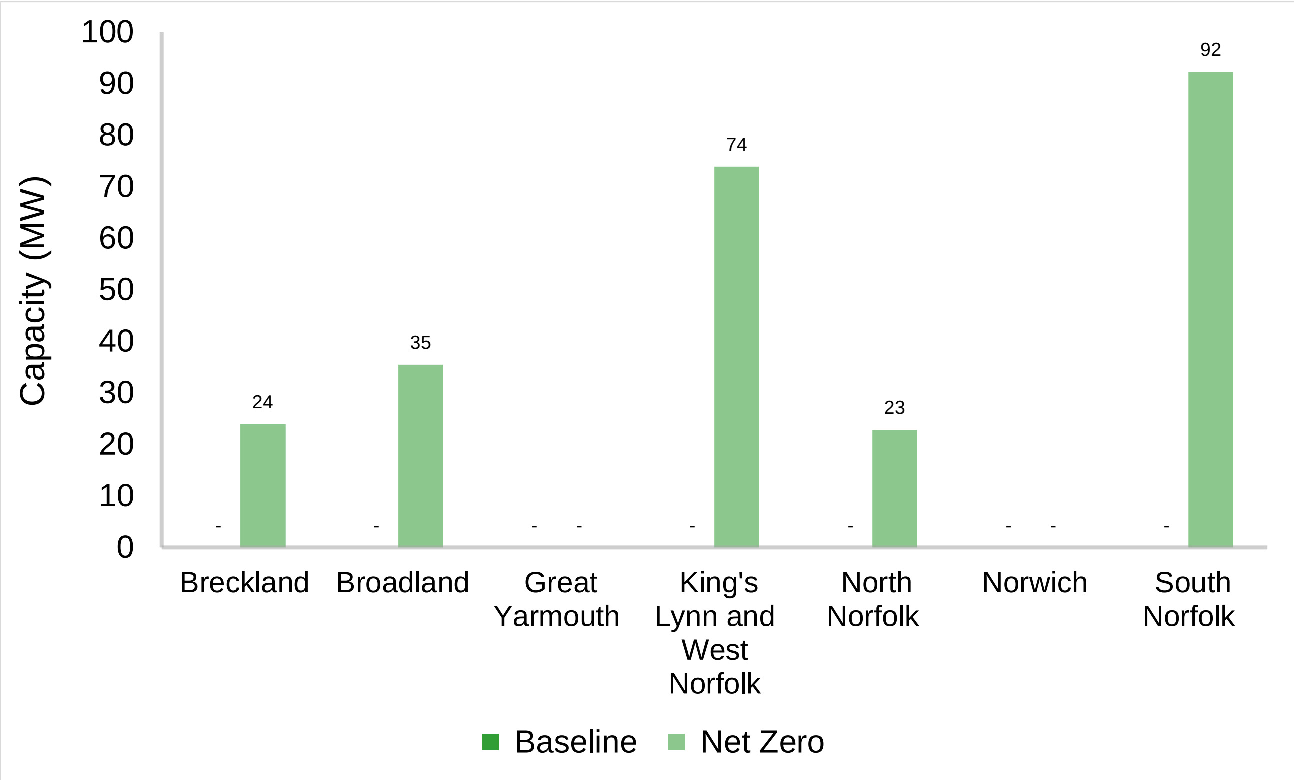
It is worth noting that this analysis used marginal construction labour intensities, meaning that relative employment requirements per unit of additional capacity per year were used. Therefore, this corresponds to assuming that the construction of each additional unit of capacity takes place within a year. For some areas, this may exaggerate peak employment requirements compared to if longer construction periods were used. This assumption was deemed to be valid as when averaged out across multiple sites, aggregated employment requirements will become closer to employment requirements when assuming longer construction periods. However, when considering the severity of peak employment figures, the effect of this assumption should be considered.

APPENDIX 2 – FURTHER SECTOR ANALYSIS NOT IN SCOPE

CARBON CAPTURE AND STORAGE

Carbon capture and storage in Norfolk is currently assumed to be zero, in accordance with National Grid's Future Energy Scenarios[153]. National Grid project a 249 MW capacity for carbon capture and storage in Norfolk to achieve Net Zero, with Breckland providing most of the capacity. **Figure 151** shows the values we assume in our modelling, by local authority.

Figure 151: Norfolk CCS generation capacity values[154]



Job creation scenarios in Norfolk

For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in

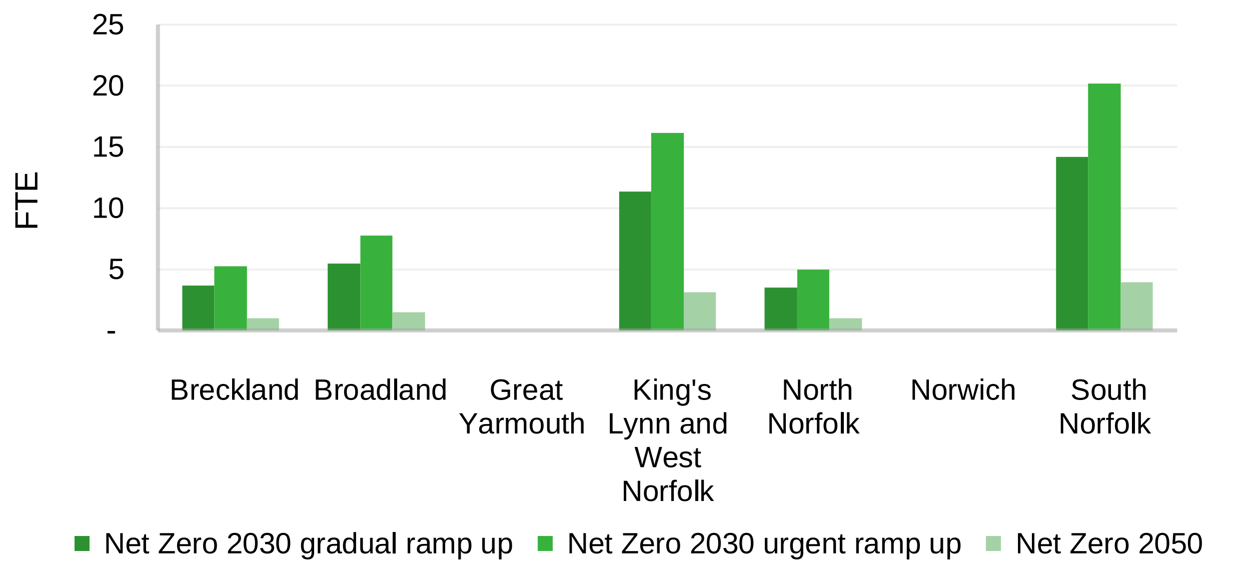
[153] National Grid. (2022). FES Documents.
[154] Estimated using values from National Grid Future Energy Scenarios (2021 and 2050), scaled to local authorities using current government data on renewables generation.

different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation for carbon capture and storage is seen to be low compared to most other sectors in this report, South Norfolk having the most significant jobs with a peak of 20 under the Net Zero 2030 Urgent Ramp Up scenario. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in

Figure *152*. Higher peak jobs for given scenarios are associated with faster increases in capacity.

Figure 152: Norfolk CCS peak jobs across the scenarios



The years in which the peak jobs shown in

Figure *152* occur in each scenario are provided in **Table 55**. More insight into these values is provided by **Figure 153** below, which depicts how the total number of jobs changes over time for each scenario.

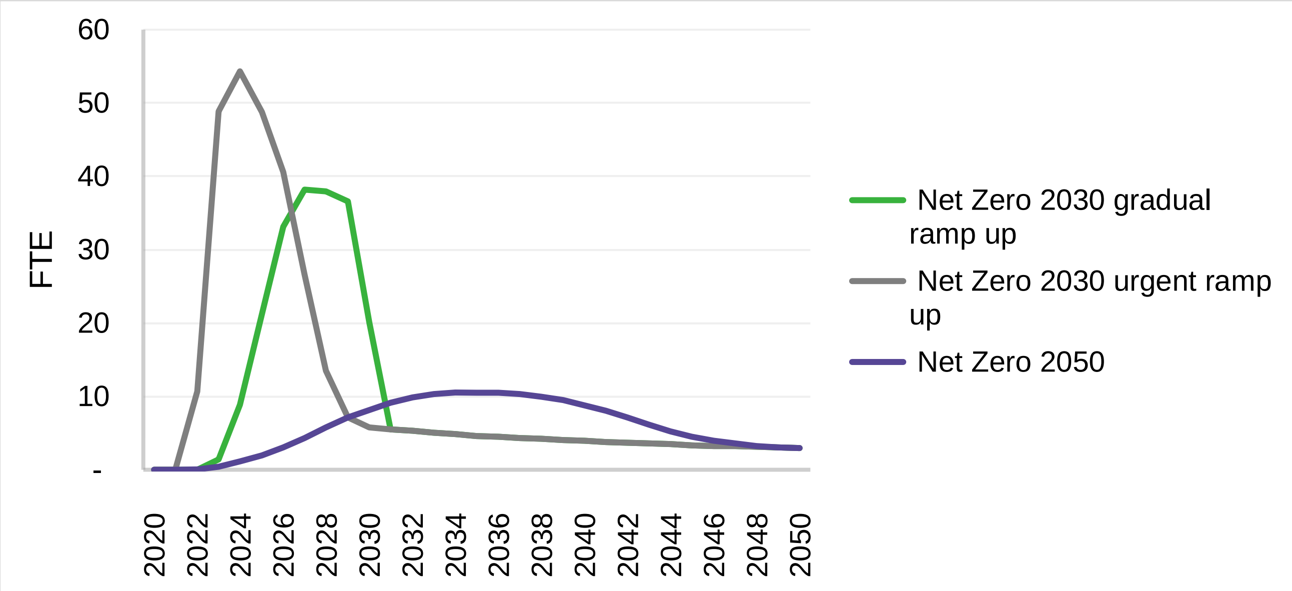
Table 55: Year in which peak jobs occur for CCS in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2027	2024	2034

The development of carbon capture and storage jobs over time for each of the three scenarios is shown in **Figure 153**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity

– as seen in both of our Net Zero 2030 scenarios. For carbon capture and storage we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after the 2050 time period we consider here.

Figure 153: Norfolk CCS FTE over time



Breakdown of job types in Norfolk

Different types of jobs have been modelled, as associated with construction and installation of capacity, operation and maintenance of capacity, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity.

Figure 154, **Figure 155** and **Figure 156** present the number of jobs in each type over time for carbon capture and storage, for each scenario. For both the Net Zero 2030 scenarios, a gradual decrease in operation and maintenance jobs over time can be seen – this is due to assumed learning rates for carbon capture and storage employment – the principle that fewer jobs will be needed in the future to maintain the same capacity, due to improved efficiencies in processes and technologies. There are minimal decommissioning jobs across the scenarios, due to low rates of capacity reaching end-of-life in the period considered, as noted above. The same can be said for any construction and installation jobs associated with replacing end-of-life capacity – which is why minimal construction and maintenance jobs are seen after 2030 in both the Net Zero 2030 scenarios.

Figure 154: Norfolk CCS FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

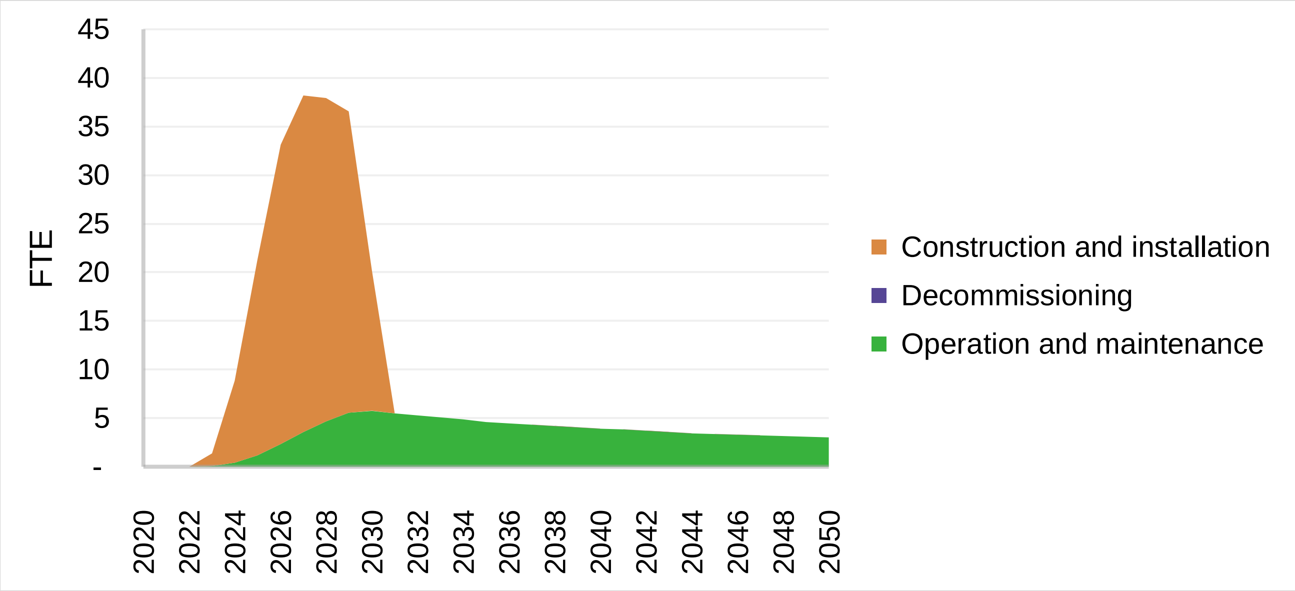


Figure 155: Norfolk CCS FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

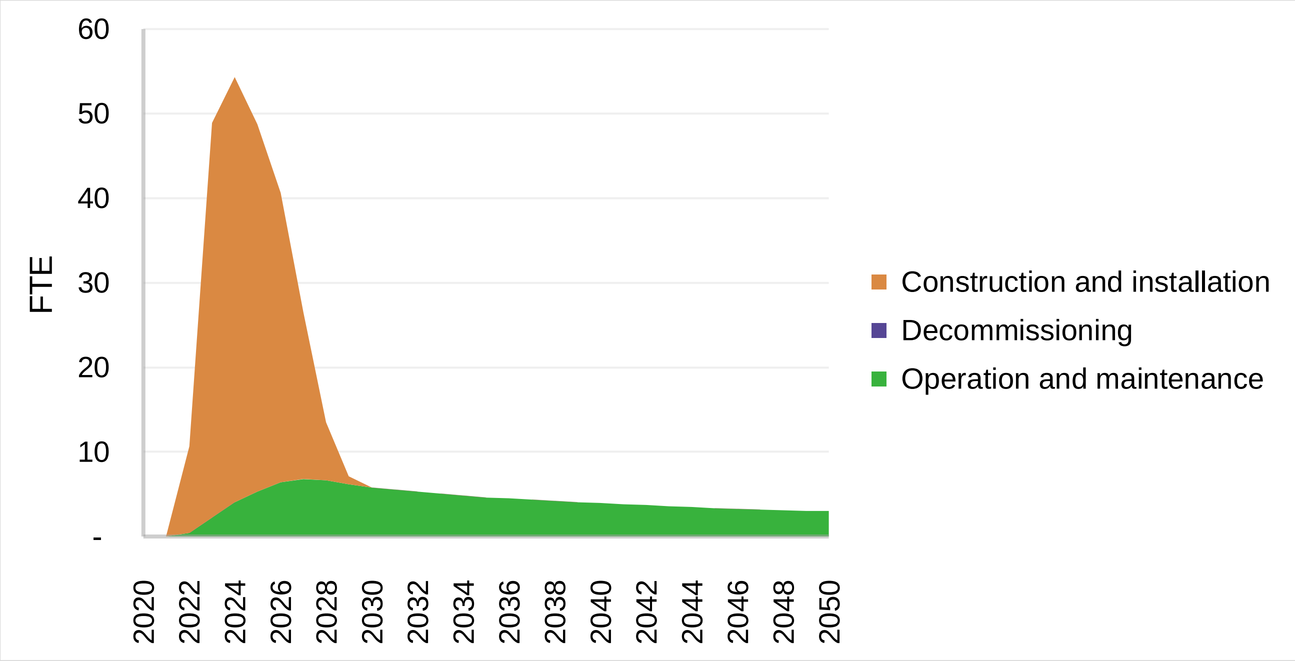
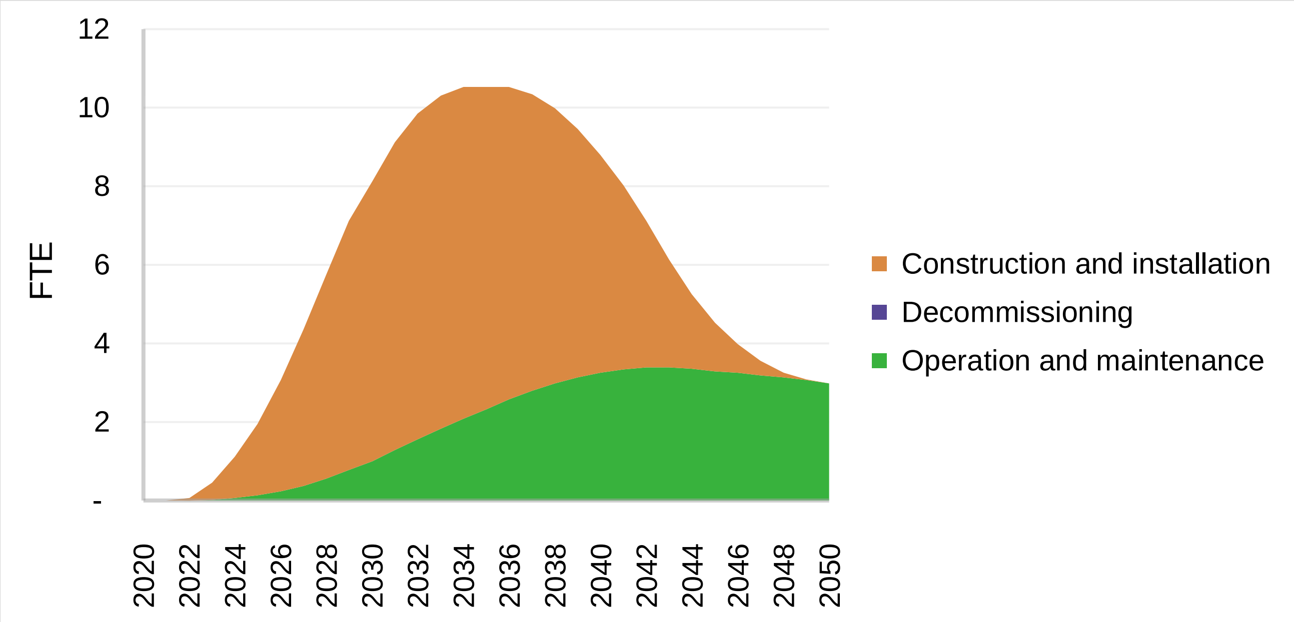


Figure 156: Norfolk CCS FTE by job type for the Net Zero 2050 Scenario

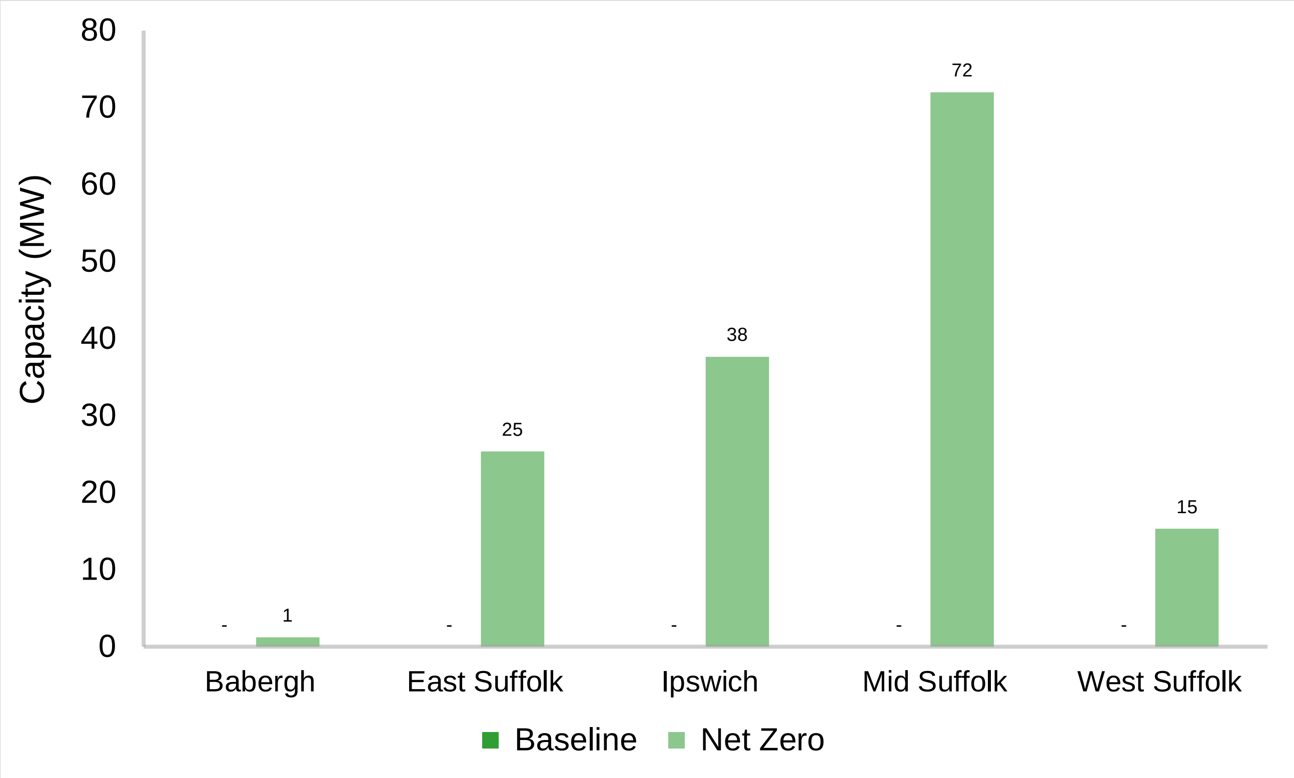


Current and expected capacity in Suffolk

Carbon capture and storage in Suffolk is currently assumed to be zero, in accordance with National Grid's Future Energy Scenarios[155]. National Grid projections scaled to Suffolk give a 151 MW capacity for carbon capture and storage in Suffolk to achieve Net Zero, with Mid Suffolk providing most capacity. **Figure 157** shows the values we assume in our modelling, by local authority.

[155] National Grid. (2022). FES Documents.

Figure 157: Suffolk CCS generation capacity values[156]



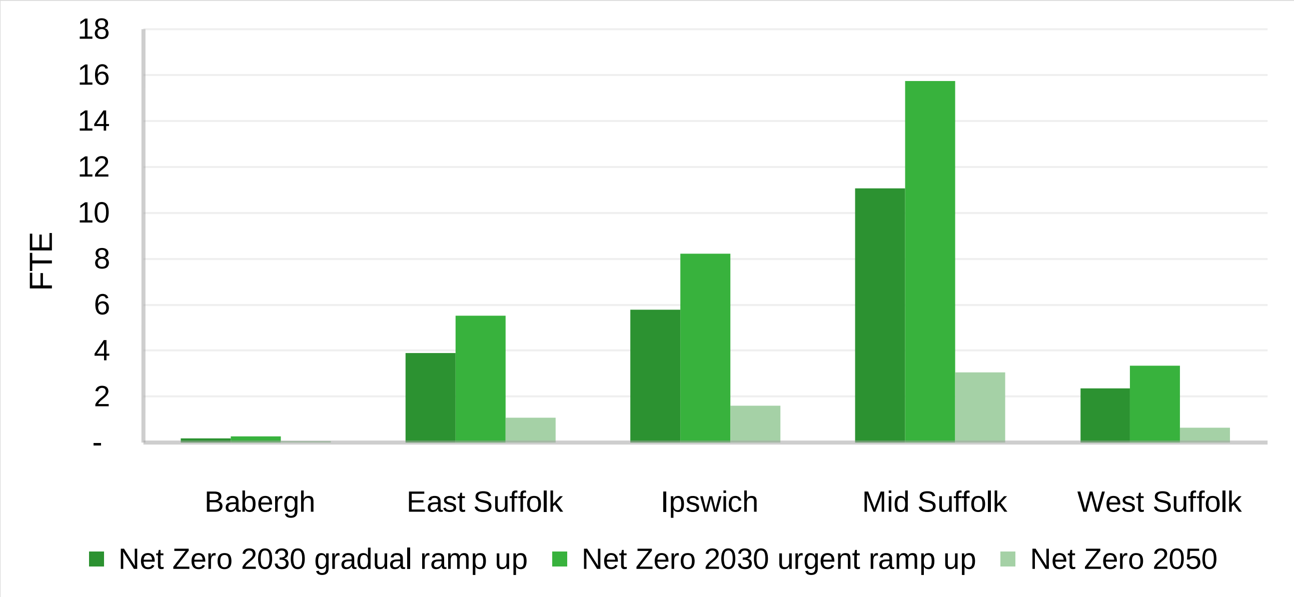
Job creation scenarios in Suffolk

For the increases in capacity given above, we have modelled job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of capacity change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation for carbon capture and storage is seen to be low compared to most other sectors in this report, Mid Suffolk having the most significant jobs with a peak of 16 under the Net Zero 2030 Urgent Ramp Up scenario. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in **Figure 158**. Higher peak jobs for given scenarios are associated with faster increases in capacity.

[156] Estimated using values from National Grid Future Energy Scenarios (2021 and 2050), scaled to local authorities using current government data on renewables generation.

Figure 158: Suffolk CCS peak jobs across the scenarios



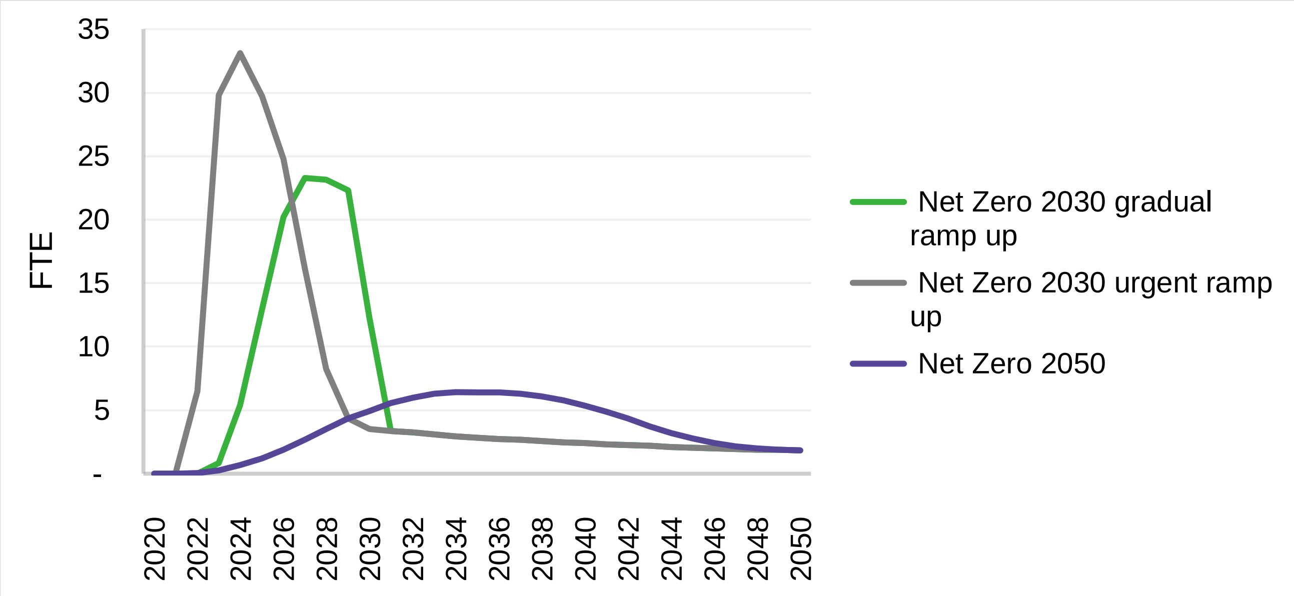
The years in which the peak jobs shown in **Figure 158** occur in each scenario are provided in **Table 56**. More insight into these values is provided by **Figure 159** below, which depicts how the total number of jobs changes over time for each scenario.

Table 56: Year in which peak jobs occur for CCS in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2027	2024	2034

The development of carbon capture and storage jobs over time for each of the three scenarios is shown in **Figure 159**. Pronounced peaks in the number of jobs required are due to concentrated increases in capacity – as seen in both of our Net Zero 2030 scenarios. For carbon capture and storage, we do not see the effects of replacement of end-of-life capacity, since the long lifetime of installations means the jobs associated with replacing the first peak of installations occur after 2050.

Figure 159: Suffolk CCS FTE over time



Breakdown of job types in Suffolk

Different types of jobs have been modelled and are associated with: the construction and installation of capacity, operation and maintenance of assets, and decommissioning of end-of-life capacity. These contribute to the total number of jobs to different extents, depending on the intensity of work required for each of these activities, and the level of cumulative capacity, increase in capacity or replacement of capacity. **Figure 160**, **Figure 161** and **Figure 162** present the number of jobs in each type over time for carbon capture and storage, for each scenario. For both the Net Zero 2030 scenarios, a gradual decrease in operation and maintenance jobs over time can be seen – this is due to assumed learning rates for carbon capture and storage employment – the principle that fewer jobs will be needed in the future to maintain the same capacity, due to improved efficiencies in processes and technologies. There are minimal decommissioning jobs across the scenarios, due to low rates of capacity reaching end-of-life in the period considered, as noted above. The same can be said for any construction and installation jobs associated with replacing end-of-life capacity – which is why minimal construction and maintenance jobs are seen after 2030 in both the Net Zero 2030 scenarios.

Figure 160: Suffolk CCS FTE by job type for the Net Zero 2030 Gradual Ramp up Scenario

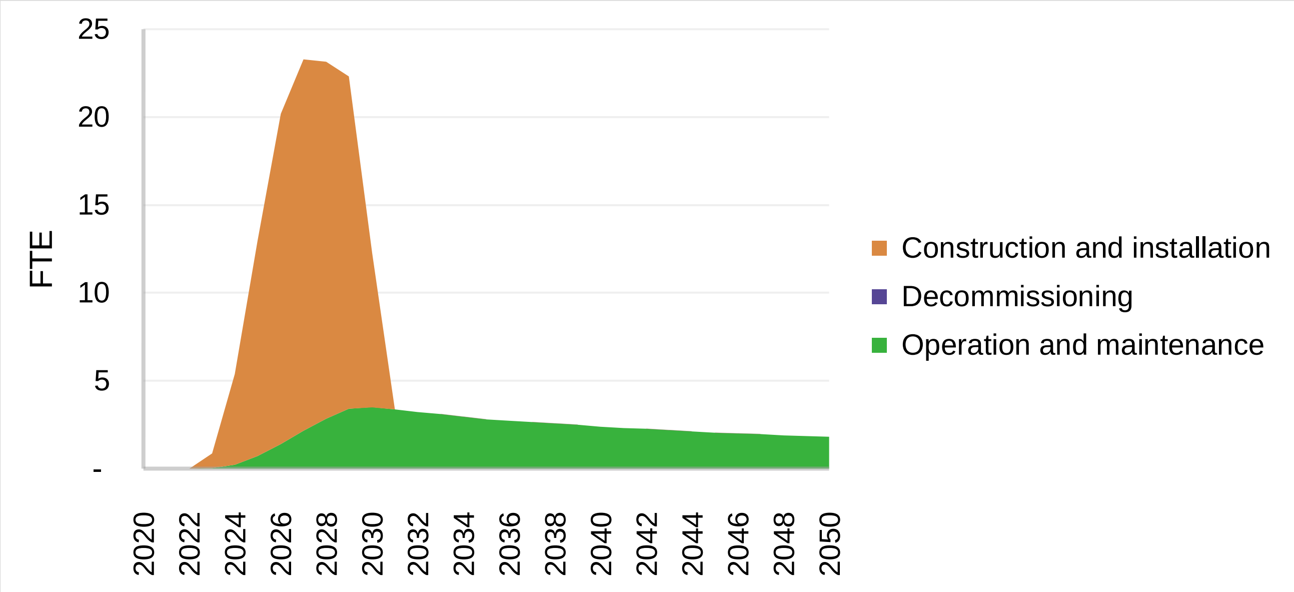


Figure 161: Suffolk CCS FTE by job type for the Net Zero 2030 Urgent Ramp up Scenario

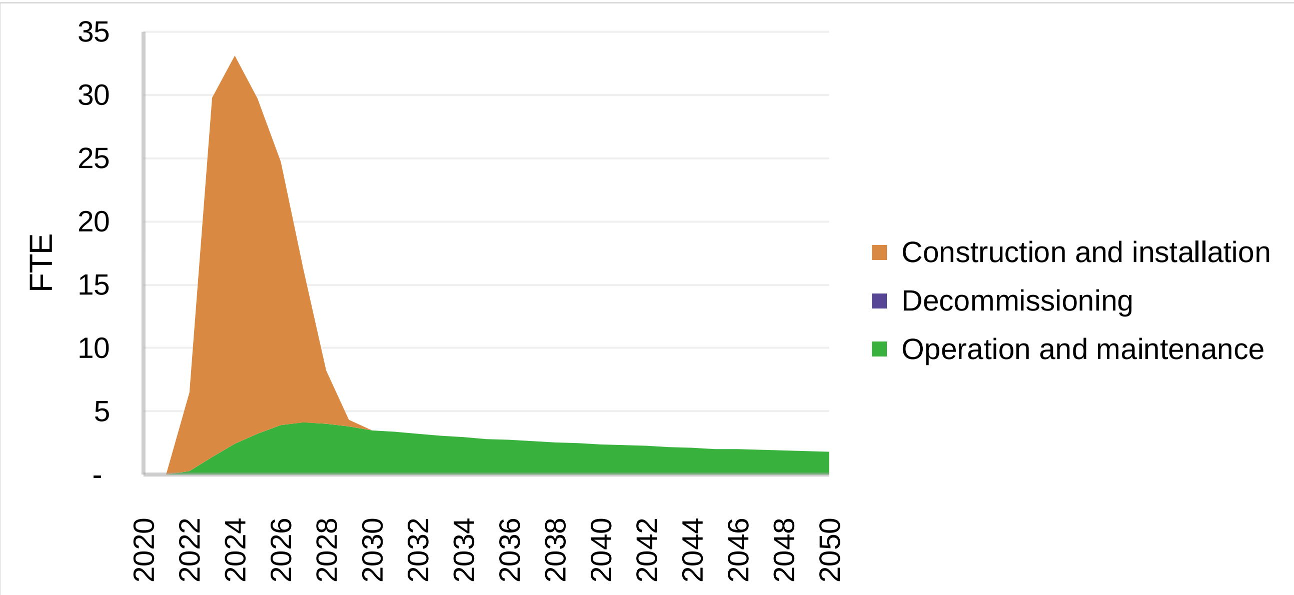
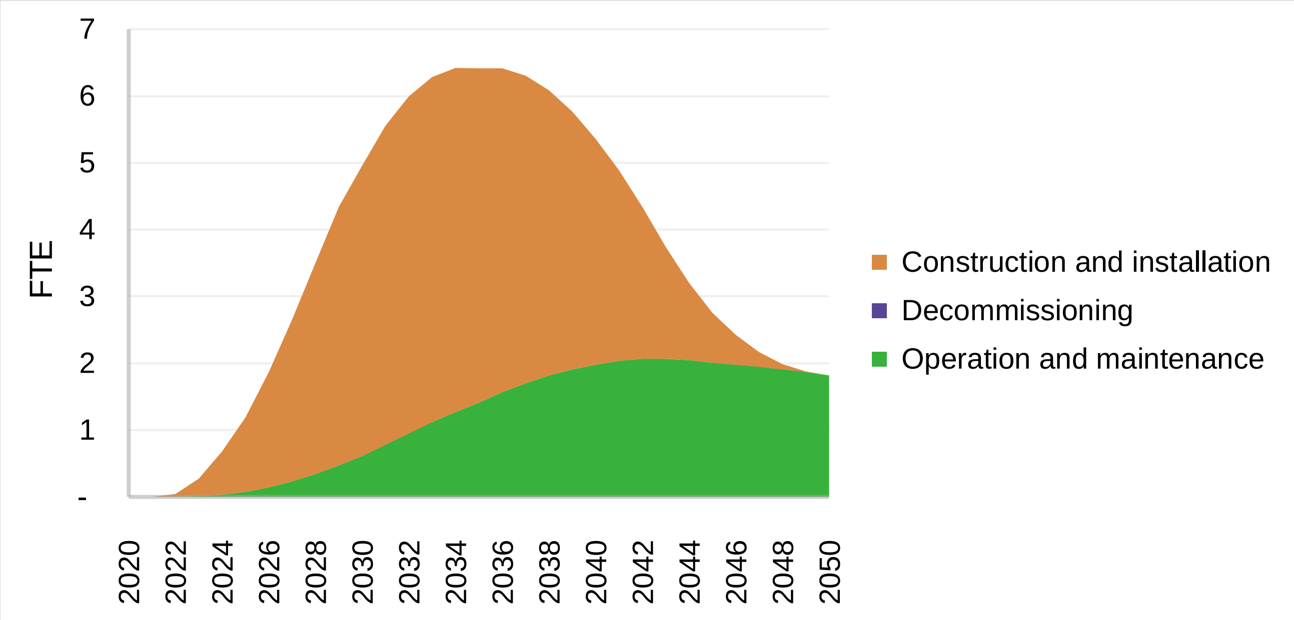


Figure 162: Suffolk CCS FTE by job type for the Net Zero 2050 Scenario



LOW CARBON SERVICES

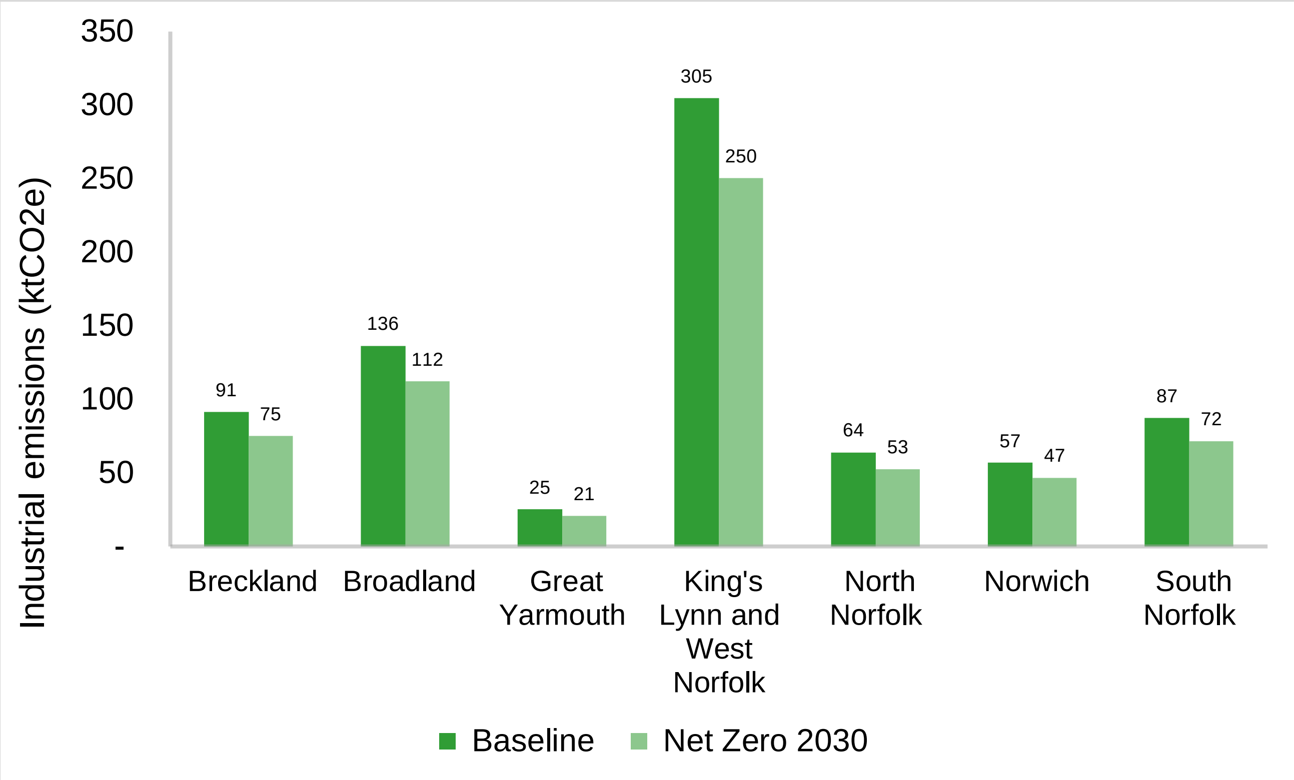
Current and expected generation capacity in Norfolk

For low carbon services we have taken reduction in industrial emissions as our indicator for estimating associated jobs, since we assume jobs in this sector are dominated by work required to allow organisations to reach Net Zero. More detail on the methodology is provided in **Appendix 1**.

Industrial emissions in Norfolk are currently estimated at around 770 ktCO2e[157], with King's Lynn and West Norfolk having the most significant value out of the local authorities. Under CCC projections, industrial emissions reduce by 18% from 2020 to 2050[158], which is the reduction we assume for all local authority industrial emissions. **Figure 163**shows the values we assume in our modelling, by local authority.

[157] DESNZ and BEIS. (2022). UK local authority and regional greenhouse gas emissions national statistics.
[158] CCC. (2020). Deep-Decarbonisation Pathways for UK Industry (Element Energy).

Figure 163: Norfolk industrial emissions values (proxy for service capacity)[159]



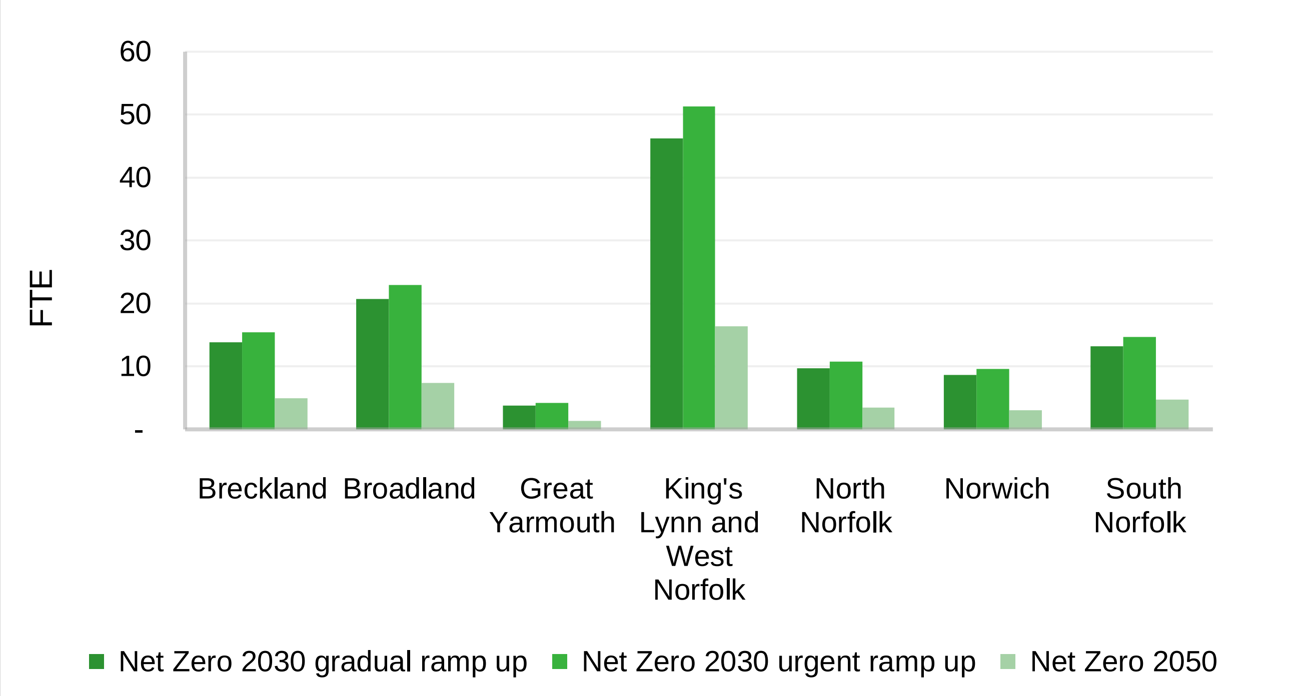
Job creation scenarios in Norfolk

For the decreases in industrial emissions given above, we have modelled low carbon services job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of emissions change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for low carbon services in different local authorities are in line with those that see the largest decreases in industrial emissions – King's Lynn and West Norfolk being the highest. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in **Figure 164**. Higher peak jobs for given scenarios are associated with faster changes in emissions levels.

[159] Baseline values taken from government data for 2020 industrial emissions at local authority level, % decrease in emissions taken from CCC industrial emissions projections.

Figure 164: Norfolk low carbon services peak jobs



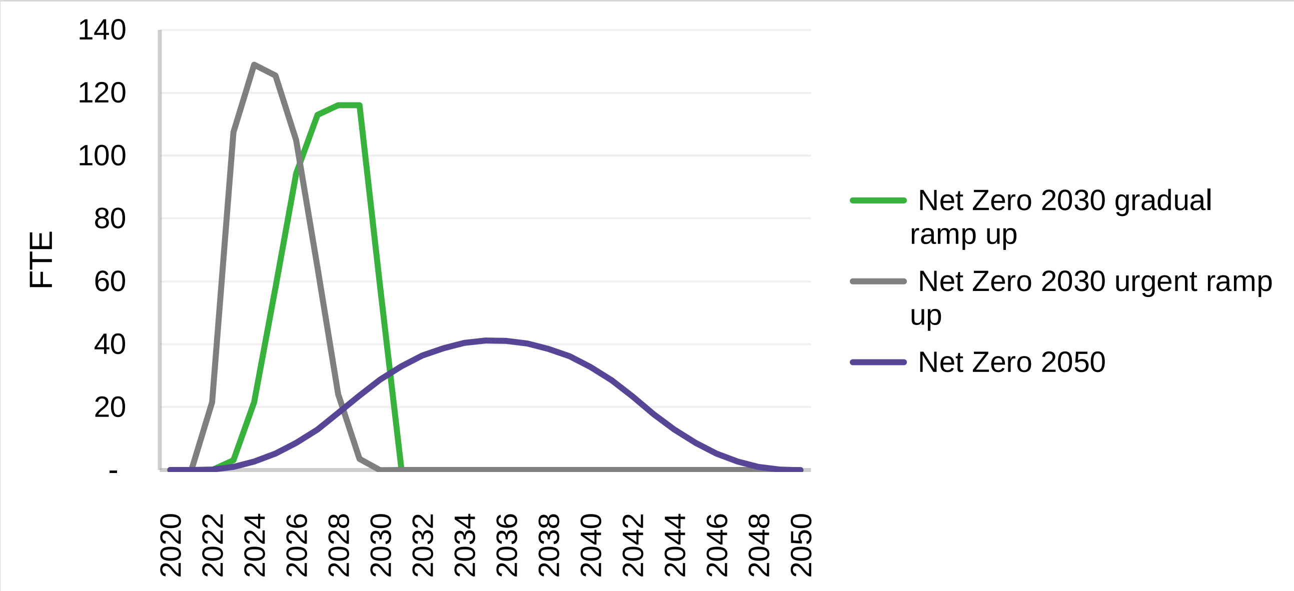
The years in which the peak jobs shown in **Figure 164** occur in each scenario are provided in **Table 57**. More insight into these values is provided by **Figure 165** below, which depicts how the total number of jobs changes over time for each scenario.

Table 57: Year in which peak jobs occur for low carbon services in Norfolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2024	2035

The development of low carbon services jobs over time for each of the three scenarios is shown in **Figure 165**. Pronounced peaks in the number of jobs required are due to concentrated changes in emissions – as seen in both of our Net Zero 2030 scenarios. For low carbon services we do not see the effects of replacement of end-of-life capacity, since we assume jobs are dominated by work required to allow organisations to reach Net Zero, rather than ongoing services, and as such are minimal after the Net Zero date.

Figure 165: Norfolk Low Carbon Services FTE



Breakdown of job types in Norfolk

Jobs in the low carbon services sector have all been taken as "service" jobs, and therefore no split is shown between construction/installation, decommissioning and operation/maintenance jobs, as has been provided for other sectors. The number of service jobs for each scenario is evident in **Figure 165**.

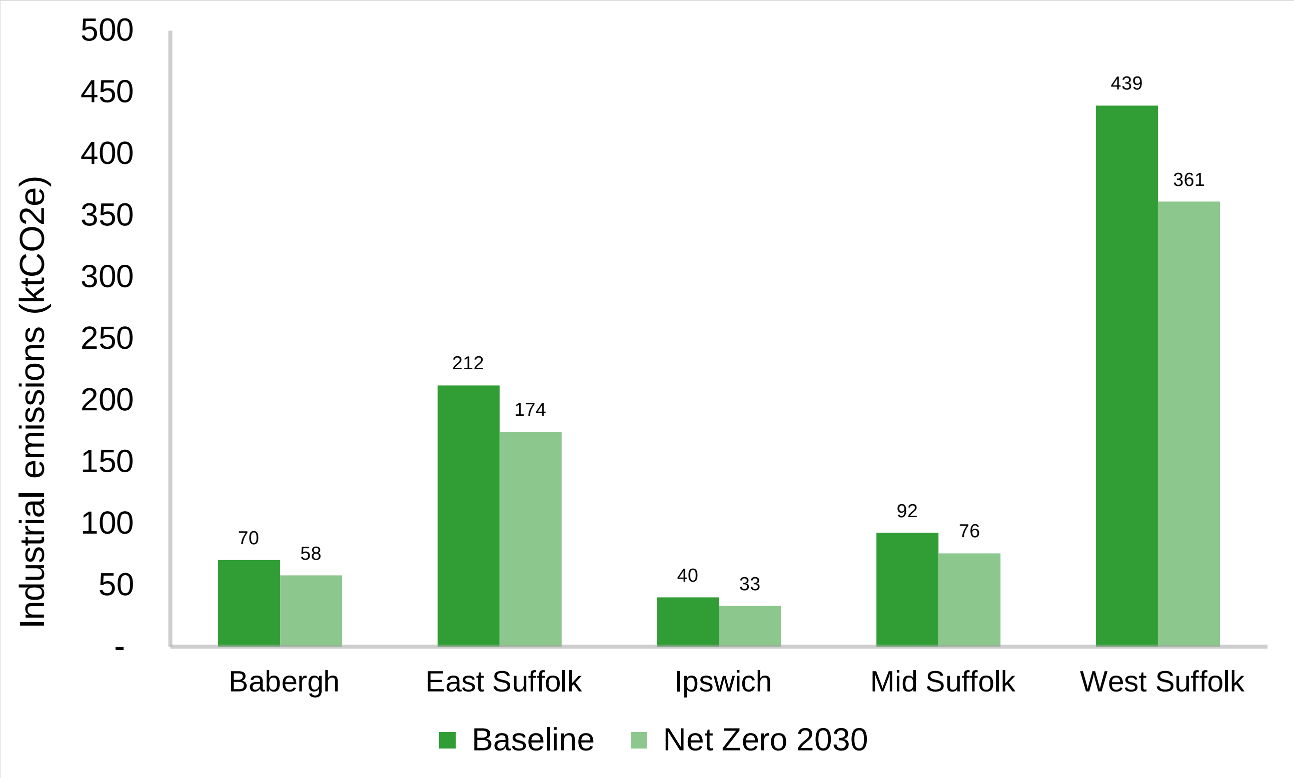
Current and expected generation capacity in Suffolk

For low carbon services we have taken reduction in industrial emissions as our indicator for estimating associated jobs, since we assume jobs in this sector are dominated by work required to allow organisations to reach Net Zero. More detail on the methodology is provided in **Appendix 1**.

Industrial emissions in Suffolk are currently estimated at around 850 ktCO2e[160], with West Suffolk having the most significant value out of the local authorities, followed by East Suffolk. Under CCC projections, industrial emissions reduce by 18% from 2020 to 2050[161], which is the reduction we assume for all local authority industrial emissions. **Figure 166** shows the values we assume in our modelling, by local authority.

[160] DESNZ and BEIS. (2022). UK local authority and regional greenhouse gas emissions national statistics.
[161] CCC. (2020). Deep-Decarbonisation Pathways for UK Industry (Element Energy).

Figure 166: Suffolk industrial emissions values[162]



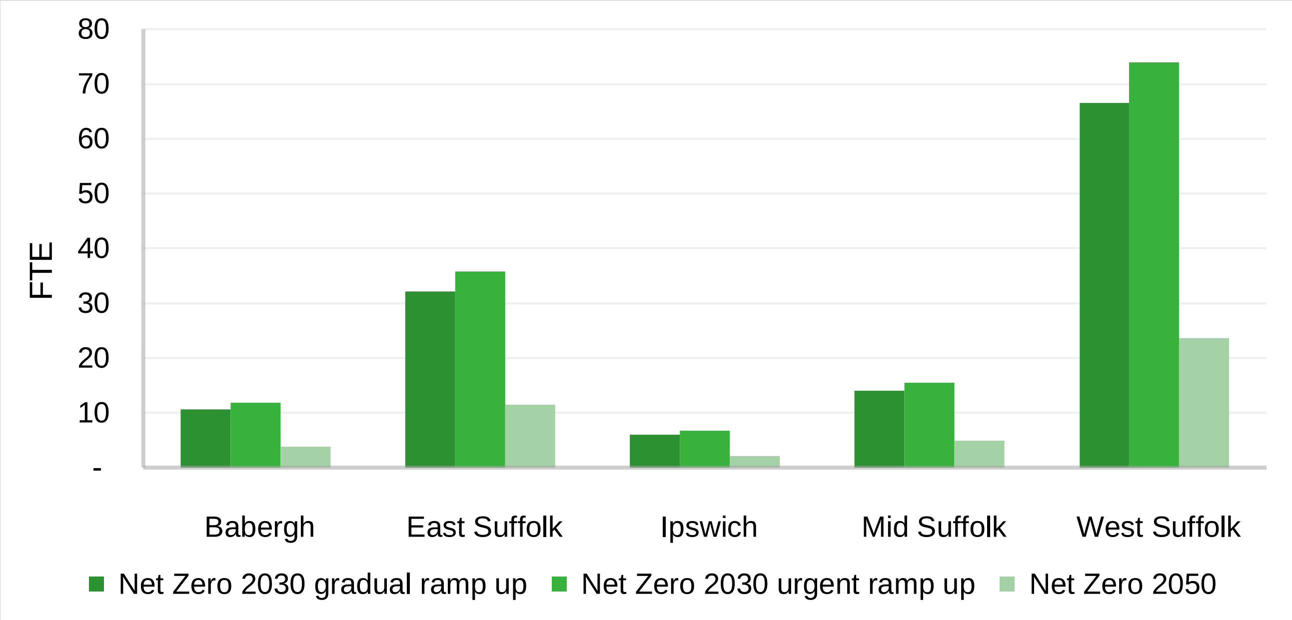
Job creation scenarios in Suffolk

For the decreases in industrial emissions given above, we have modelled low carbon services job creation in each local authority under three scenarios. Each scenario models a different pathway for the speed of emissions change over time, resulting in different levels of job creation. Details on the methodology used for jobs estimation can be found in **Appendix 1**.

Job creation hotspots for low carbon services in different local authorities are in line with those that see the largest decreases in industrial emissions – West Suffolk being the highest, followed by East Suffolk. The highest peaks are seen in the Net Zero 2030 urgent ramp up scenario, followed by the Net Zero 2030 gradual ramp up and Net Zero 2050 scenarios, as shown in **Figure 167** Higher peak jobs for given scenarios are associated with faster changes in emissions levels.

[162] Baseline values taken from government data for 2020 industrial emissions at local authority level, % decrease in emissions taken from CCC industrial emissions projections.

Figure 167: Suffolk low Carbon services peak jobs



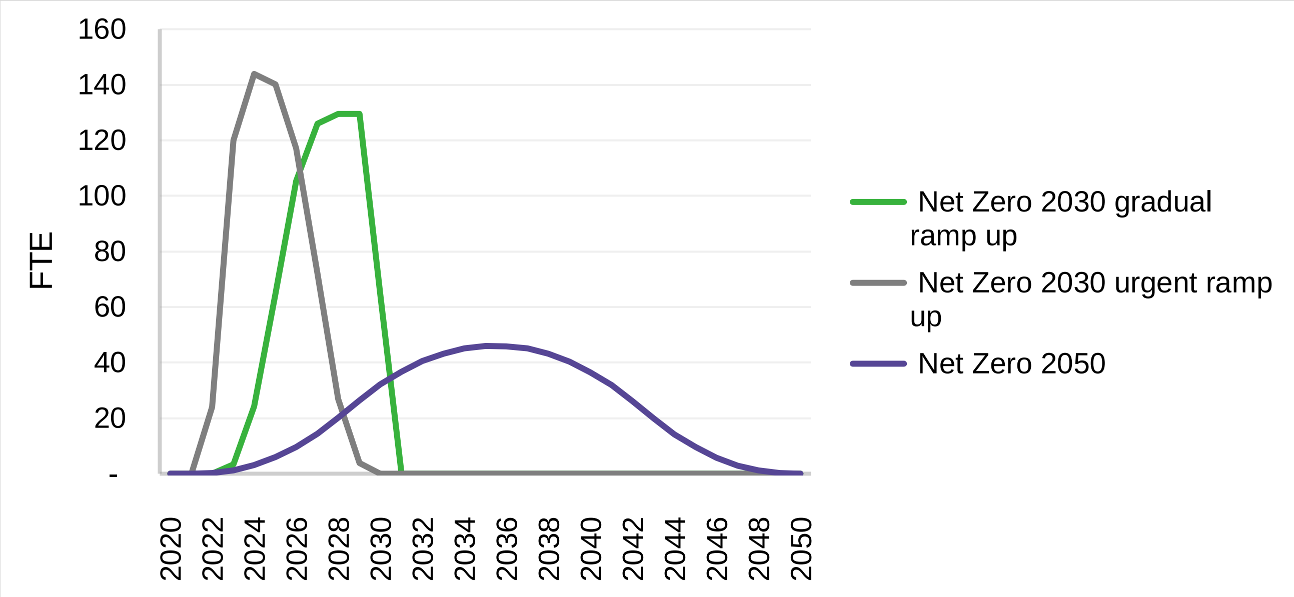
The years in which the peak jobs shown in **Figure 167** occur in each scenario are provided in **Table 58**. More insight into these values is provided by **Figure 168** below, which depicts how the total number of jobs changes over time for each scenario.

Table 58: Year in which peak jobs occur for low carbon services in Suffolk under each scenario

	NET ZERO 2030 GRADUAL RAMP UP	NET ZERO 2030 URGENT RAMP UP	NET ZERO 2050
Year in which peak jobs occur	2029	2024	2035

The development of low carbon services jobs over time for each of the three scenarios is shown in **Figure 168**. Pronounced peaks in the number of jobs required are due to concentrated changes in emissions – as seen in both of our Net Zero 2030 scenarios. For low carbon services we do not see the effects of replacement of end-of-life capacity, since we assume jobs are dominated by work required to allow organisations to reach Net Zero, rather than ongoing services, and as such are minimal after the Net Zero date.

Figure 168: Suffolk low carbon services FTE over time



Breakdown of job types in Suffolk

Jobs in the low carbon services sector have all been taken as "service" jobs, and therefore no split is shown between construction/installation, decommissioning and operation/maintenance jobs, as has been provided for other sectors. The number of service jobs for each scenario is evident in **Figure 168**.

APPENDIX 3 – LOCAL SKILLS FUNDING AND TRAINING

Norfolk County Council and Suffolk County Council provide funding support for low carbon initiatives which protect, enhance and provide access to the natural environment and reduce carbon consumption for individual businesses in the area.

Table 59: Key Funding Programmes - Norfolk County Council (NCC)

FUNDING PROGRAMME	DETAIL
Supply Chain Innovation for Offshore Renewable Energy (SCORE)	40% of eligible costs, or £50,000 with a minimum grant of £2,500 Grants are available for SMEs across England to develop new products, processes and ideas in offshore renewable energy. 12 hours of subsidised business support to help grow and develop businesses within the offshore renewables

Table 60: Key Funding Programmes - Suffolk County Council (NCC)

FUNDING PROGRAMME	DETAIL
West Suffolk Greener Businesses Grant	The Green Business Grant is funded by West Suffolk Council to help local businesses and organisations reduce their energy use and save money. Eligible businesses based in West Suffolk can apply for up to £1000 to fund capital works designed to improve environmental performance.
West Suffolk Solar	The council plans, finances, installs and manages the solar installation. The installation is a relatively simple and quick process. Once installed, the council monitors and maintains the performance. The installation is completely financed by the council.
Suffolk Carbon Reduction Loan Scheme	The loans are available to any business with fewer than 250 employees, so long as the financial criteria is met. The only restriction on the loan is that funding must go on work within Suffolk that

	delivers demonstrable carbon savings. Loans will be paid directly to the installer/ supplier and then repaid by the applicant.
Plug In Suffolk Scheme	The Plug In Suffolk Scheme offers fully funded installation of EV chargers, fully operated and maintained for businesses who want to offer EV charging to their clients/general public. Businesses pay from just £1.99/charger/day and can keep 90% of charging revenue. With this option the business doesn't pay for installation but has a fixed fee to pay each day. Different operating models are available and there is also the option of 100% green energy.
Suffolk Climate Action Community Match Fund	The Fund is to assist charities, community interest companies, parish councils, voluntary groups and other not for profit organisations who wish to deliver community-based carbon reduction projects that contribute to Suffolk's Climate Emergency Plan.
Suffolk Greener Homes 0% Loan Scheme	The Greener Homes Loan Scheme offers loans of up to £5,000 at 0% APR to help homes cut their energy use. Loans are available for energy saving measures such as insulation, boiler upgrades and renewable energy systems. Loans are only available for the installation of approved materials and technologies by accredited installers. There are two types of loan available. Short term loans (2 to 12 months) of up to £1,000 for smaller improvements such as insulation, and long term loans (1 to 3 years) of up to £5,000 for more expensive measures such as renewable projects.
Warm Homes Suffolk	Warm Homes Suffolk wants to help the people of Suffolk live in homes that cost less to heat, so they can reduce their energy usage and enjoy lower bills. Home owners, renters and landlords can apply.
Solar Together Suffolk	Local councils have teamed up with iChoosr to organise Solar Together for homeowners as well as small and medium-sized enterprises, to help deliver carbon savings across the country. All residents living in one of the participating council areas and who own their own house (or have permission from the landlord to install a solar PV system) can register for the Solar Together group-buying scheme. Small and medium-sized enterprises (non-

	domestic) and Commonhold Associations meeting this requirement can participate as well.

Table 61: Key Funding Programmes - New Anglia Local Enterprise Partnership

FUNDING PROGRAMME	DETAIL
Business Transition to Net Zero Grant	The Business Transition to Net Zero Grant is aimed at businesses in Norfolk and Suffolk with ambitions to reduce their carbon footprint and increase productivity. Grants between £25k and £100k are available, with a maximum intervention rate of 20% of the cost of the development. To be awarded the minimum of £25k, the business must show that the total project costs of at least £125k. The scheme will fund capital developments, rather than LED lighting or the supply or installation of solar panels. Eligible schemes will include those which improve productivity for the business and supply chain and make use of clean and/or renewable energy production and the recycling of goods and materials. The scheme will also take the business owner through a decarbonisation plan. To be eligible for the grant the business must meet the criteria outlined here.
Road to Net Zero Business Support Programme	The Road to Net Zero Business Support Programme is a pilot initiative designed to pro-actively pivot business support and grants on a net zero future, building business advice expertise, and developing a portfolio of tested interventions which can be rolled out further in the future. This is a pilot project, funded by the UK Community Renewal Fund from HM Government.

	There is still support available in Suffolk, but have been fully allocated in Norfolk.
Net Zero Demonstrator	Five projects are currently being progressed in support of this element of the Programme. The Challenge Fund is designed to bring innovative / creative ideas and the testing technologies in the private sector to help solve public sector net zero challenges. The Net Zero Challenge Fund enables the programme to support a small number of flagship projects at 100%.

SKILLS INVESTMENT - NORFOLK COUNTY COUNCIL (NCC)

In 2021, the New Anglia Skills Board produced the Norfolk & Suffolk Cross-Cutting Skills report, which set out the major skills challenges across Norfolk & Suffolk and the LEP's proposed solutions. Some of the key general and energy specific challenges identified in the report are listed below:

1) A net loss of near 12,000 people with a Level 4 qualification or above on an average workday.
2) Over 100,000 jobs to be filled between now and 2024 due to people leaving the workforce.
3) **Energy:** A need for a better supply of local, graduate level mechanical and electrical engineering skills.
4) **Energy:** Employers need to access skills and workers locally from other industries at key times, as much of their requirements are generic.
5) **Energy:** Delivery of apprenticeships not linked to employer needs.
6) **Energy:** Key concerns linked to the future supply of employees in the sector.
7) **Energy:** Imbalances in the workforce linked to age and gender.
8) **Energy:** Removing obstacles to residents securing jobs in the sector.

Many of the 'Cross-Cutting' issues related to each sector were centred around the lack of motivated people who are 'work-ready' as most new roles require technical knowledge. The LEP set out seven key priorities below for addressing the 'Cross-Cutting' issues:

1) **Local Sector Partnerships:** Enable local sector employers and stakeholders to articulate their skills priorities and work collaboratively to connect with national sector deals and maximise private/public skills investment.

2) **Future Industry Proofing:** Support local employers to realise opportunities from industry, ensuring that the availability of skills to work in such environments is an area of competitive advantage for the local economy.

3) **Careers Inspiration:** Support young people and adults to understand the outstanding career opportunities available locally, and the skills pathways to achieve those careers.

4) **Robust Technical Skills Pathways:** Ensure that effective, sustainable, employer-partnered local pathways (School / Apprenticeships / FE / University) are accessible for young people and adults to develop valuable technical skills urgently.

5) **In-Career Development:** Ensure high quality provision for the existing workforce to upskill in relation to the future skills needs of local businesses and the career development of local people.

6) **Teaching/Trainer Pipeline:** Ensure that there are enough qualified, technically experienced / technology-savvy teachers to meet the training and education needs of the future workforce.

7) **Building Local Skills Capacity:** Support local skills providers to be the pivotal suppliers of local skills needs, developing expertise to become nationally recognised in areas of strength.

The Council has also committed to fund a number of programmes to aid training and re-training for adults as well as supporting the Princes Trust programme, which aims to help young people who are not in full-time work and a training for work programme for pre-16 and 16-19 year olds.

The range of skills programmes to drive action at the local level the key schemes have been outlined below:

1. Training for Work – Find training opportunities in Norfolk for 16-19-year-olds on through the Help You Choose website.
2. Fast Lane Training Services – FLTS provides a training and assessment service for highways and construction contractors.
3. Princes Trust Team Programme – The Princes Trust Team Programme aims to help young people get back into education programmes or work. It also provides young people with an opportunity to build confidence and self-esteem, as well as gain new skills and meet new people.
4. Norfolk Community Directory – A directory of organisations in Norfolk offering training courses.
5. Adult Learning – A wide variety of courses including, apprenticeships and online learning support.
6. NCC Apprenticeship Strategy – The Norfolk Apprenticeship Strategy 2020-2023 sets out a strategic vision and operational action plan for apprenticeships in Norfolk across all areas of Norfolk County Council.

SKILLS INVESTMENT – SUFFOLK COUNTY COUNCIL (SCC)

Whilst SCC is yet to create a dedicated Green Skills function, the Norfolk & Suffolk 'Cross-Cutting' Skills report discussed above will aid SCC in shaping its green skills strategy. More broadly, SCC supports several initiatives to augment jobs and skills in the county – some of the key schemes are outlined below:

1. Adult Learning and Careers Advice – Adults can find out about opportunities to improve skills and confidence or learn something new with a range of courses. Courses are available for all ages, from 19 years and above.
2. Work Well Suffolk - Work Well Suffolk is a three-year project (2020-2022) being managed by Suffolk County Council. Its aim is to help more than 2,000 young people into employment by tackling barriers they may face. This includes how young people can get work experience with us or start a career in the public sector through an apprenticeship, internship and graduate placement.
3. Yojo Careers and Apprenticeships App - Young people can use the app to find apprenticeships and career advice.

To supplement SCC's work on jobs and skills the SCC has a dedicated Skills Team, which seeks to promote businesses, inspire young people and invest in skills in the county. As of October 2022, the Skills Team published a bulletin displaying achievements to date:

Adult Learning Service:

Figure 169: Academic year 2021-22 – Adult Learning Service Engagement

Work Well Suffolk

The Work Well Suffolk Team have engaged with over 1,830 participants across the county which is 101% of the target date.

- 92 people have gone into education or training.
- 424 have gone into employment or self-employment.

Apprenticeships Suffolk

- Employers engaged – 257
- Employers supported – 110
- Apprenticeships started – 49
- Established participants – 196

GREEN JOBS AND SKILLS INVESTMENT NORFOLK AND SUFFOLK – NEW ANGLIA LOCAL ENTERPRISE PARTNERSHIP FOR NORFOLK AND SUFFOLK

New Anglia is the Government's Green Economy Pathfinder Local Enterprise Partnership. As the Green Economy Pathfinder the LEP utilises and invests in green economy expertise, taking what the LEP learns and recommending to Government and national business how they can benefit from the approach[163]. An example of this work is the Fabric First Institute. The Institute runs at the Easton Campus of Easton and Otley College, the Institute trains tradespeople in specific energy efficiency construction skills. The institute has been funded by the New Anglia Skills Deal Programme, provided by Norfolk County Council, Suffolk local authorities and the Skills Funding Agency[164].The programme has been developed in support of the Norwich City Council's £300 million 'Fabric First Framework' which plans to see the development of more low energy homes (Passivhaus) in the region over the next four years. The project will also initially train 30 students at a purpose built 'low energy' house (the Fabric First Institute)[165] an example of how funding can create new green skills opportunities around a local project.

Table 62: Skills Funding - New Anglia Local Enterprise Partnership

FUNDING PROGRAMME	DETAIL
Skills Bootcamps	'Skills Bootcamps' is the Government's high profile training and recruitment initiative designed to help address workforce and recruitment needs. They last up to 16 weeks and provide training mainly at Level 3 standard or above (A level equivalent).

[163] New Anglia LEP. (N.D). Green Economy Pathfinder.
[164] Ibid.
[165] Ibid.

	The scheme helps employers who wish to retrain their existing staff so they can increase productivity, develop new business and/or retain staff. The scheme also offers opportunities to individuals who are self-employed, and also any adult employed or unemployed who is looking to gain new skills to enable them to progress. Those who are unemployed or looking for a sector change will be offered an interview with an employer for a job. **Eligibility:** Skills bootcamps should be open to all adults aged 19 or over, who are full-time or part-time employed, self-employed, unemployed, as well as adults returning to work after a break. Some bootcamps are also open to serving prisoners due to be released in six months of a completion of a Skills Bootcamp or Temporary Release.
Youth Pledge	The New Anglia Youth Pledge is supported by public and private sector stakeholders across Norfolk and Suffolk. The Youth Pledge works in three main strands: **Work Inspiration Events:** These events connect schools and colleges and other industry volunteers. The events are free to attend and offer numerous benefits to both students and employers. The two main events are held at the Suffolk or Norfolk Skills and Careers festivals. **Work Placements:** Work placements enable young people to experience industry before choosing a career. **Special Educational Needs or Disabilities Students:** Finding potential in SEND candidates.
Apprenticeships	Employers can use the New Anglia Partnership Apprenticeship Toolkit for Employers. Employers

	can also offer support to Apprenticeships Norfolk or Apprenticeships Suffolk.
Working With Students and Graduates - University of Suffolk - University of East Anglia - Norwich University of the Arts	Linking local graduates with employers.
New Anglia Careers Hub	The New Anglia Careers Hub brings together schools, colleges, employers and providers to drive forward a careers education that will support the ambitions of the business community in Norfolk and Suffolk and its young people. The careers hub also aims to develop communication between schools. The hub is jointly funded by the Careers and Enterprise Company (CEC) and the European Social Fund (ESF). **Enterprise Adviser:** The Enterprise Adviser Network (EAN) aims to increase employer engagement with schools and colleges in Norfolk and Suffolk. The Hub matches schools and colleges with business volunteers and careers programme providers to create powerful, lasting partnerships that inspire young people.
Sector Skills Plans	New Anglia LEP works with sector partners to develop skills plans for the key growth and employment sectors in the region. They identify the main skills needs of each sector and agreed actions to help meet these needs.
Norwich Opportunity Area	The Norwich Opportunity Area initiative is a partnership with the Department for Education. Norwich was identified as one of the 12 Opportunity Areas in October 2016 to improve social mobility. The Norwich Opportunity Area is a network of local partners collaborating on coordinated activities to increase social mobility in Norwich. The partnership works in four main strands:

1 – **Improving speech and communication in the early years** so that children have the best chance as they start school.

2 – **Improving teaching and attainment,** from primary school through to age 18, so that young people gain the skills, knowledge and qualifications they need for the next stage of life.

3- Advice on **careers and working life,** supporting and informing young people in key decisions around qualifications and skills needed at important transition points.

4 – Reducing the number of **children at risk of exclusion and disengagement from education,** by supporting them to overcome the problems of social mobility.

APPENDIX 4 – LIST OF RELEVANT NATIONAL COURSES

SOLAR AND WIND SPECIFIC COURSES

Gemserv used the Solar Energy UK Skills database to look for relevant courses in solar and searched the OFQUAL database and course provider websites to search for wind related courses.

Table 63: National course with relevant to the solar and wind sectors

Course	Priority Course	Ofqual Certified	Comments
LCL Awards Level 3 Award in the Installation and Maintenance of Solar Thermal Hot Water Systems		Yes	Know the requirements to install, commission and handover solar thermal hot water systems Inspect, service and maintain 'active' solar thermal hot water systems Install, commission and handover 'active' solar thermal hot water systems Know the requirements to inspect, service and maintain 'active' solar thermal hot water systems
EAL Level 3 Award In the Installation of Small Scale Solar Photovoltaic Systems		Yes	This qualification allows the learner to acquire underpinning knowledge and related skills for the installation of small scale solar photovoltaic systems.
BPEC Level 3 Award in the Installation and Maintenance of Solar Thermal Hot Water Systems		Yes	Know the requirements to install, commission and handover solar thermal hot water systems Inspect, service and maintain 'active' solar thermal hot water systems Install, commission and handover 'active' solar thermal hot water systems Know the requirements to inspect, service and maintain 'active' solar thermal hot water systems
LCL Awards Level 3 Award In the Installation and Maintenance of Small Scale Solar Photovoltaic Systems		Yes	Know the requirements to install, commission and handover small scale solar photovoltaic systems Install, commission and handover small scale solar photovoltaic systems

			Know the requirements to inspect, service and maintain small scale solar photovoltaic systems Inspect, service and maintain small scale solar photovoltaic systems
NOCN Level 3 Award for Solar PV Installer and Operator	X	Yes	Available on OFQUAL website but not on NOCN list of courses.
NOCN Level 5 Certificate for Certified Solar Photovoltaic Practitioner	X	Yes	The learner will learn key practical skills and knowledge in these mandatory units: Photovoltaic Systems Design and Development & Producing Photovoltaic Technical Reports and Feasibility Studies
ITC Level 1 Certificate in Safe Working Practice in the Wind Turbine Industry		Yes	The training intended to provide skills and knowledge for those new to the Wind Turbine Industry. It is a pathway to the Level 2 Diploma.
ITC Level 2 Diploma in Safe Working Practice in the Wind Turbine Industry		Yes	This qualification has been developed in conjunction with MaerskTraining in Newcastle to support the needs of those entering employment in this sector. The training intended to provide skills and knowledge for those seeking employment the Wind Turbine Industry.
Level 2 Diploma in Electrical Power Engineering - Distribution & Transmission (Technical Knowledge) (2304-17)	X	Yes	Replaced what was previously the City & Guilds Level 3 Diploma In Electrical Power Engineering - Wind Turbine Maintenance (Technical Knowledge)
Level 2 Diploma in Electrical Power Engineering (2304-21)		Yes	Replaced what was previously the City & Guilds Level 3 Diploma In Electrical Power Engineering - Wind Turbine Maintenance (Technical Knowledge)
ITC Level 3 Certificate in Safe Working Practice in the Wind Turbine Industry		Yes	This qualification has been developed to provide learners with key safety knowledge and skills as well as fundamental technical skills and knowledge to be able to enter the wind turbine industry. Based on inter/national Global Wind Organisation (GWO) safety standards the qualification includes a comprehensive set of units to give learners a launch pad to commence or continue their journey into the sector.

Level 3 NVQ Diploma in Electrical Power Engineering - Wind Turbine Operations and Maintenance	X	Yes	

MOBILITY

Courses were found via official OFQUAL database. The awards are dominated by awareness courses and vehicle maintenance courses with only one course on installation of EV charge points.

Table 64: National mobility courses

Course	Priority Course	Ofqual Certified	Comments
IMI Level 1 Award in Electric/Hybrid Vehicle Awareness		Yes	
City & Guilds Level 1 Award in Introduction to Electric and Hybrid Vehicle High Energy Systems		Yes	
City & Guilds Level 2 Award in Safe Maintenance of Electric and Hybrid Vehicles		Yes	
City & Guilds Level 2 Award in Hazard Management of Electric and Hybrid Vehicles		Yes	
IMI Level 2 Award in Preparing Heavy Electric/Hybrid Vehicles for Repair		Yes	
IMI Level 2 Award in Electric/Hybrid Vehicle Hazard Management for Emergency and Recovery Personnel		Yes	
IMI Level 2 Award in Electric/Hybrid Vehicle Routine Maintenance Activities		Yes	
IMI Level 3 Award in Electric/Hybrid Vehicle System Repair and Replacement		Yes	

LCL Awards Level 3 Award in the Installation and Commissioning of Electric Vehicle Charging Equipment in Domestic, Commercial and Industrial locations	X	Yes	This qualification covers the installation of dedicated conductive charging equipment for the charging of pure electric and plug-in hybrid electric road vehicles (PHEV) and includes the extended range of electric vehicles (E-REV). It covers the installation of both AC and DC charging equipment intended for plug-in electric vehicles (PEV) complying with BS EN 61851 and "The Code of Practice for Electric Vehicle Charging Equipment Installations".
Level 3 Award in the design and installation of domestic and small commercial electric vehicle charging installations (2921-31)	X	Yes	
Level 3 Award in the Design and Quality Assurance of Largescale Electric Vehicle Charging Installations (2921-32)	X	Yes	
Level 3 Award in the Installation and Maintenance of Largescale Electric Vehicle Charging Installations (2921-33)	X	Yes	
IMI Level 3 Award in Heavy Electric/Hybrid Vehicle System Repair and Replacement		Yes	
City & Guilds Level 3 Award in Component Removal and Replacement in Hydrogen Fuel Cell Electric Vehicles		Yes	
City & Guilds Level 3 Award in Component Removal and Replacement in Hydrogen Fuel Cell Electric Vehicles		Yes	
City & Guilds Level 4 Award in Diagnosis and Rectification of Faults in Hydrogen Fuel Cell Electric Vehicles		Yes	Level 4; not yet available (from Feb 2024)
IMI Level 4 Award in the Diagnosis Testing and Repair of Electric/Hybrid Vehicles and Components		Yes	
Postgraduate Engineer (ST0456)		Yes	**Level 7** – suitable adjacent qualification for highly skilled roles such as Smart Connected and Autonomous Vehicle Engineer; Sustainable Automotive Electrification Engineer; Engineering Business Manager

BIOENERGY & ALTERNATIVE FUELS

Courses were found via official OFQUAL database. The hydrogen related courses are only available in Northern Ireland with bioenergy courses relating to installation of biomass boilers rather than large installations.

Table 65: National course with relevant to bioenergy and alternative fuels

Course	Ofqual Certified	Comments
IMI Level 1 Award in Hydrogen Awareness	Yes	https://register.ofqual.gov.uk/Detail/Index/47955?category=qualifications&query=hydrogen
OCN NI Level 2 Award in Hydrogen Applications and Technologies	Yes	Only in Northern Ireland https://register.ofqual.gov.uk/Detail/Index/48350?category=qualifications&query=hydrogen
OCN NI Level 3 Award in Hydrogen Applications and Technologies	Yes	Only in Northern Ireland https://register.ofqual.gov.uk/Detail/Index/48104?category=qualifications&query=hydrogen
LCL Approved GTEC Level 3 Biomass Installer	No	Need pre-requisites of energy efficiency and water quality https://gtec.co.uk/gtec-training-courses/renewable-training-courses/biomass-installer-training-course/
HETAS H005 | Biomass Appliance Installer	No	https://www.hetas.co.uk/trade/training-courses/h005-biomass-appliance-installer/

FUEL CELLS AND ENERGY STORAGE

Battery and fuel cell specific courses are sparse but a publication by the National Electrification Skills Framework[166] and Forum highlights existing courses which could be applicable to batteries. Gemserv internal knowledge was used to decide whether courses were also applicable to fuel cell roles.

Table 66: National course with relevant to fuel cells and energy storage

Course	Priority Area	Ofqual Certified	Comments
Lean Manufacturing Operative (ST0420)		Yes	**Level 2** – suitable qualification for battery and fuel cell assembly operative

[166] HVM Catapult, 2021. National Electrification Skills Framework

BTEC L2 Diploma in Manufacturing		Yes	
Maintenance and Operations Engineering Technician (ST0154)		Yes	**Level 3** – suitable qualification for Electrode and Cell Assembly Technician; Battery Formation, Aging and Testing (FA&T); Control Room Technician; Maintenance Technician; Battery Module and Pack Technician; Fuel Cell Stack Technician
Science Manufacturing Technician (ST0250)		Yes	
BTEC L3 Certificate in Applied Science		Yes	
BTEC L3 Diploma in Engineering		Yes	
Process Leader (ST0695)		Yes	**Level 4** – suitable qualifications for battery and fuel cell team leader and quality manager
Quality Practitioner (ST0853)		Yes	
Digital and Technology Solutions Professional (ST0119)		Yes	**Level 6** – suitable adjacent qualification for highly skilled roles such as Battery / Fuel Cell Engineer; Software Engineer; Network Engineer; Data Analyst
Product Design and Development Engineer (ST0023)		Yes	
LCL Awards Level 3 Award in the Design, Installation and Commissioning of Electrical Energy Storage Systems	X	Yes	This regulated qualification is for those wishing to achieve a nationally recognised qualification in the design, installation and commissioning of Electrical Energy Storage Systems. The qualification has been designed in conjunction with the latest IET Code of Practice and is recognised by the Microgeneration Certification Scheme (MCS).
EAL Level 3 Award in the Design Installation and Commissioning of Electrical Energy Storage Systems	X	Yes	This qualification covers the covers the knowledge, understanding and some of the skills associated with the design, specification, installation, inspection, testing, commissioning and handover of electrical energy storage systems (EESS). It follows the IET Code of Practice for Electrical Energy Storage Systems and industry guidance, together with the requirements of BS 7671. It is aimed at competent electricians who wish to demonstrate they have the necessary

			understanding and skills associated with an EESS associated typically with a dwelling. It has a range of relevant outcomes covering statutory legislation applicable to EESS, the principles of batteries and EESS, how to specify and design an EESS, installation, inspection and testing, and handover of an EESS.
Battery Manufacturing Technician Level 3		N/A	A current standard being developed

To find out more please contact:
jon.regnart-russell@gemserv.com
Choose the Gemserv office location

WRITTEN BY GEMSERV

Gemserv