

# A clean COVID-19 recovery: UK

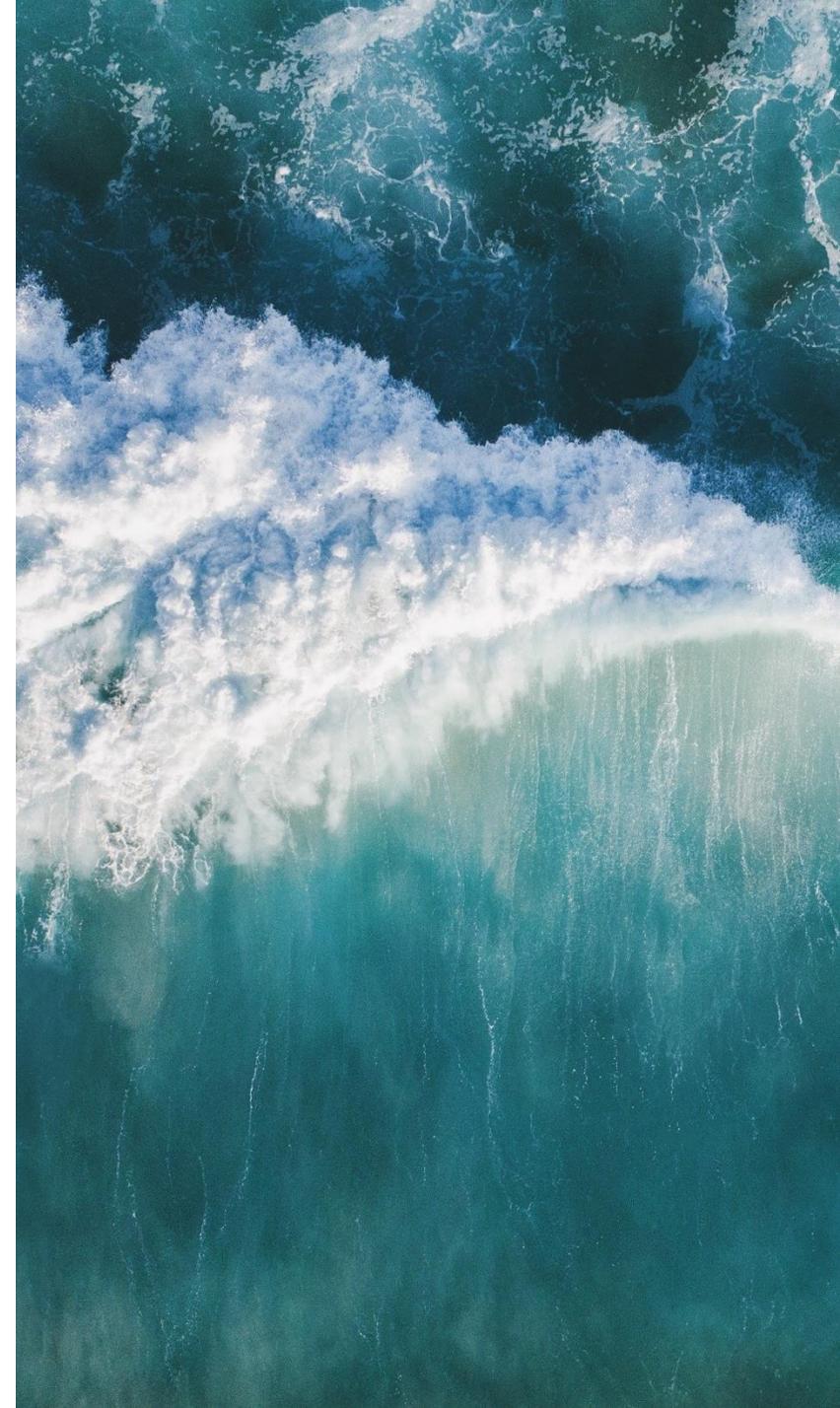
668 projects for a green COVID-19 recovery and resilience plan for the UK

May 2021

Prepared by EY-Parthenon,  
funded by the European Climate Foundation

# Agenda

- ▶ Executive summary
- ▶ Scale of the opportunity
- ▶ The UK's renewables journey so far
- ▶ Key policy recommendations
- ▶ Appendix



# A green recovery focused on renewable energy can kick-start economic growth, reverse ca. 90% of job losses from the pandemic, and enable a step-change on climate

**1** The UK has gained momentum towards decarbonisation, becoming a global leader in offshore wind generation - but more work remains to be done to achieve its ambitious net zero and energy transition targets

- ▶ Contracts for difference (CfDs) have been the key policy enabler behind rapid deployment of renewables capacity - the UK had 10.5GW of offshore wind in operation at the end of 2020, the highest of any country globally.

**2** A post-COVID-19 green economic recovery presents a significant opportunity to make further headway in realising the UK's renewable energy potential and draw in billions of pounds in private capital to multiply the effect of economic stimulus spending. The UK has already made headway as an early mover on green recovery, but more can be done

- ▶ The UK has a \$150bn+ pipeline of investible renewable energy projects, large enough to play a key role in a broader post-COVID-19 economic recovery and have a transformational impact on the UK energy sector.
- ▶ Investment in renewable capacity deployment will be private-led, with only limited government expenditure required to draw in large private capital investment. Previous CfD auction rounds have seen ca. £100 of private investment for every £1 of government spending.

**3** Targeting economic renewal through green energy offers enormous potential for sustained job creation and economic growth, especially in Northern England and Scotland

- ▶ The current project pipeline alone has the potential to create 625,000 jobs, mitigating 90% of job losses from the COVID-19 pandemic.
- ▶ Furthermore, the renewable energy investments enabled by the visible pipeline is a major opportunity to advance regional development objectives as part of the 'levelling up' agenda.



We have identified a 43GW pipeline of 668 'shovel ready' projects that will enable the UK to meet its climate ambitions, create jobs and drive economic growth through a green recovery

# The visible project pipeline is large enough to contribute significantly to the UK's renewable energy and climate agenda, as well as economic growth



**668 projects in the pipeline**



**82 metric tons of carbon dioxide equivalent (MtCO<sub>2</sub>e) avoided**



**US \$190bn of private-led investment**



**43GW of renewable generation capacity**



**Up to 625,000 jobs created**



**US\$5bn recurring Gross Domestic Product (GDP) impact**

The visible pipeline of projects has the potential to unlock positive environmental value and contribute significantly to the UK's renewable energy and climate targets

- ▶ The deployment of the identified projects will contribute positively to progress towards the achievement of the UK's carbon budgets and net zero target by 2050.
- ▶ The project pipeline is estimated to contribute a reduction in CO<sub>2</sub> emissions of 82 MtCO<sub>2</sub>e per year reduction in CO<sub>2</sub> emissions - this represents a 23% reduction in total UK emissions and contributes 34% of the UK's 2030 Nationally Determined Contributions (NDC) emissions reduction target.
- ▶ Additional benefits include improved air quality and health outcomes, as well as improved gender equality - a 2019 International Renewable Energy Agency (IRENA) report found that representation of women is 10% better in the renewables sector compared with traditional energy industries.

The projects identified represent US\$190 billion opportunity for private-led investment, and have the potential to support an estimated 625,000 jobs

- ▶ The low-carbon projects identified may make a major contribution to a green economic recovery in the UK, and job creation would cover the full extent of the job losses attributed to the COVID-19 pandemic in the UK.
- ▶ The 625,000 potential jobs exceed the number of jobs in the UK oil and gas sector, which is estimated to employ 269,000 people. The number of jobs created depends in large part on the UK's ability to strengthen its renewable energy supply chain: in particular, manufacturing for offshore wind.
- ▶ Roughly 80% of jobs require low-to-medium education, in vocational rather than academic skills.
- ▶ Job creation has the potential to support regional levelling up in coastal towns and industrial clusters such as the Humber and East Anglia.

# The UK has several policy levers that can be pulled to unlock the potential in the visible renewable energy pipeline and accelerate broader renewables investment

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- 1 Set new, bold targets for capacity expansion that are specific to onshore wind and solar photovoltaic (PV), alongside the 40GW target for offshore wind (as the UK increases electrification across sectors such as transport and heating, this is a 'no regrets' policy decision, which will enable the UK to meet its energy needs)

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- 2 Extend CfDs more ambitiously across onshore wind, solar PV and offshore wind, with price floors in place to secure developer and investor confidence

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- 3 Expand and upgrade the grid network through infrastructure projects that are transformative in nature, such as the North Sea offshore grid, and that have the potential to support and accelerate new renewables capacity deployment

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- 4 Actively use green investments as a means to strategically strengthen and build new industry clusters and level up UK regions, with a particular focus on offshore wind

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- 5 Set the EU Emissions Trading System (ETS) cap in line with the Climate Change Committee (CCC) recommendation of 39 MtCO<sub>2</sub>e for the power sector in 2023, falling to 14 MtCO<sub>2</sub>e by 2030 (this will ensure the carbon price continues to help drive zero emission power investments)

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- 6 Pursue an ambitious 'sector deal' for hydrogen supported by both government and private investment, with an explicit ambition to make the UK a global leader in the development, production and use of this technology as a means to unlock the broader potential of a green economy

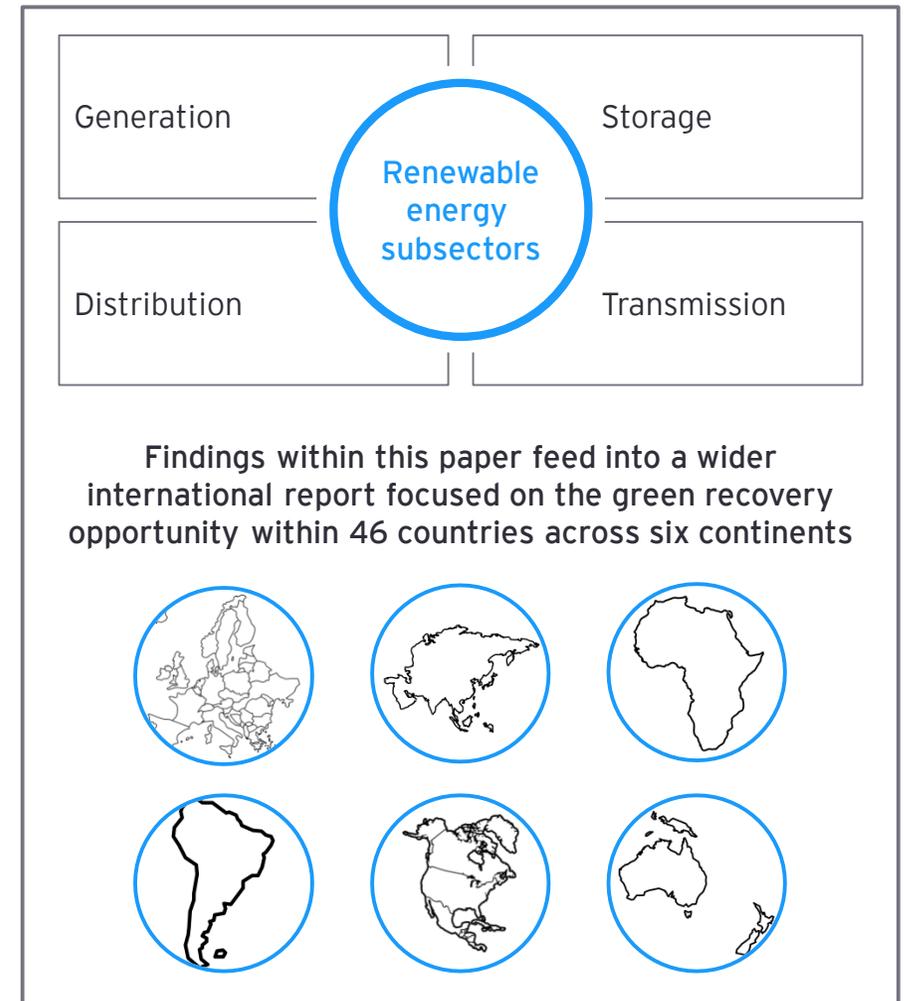
# This report is focused on shovel-ready renewable energy projects within the UK, and the key enablers and policy recommendations that will help fulfil the pipeline

The objective of this report is to support the development of green recovery plans by providing an overview of shovel-ready investment opportunities

- ▶ EY teams have identified projects that can support jobs in the short term and contribute to the UK's renewable energy and climate objectives. Projects were researched within four subsectors of renewable energy (generation, storage, transmission and distribution), primarily using secondary research (e.g., databases), and supplemented by interviews with local stakeholders (including project developers, investors, public organisations and academics).
- ▶ The 668 shovel-ready opportunities all have the potential to create environmental, economic and social value in the coming years. These opportunities are real, requiring some stimulus in order to be realised (which could be additional financing or overcoming other barriers).

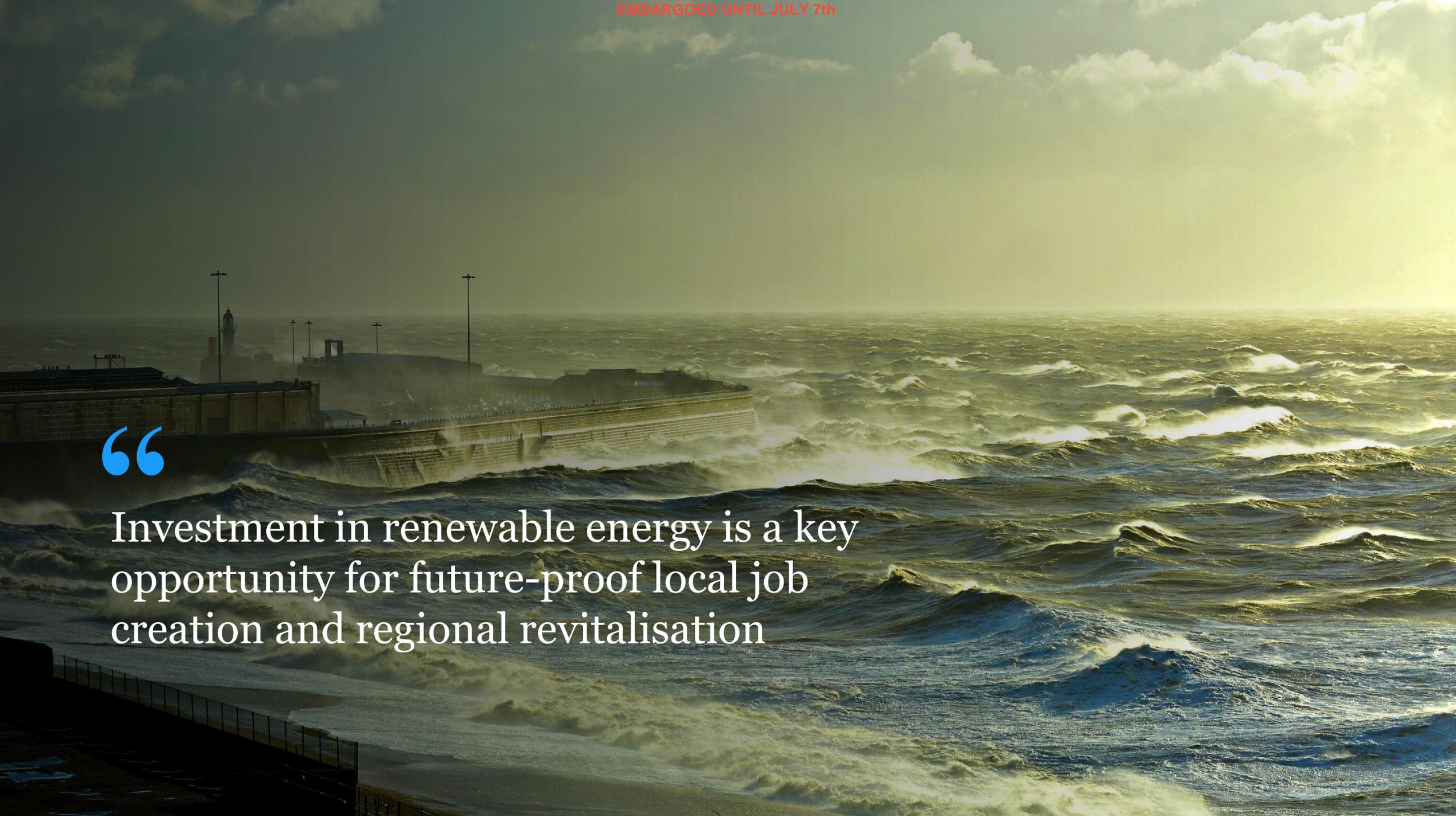
The projects identified represent a subset of the green projects under development in the UK

- ▶ This list of projects uncovered has been collated over a short timeframe. It illustrates an initial view of the size of the project pipeline that exists within the UK to underpin a green and resilient recovery from the COVID-19 economic crisis.
- ▶ The list can only be seen as a subset of all projects with climate benefits under development in the UK at various levels of maturity, as we have primarily focused on short-term opportunities, i.e., projects that will reach financial close in the next 24 months.
- ▶ Furthermore, we have also only focused on renewable energy rather than other forms of green projects such as electric vehicles or energy efficiency solutions.



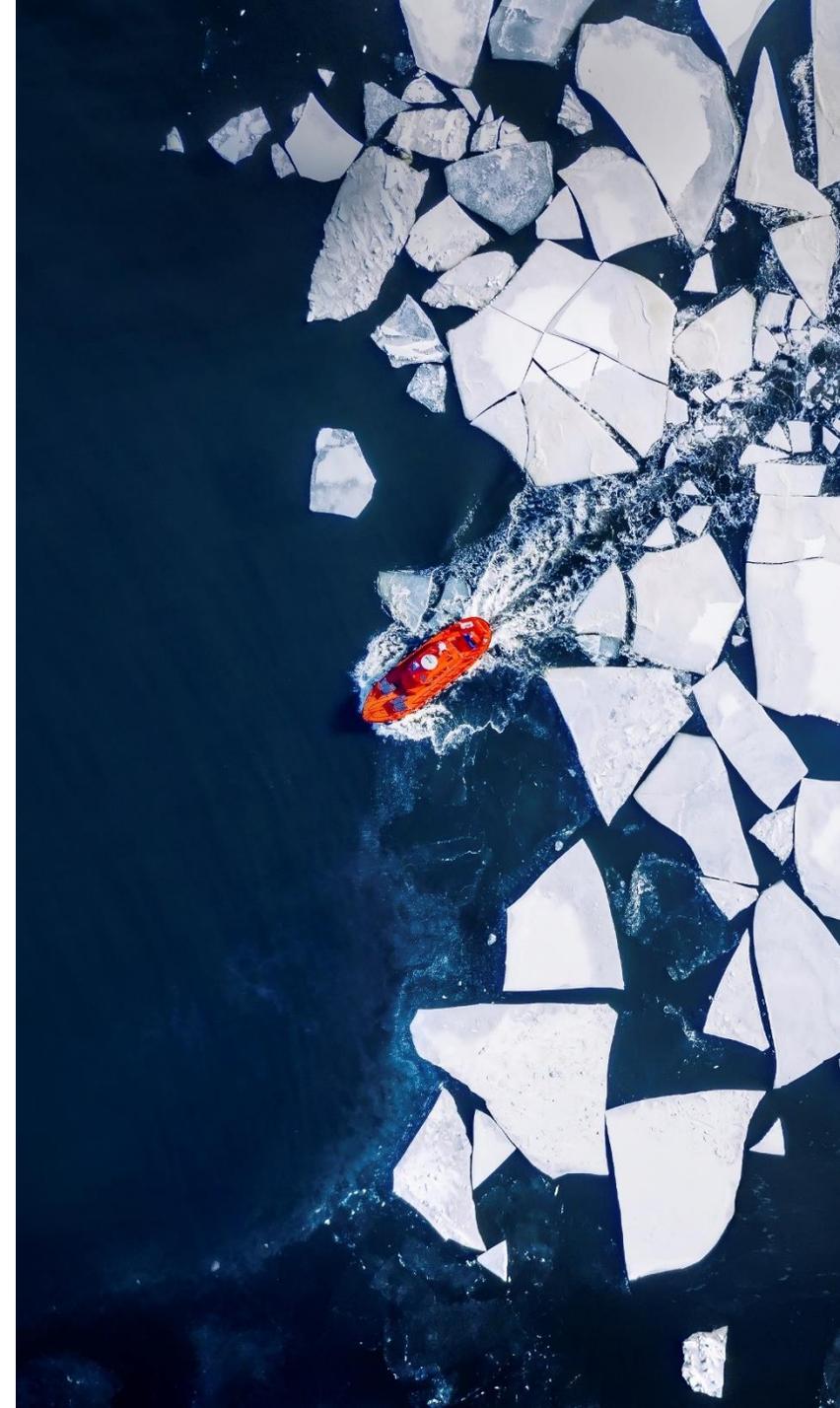
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Investment in renewable energy is a key opportunity for future-proof local job creation and regional revitalisation



# Agenda

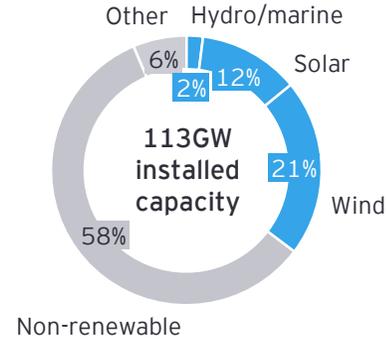
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# The visible pipeline of renewable energy projects in the UK contains 668 projects

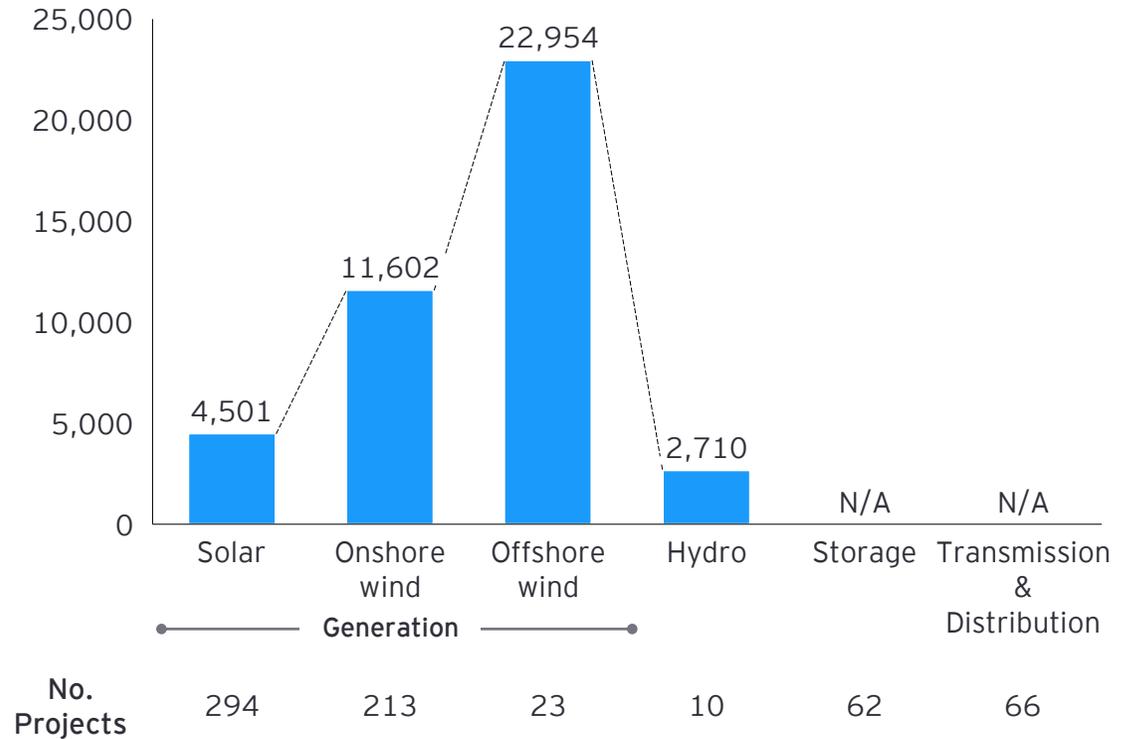
## Country overview

GDP	US\$2,722bn
Population	67mn
GDP per capita	US\$40,642
Electricity consumption per capita	4.8MWh
Emissions per capita	5.1 t CO2



## Breakdown of 668 projects identified by subsector

Total capacity (MW)



### Key targets

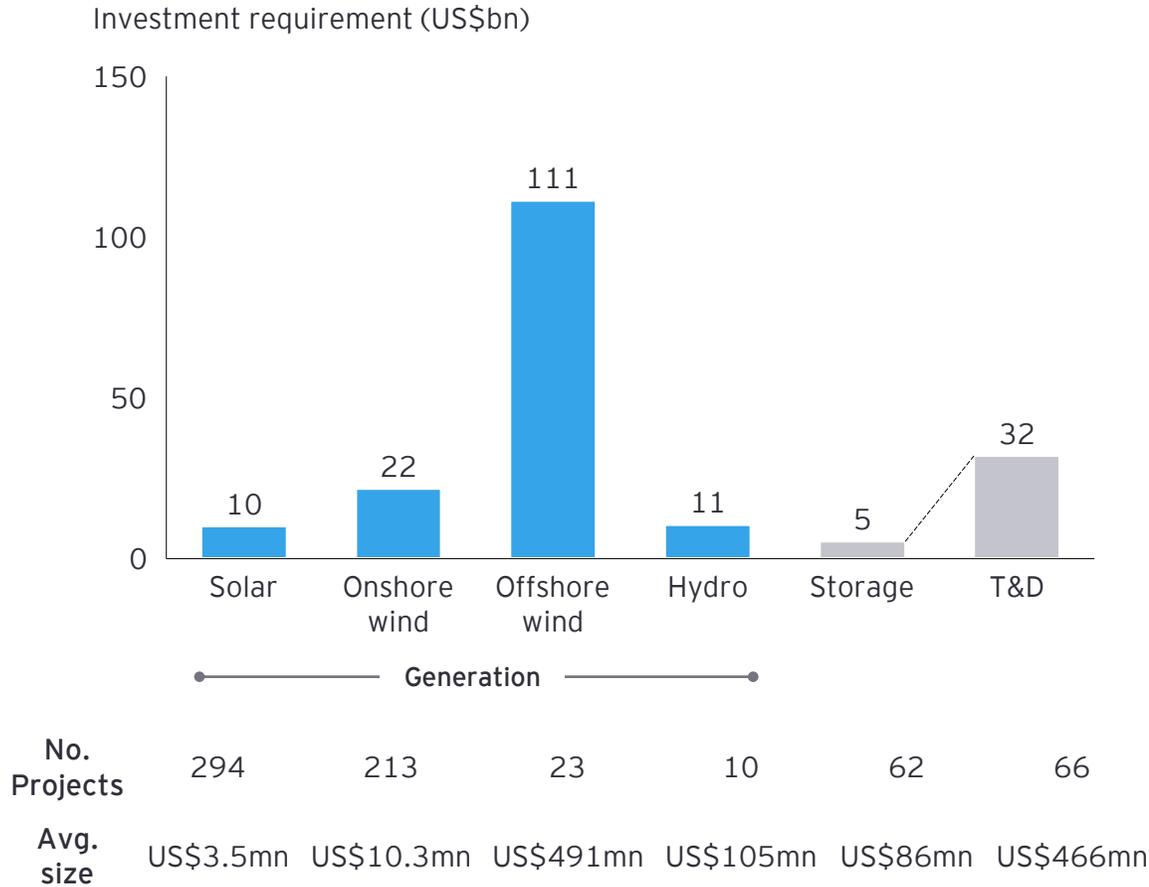


- Net zero** by 2050
- 40GW** offshore wind capacity by 2030
- 5GW** low-carbon hydrogen production capacity by 2030

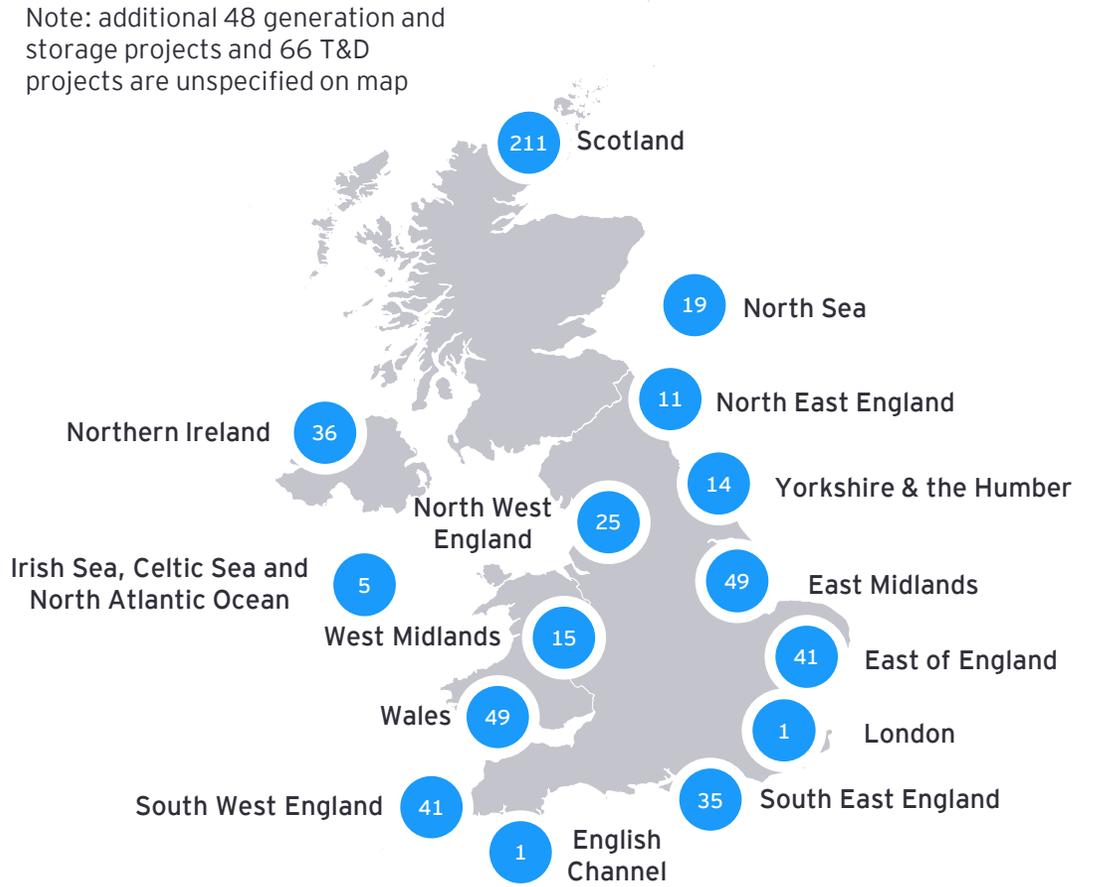
Scale of the opportunity

A potential US\$190bn of investment is required to fulfil the project pipeline identified, spanning several regions of the UK

Breakdown of 668 projects by size of investment

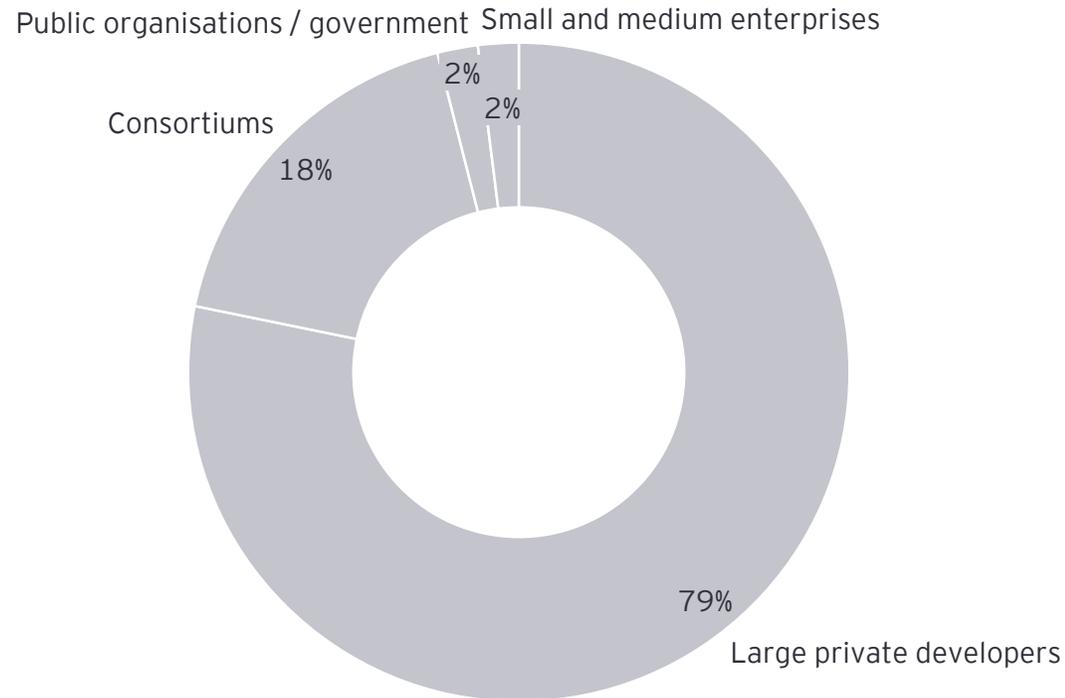


Breakdown of 668 projects by geography (units, projects)

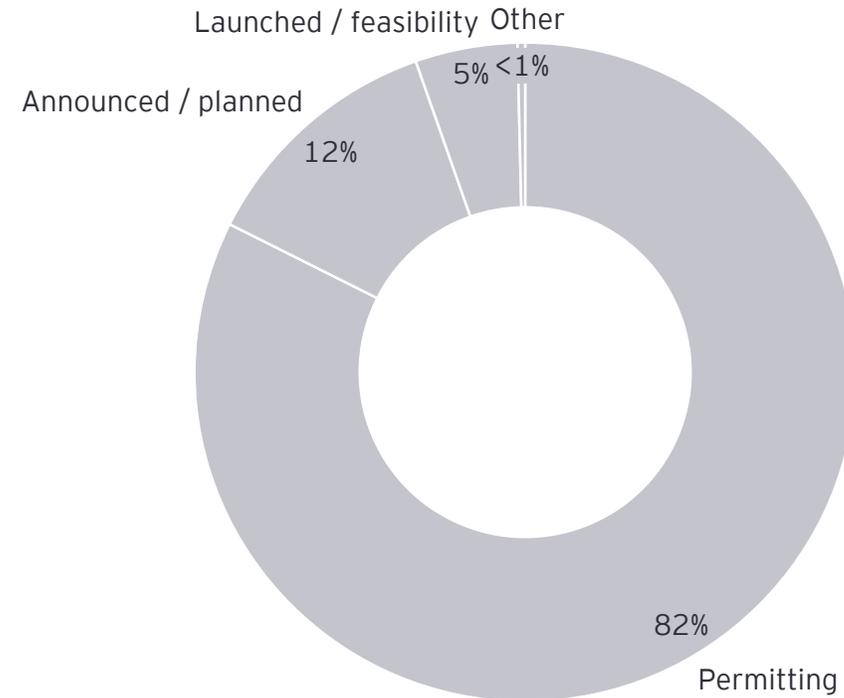


# Private organisations are the primary driver behind the size of the project pipeline, with the majority in the permitting stage

Breakdown of the developer type for 540 generation projects (%)

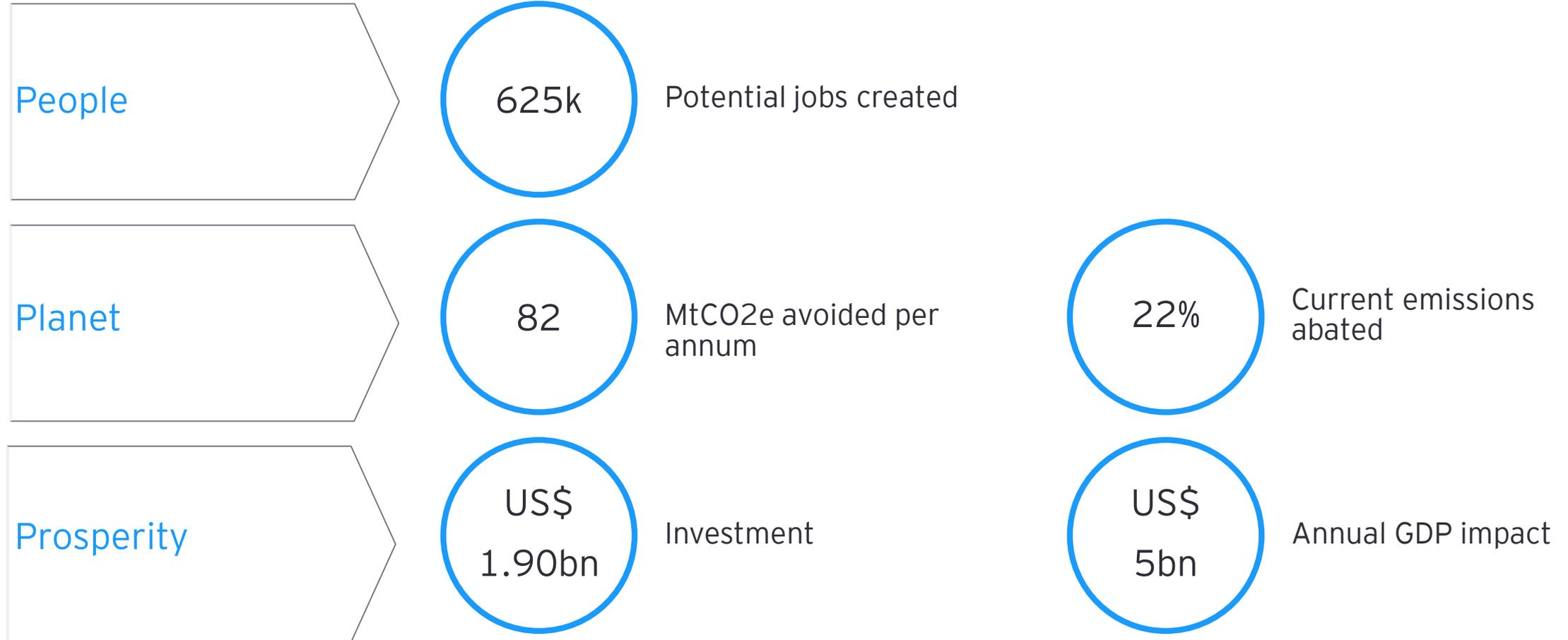


Breakdown of the maturity level for 540 generation projects (%)



# A green post-COVID-19 economic recovery can have a massive positive impact on UK jobs, emissions and economic growth

## Potential impact from visible pipeline of renewable energy projects



Note: an additional 570,000 manufacturing jobs could be created in-country with a localised supply chain.  
Source: EY-Parthenon analysis.

# People

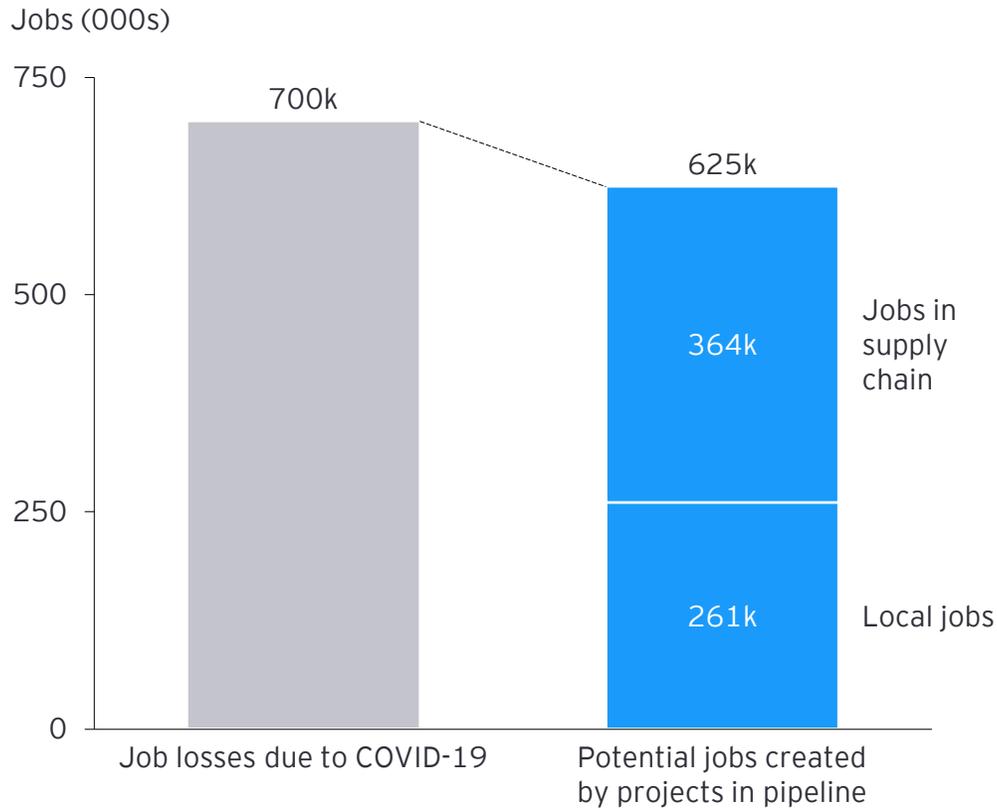
Up to 625,000 jobs created



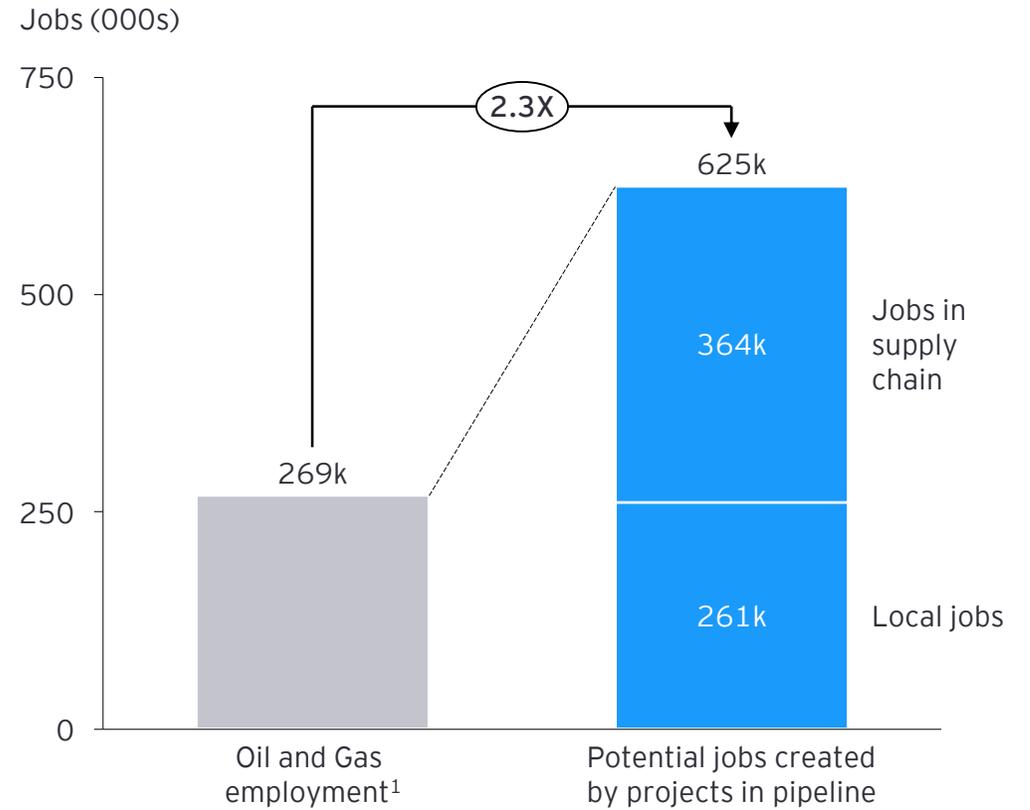
# The visible pipeline can create up to 625,000 jobs; realising the full potential depends on further strengthening local supply chains

People
Planet
Prosperity

### Job creation potential from visible pipeline vs. 2020 COVID-19 job losses



### Job creation potential from visible pipeline vs. current employment in oil and gas



1. Total employment supported by the offshore oil and gas industry. Source: Oil & Gas UK, Office for National Statistics (ONS).

# The Humber offshore wind cluster shows how investment in renewables can be used to create jobs and level up targeted regions

People
Planet
Prosperity

## Case study: Humber Offshore Wind Cluster, UK



- ▶ The Humber has been established as a cluster for offshore wind in the UK, with the objective of revitalising the region after a period of economic decline, driven by loss of jobs in traditional industries.
- ▶ The region is now home to six operational offshore windfarms (including Hornsea One, the world's largest offshore windfarm) and is set to become one of the key drivers of the UK Government's commitment to 40GW offshore energy capacity by 2030.
- ▶ The Port of Hull is an integral part of the region's infrastructure and has been a key supporting part of the economic recovery.

Hull City Council<sup>1</sup> reported that private investment into the city, including £310m by Siemens Gamesa and ABP, has led to:

10% improvement in local gross value added (GVA)

13% improvement in local employment

60% reduction in local unemployment benefit claimants

30% growth in local enterprises

1. Hull is a large city located in Yorkshire & the Humber.  
Source: Hull City Council, RenewableUK, EY-Parthenon analysis.

# Planet

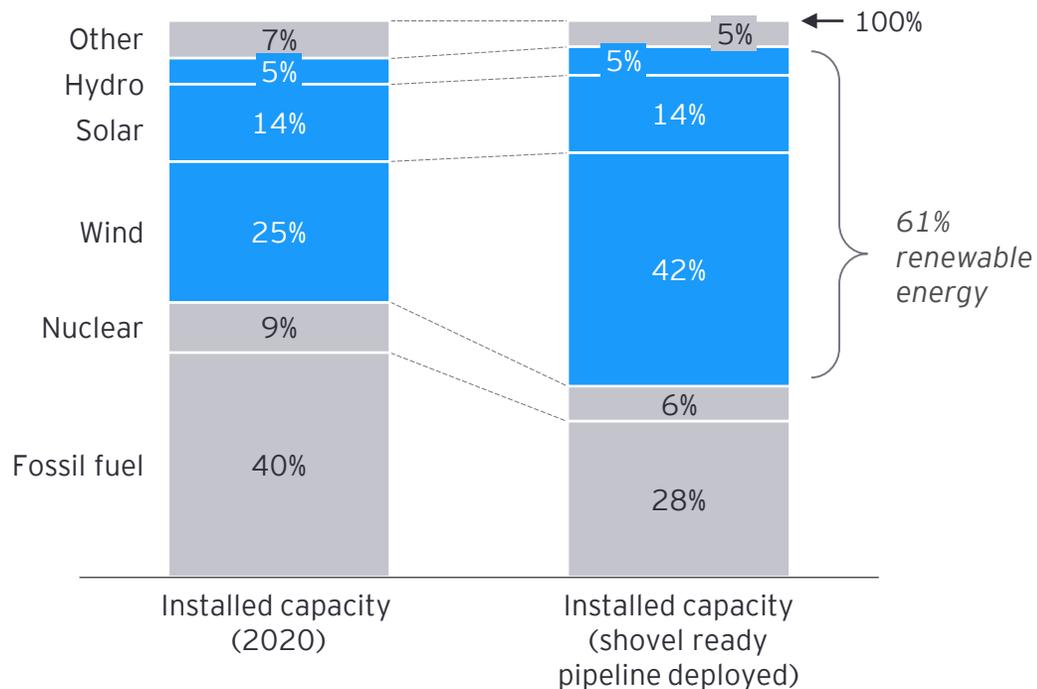
22% reduction in total emissions



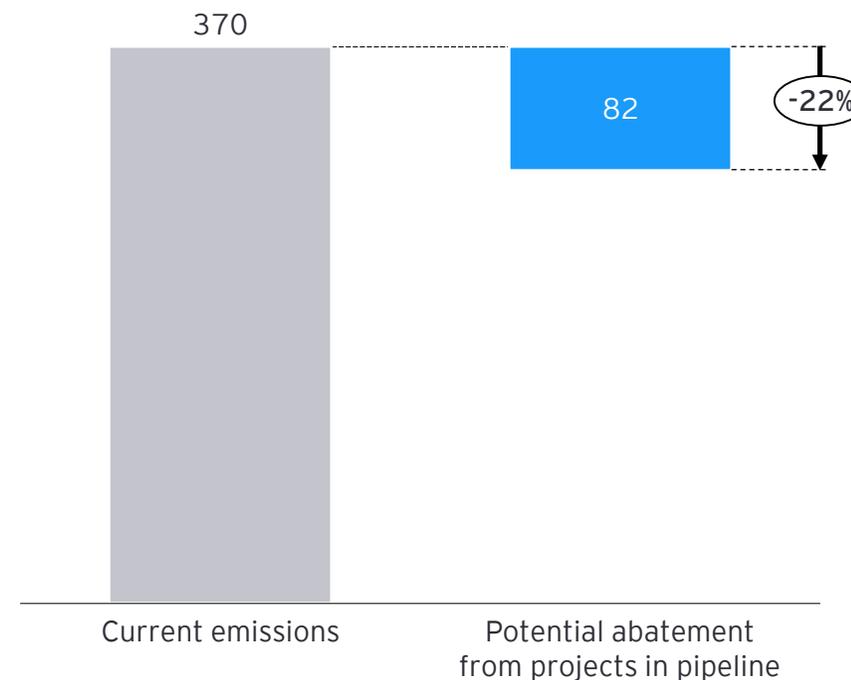
# The visible project pipeline would allow the UK to continue shifting its energy mix towards renewables



UK installed capacity, by technology (% , GW)



Potential emissions abatement from projects in pipeline vs. current total emissions (MtCO2e)



The pipeline of shovel-ready projects could help increase the scale of wind, solar and hydro capacity to 61% of the installed capacity. Bold government targets in offshore wind suggest a wind segment that comprises over 50% of installed capacity by 2030.

Deploying the visible renewable energy pipeline alone will enable up to a 22% reduction in the UK's total emissions.

# Prosperity

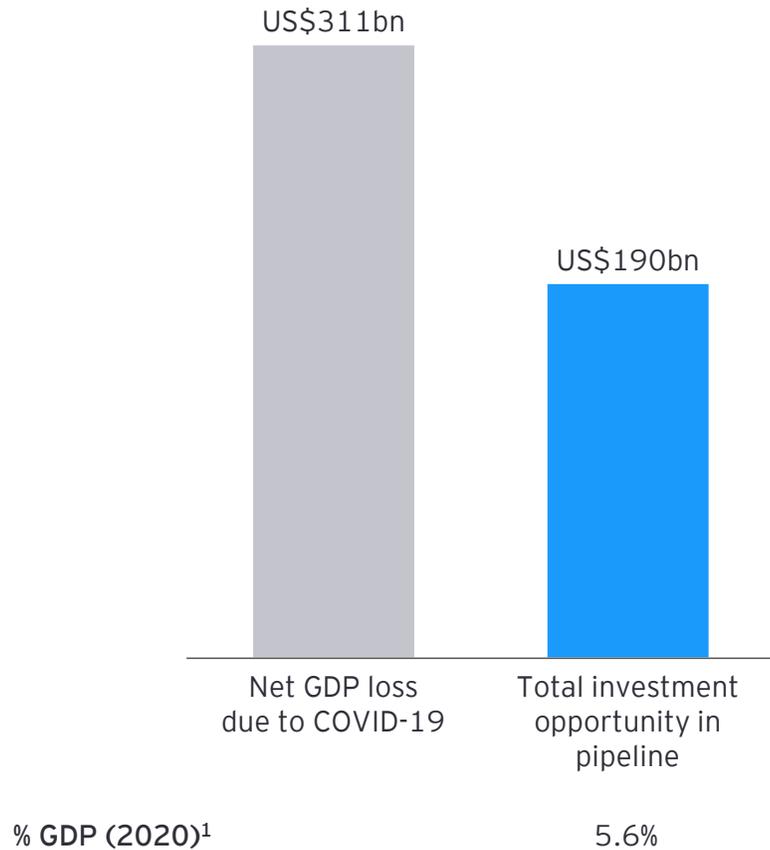
\$190bn of investment opportunities



# Beyond emissions mitigation, the visible renewable energy pipeline can generate a substantial positive impact on economic growth

People
Planet
Prosperity

UK installed capacity, by technology (% , GW)



- ▶ GDP within the UK declined by 10% in 2020, largely due to the economic impact of COVID-19.
- ▶ The pipeline of shovel-ready projects in the UK could provide an injection of US\$156bn into the economy, which is equivalent to half the GDP lost.
- ▶ By deploying the pipeline, we estimate a permanent recurring GDP contribution of £5bn per year through operations and maintenance of assets. This represents a one-off 0.2 p.p. additional increase in GDP - ca. 12% increase in the rate of growth, assuming a continuation of 1.7% average GDP growth from 2010 to 2019.

1. Oxford Economics GDP forecast 2020, fixed exchange rate and prices.  
Source: Oxford Economics, EY-Parthenon analysis.

## Scale of the opportunity

# Some projects identified are of a scale that can have a potentially transformational impact on the renewable energy sector in the UK and neighbouring countries

The two projects detailed below can have a transformative impact on the renewable energy sector in the UK, creating significant transmission capacity and adding resilience to the national grid. They have the potential to further accelerate renewable energy investment in the UK.

## North Sea electricity super-highway



- ▶ **Name:** Eastern Link project
- ▶ **Location:** Between Scotland and North East England
- ▶ **Developer:** SSE, ScottishPower and National Grid

- ▶ The Eastern Link project includes the development of underwater subsea high-voltage, direct current (HVDC) cables between Scotland and North-East England.
- ▶ The project includes two 2GW cables that will provide enough electricity transmission capacity to power around 4.5mn homes across the UK.
- ▶ The project is expected to significantly increase the UK's renewable energy transmission capacity, supporting further offshore wind development in the North Sea.

## Greenlink Interconnector



- ▶ **Name:** Greenlink Interconnector
- ▶ **Location:** Between Wales and the Republic of Ireland
- ▶ **Developer:** Hudson Clean Energy Partners

- ▶ The Greenlink Interconnector involves the construction of a HVDC underwater subsea transmission link between the Republic of Ireland and Wales.
- ▶ The 200km interconnector will consist of 170km of submarine cabling and 30km of cable on land linking substations of EirGrid with National Grid.
- ▶ The 320kV bi-directional transmission link will be capable of transmitting 500MW of electricity, enough to power 380,000 homes.

# Several hydrogen projects are already in their development stage, which could create momentum for an established hydrogen economy in the UK

## Gigastack hydrogen project



- ▶ **Name:** Gigastack
- ▶ **Location:** North Lincolnshire
- ▶ **Capacity:** 5MW
- ▶ **Developer:** Element Energy, Ørsted, Phillips 66 and ITM Power

- ▶ Gigastack is a demonstration project in the UK for industrial-scale, low-cost renewable hydrogen production through the electrolysis process.
- ▶ It received financial assistance from the BEIS Energy Innovation Programme as well as aid from the UK Government during phase 1.
- ▶ The project includes deployment of a 2MW electrolyser system and plans further development of a 100MW system at Humber refinery during phase 2.
- ▶ The demonstration will help identify the regulatory, technical and commercial challenges involved in the industrial-scale application of renewable hydrogen systems.

## Dolphyn hydrogen project

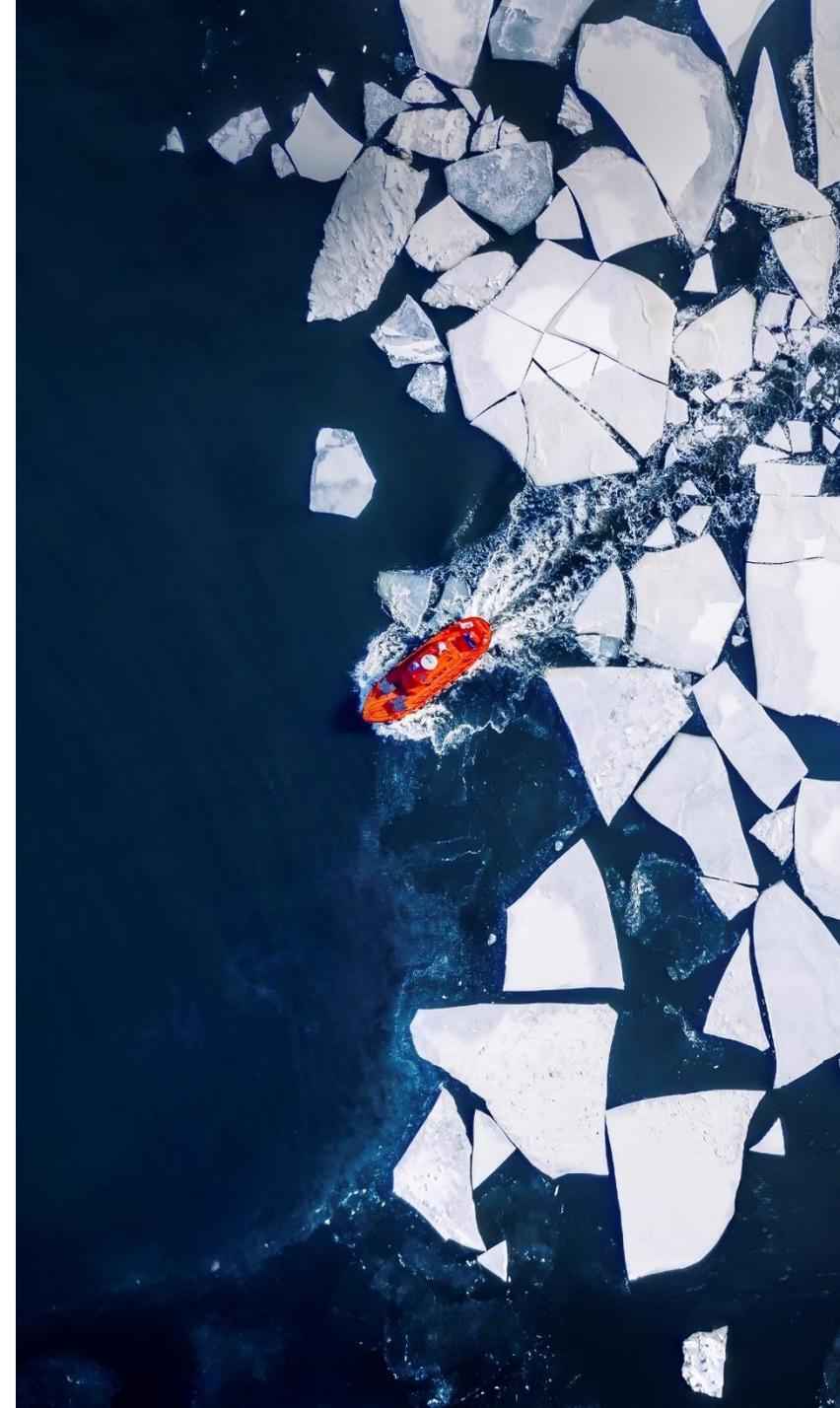


- ▶ **Name:** Dolphyn project
- ▶ **Location:** Kincardine site
- ▶ **Capacity:** 2MW
- ▶ **Developer:** Nel ASA and Doosan Corporation

- ▶ Dolphyn is a wind-to-hydrogen project and includes deployment of a 2MW prototype system at the Kincardine floating offshore wind farm.
- ▶ The project is backed by the UK Government and led by consultancy firm ERM. It aims to desalinate seawater and use it to produce hydrogen via electrolysis.
- ▶ The project will demonstrate and test the potential to produce green hydrogen offshore independently of the power system and export gas rather than electricity. A 10MW facility is planned to follow by 2027.

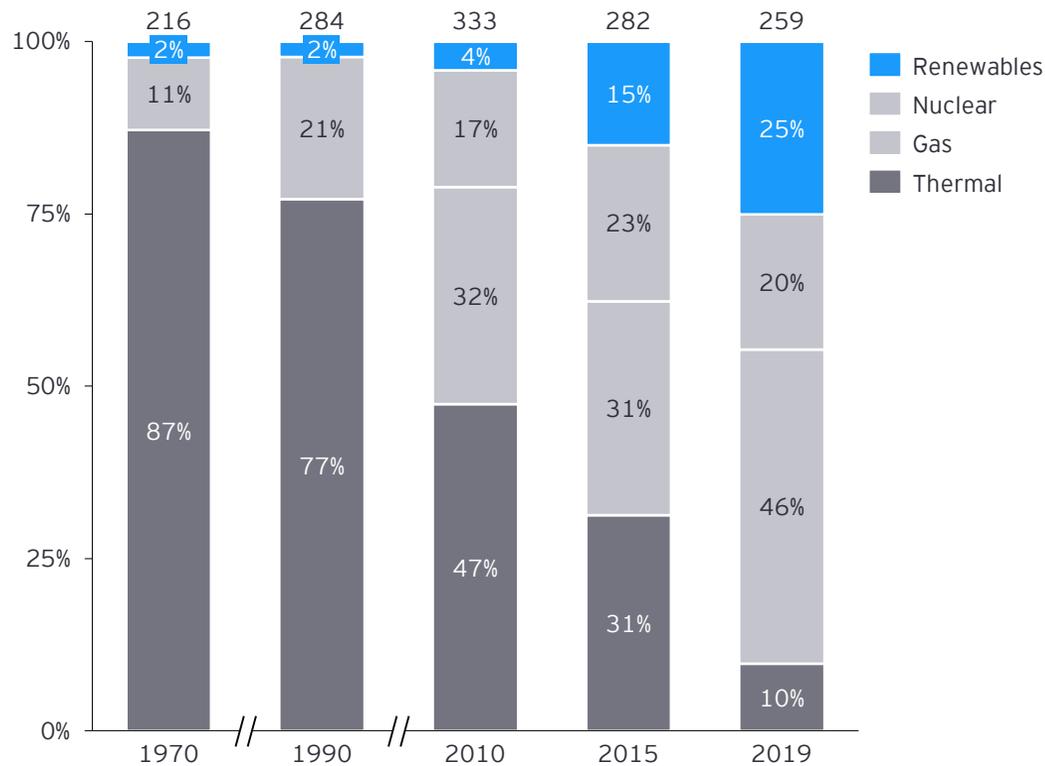
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# The UK's energy transition has uncovered several policy learnings that could support a global acceleration in energy transition

UK electricity generation, 1970 - 2019 (TWh)



- ▶ The UK has been successful in phasing out coal from its energy mix through purposeful policy action.
- ▶ Ember Climate's 'coal to clean' energy policy advises that the UK is on track to completely phase out coal by 2025, without having to build new large gas plants.
- ▶ UK success in rapidly deploying and growing renewable generation has been driven by policy success around CfDs and a sector deal with the offshore wind industry.

# The UK has been able to unlock mass deployment of private sector capital towards renewables, with public sector spend at only a fraction of total investment

US\$50  
bn

Private-led investment since 2015 in projects awarded a CfD

\$0.5bn

Estimated government budget for CfD rounds one to three

US\$50bn of investment in the renewables sector since 2015 has been enabled through inexpensive UK government policy.

▶ CfDs

▶ Sector deals

▶ Investment in grid infrastructure

▶ Regulatory sandboxes

“

99% of investment in CFD-backed projects since 2015 has come from the private sector



# The CfD auction framework has been a critical policy driver behind the UK's offshore wind build-out

CfDs
Sector deals
Grid infrastructure
Regulatory sandboxes

## Overview

- ▶ The CfD scheme is the UK Government's flagship mechanism for supporting low-carbon electricity generation.
- ▶ The scheme was launched in 2014 - three allocation rounds have been completed to date, with the fourth planned for late 2021.
- ▶ The purpose of CfDs is to incentivise investments in new low-carbon electricity generation in the UK by providing stability and predictability to future revenue streams.
- ▶ The Government has been able to provide more long-term visibility than any other market globally through its commitment to holding CfD auctions every two years and a £557mn budget to support the auctions.

## Policy description

- ▶ CfD is a long-term contract between an electricity generator and the Low Carbon Contracts Company (LCCC). The contract enables the generator to stabilise its revenues at a pre-agreed level (the strike price) for the duration of the contract.
- ▶ If the wholesale power price drops below the strike price, payments are made by the LCCC to the electricity producer to make up the difference. If the wholesale price is above the strike price, the CfD generator pays the difference back to the LCCC.

## Notable impact

East Anglia 1  
(EA1)

£2.5bn  
private  
investment

- ▶ A 714MW offshore wind farm was developed by ScottishPower Renewables
- ▶ EA1 was the largest project to receive a CfD in the first auction round
- ▶ The project was commissioned and began receiving CfD support in 2020



## International examples

- ▶ In 2019, the Polish Government approved a new draft amendment to its renewable energy source (RES) Act that will allow the development of onshore wind farms or PVs under new CfD rules.
- ▶ In 2020, Italy awarded a 20-year CfD contract to EDP Renewables for wind power plants via auction.

# The sector deal has enabled rapid growth in offshore wind by enabling long-term planning and collaboration across all stakeholders

CfDs

Sector deals

Grid infrastructure

Regulatory sandboxes

## Overview

- ▶ Launched in 2019, the Offshore Wind Sector Deal is a partnership between the UK Government and the offshore wind industry.
- ▶ The government engaged with the private sector (e.g. developers), industry bodies, educational institutions and several other key stakeholders in the offshore wind industry to formalise a government commitment to supporting the industry.
- ▶ The deal aims to tackle climate change whilst boosting productivity, employment, innovation and skills in the UK.
- ▶ The deal is built on the foundations of the Industrial Strategy: Ideas, people, infrastructure, business environment and places.

## Policy description

- ▶ Crown Estate and Crown Estate Scotland has committed to undertake new seabed leasing to ensure a sustainable pipeline of new projects for the late 2020s and early 2030s.
- ▶ The Offshore Industry Council Wind Investment in Talent Group has been established to identify skills needs across the sector, and develop curricula and accreditation to deepen the skills base.
- ▶ The Offshore Wind Growth Partnership (OWGP) was established, with sector commitment to contribute up to £250mn.

## Notable impact

- ▶ In September 2019, the Crown Estate launched a new seabed leasing round that will provide opportunity for at least 7GW of new projects in English and Welsh waters.
- ▶ OWGP launched a £2mn fund in 2020 to support ten supply chain companies over 12 months.
- ▶ Since the publication of the sector deal, the 2019 CfD auction achieved record low prices - 65% lower than the 2015 auction.



## International examples

- ▶ In 2020, Polish government representatives, investors and stakeholders from the offshore wind supply chain signed a letter of intent to develop an offshore wind sector deal.

# Sustained grid infrastructure investment has been critical to build-out of renewables, enabling multidirectional flow and new supply centres

CfDs
Sector deals
<b>Grid infrastructure</b>
Regulatory sandboxes

## Overview

- ▶ The UK's grid operators have proactively invested in upgrading the country's transmission network, as the development of large-scale renewables in coastal areas has created new supply centres.
- ▶ The National Grid operates 7,200km of overhead lines, 1,580km of underground lines and 346 substations.
- ▶ Robust transmission infrastructure is crucial for supporting the growth of a renewables electricity sector, which relies on a multidirectional grid.
- ▶ This has been a key enabler for renewables investments in the UK, whilst supporting cost reduction for renewables over time.

## Notable projects



- ▶ Exeter is a 400kV double busbar substation in South West England.
- ▶ It forms part of the National Grid's investment into smart grid development.
- ▶ It has helped provide resilience to South West's transmission network, which has a large amount of onshore wind generation.

## National Grid capital investment, electricity transmission (£m)



Source: National Grid, Statista, EY-Parthenon analysis.



## International examples

- ▶ In 2020, the German Government confirmed the development of the SuedOstLink, a 500km 525kV underground cable.
- ▶ The transmission cable connects the north of Germany, which contains high wind resource, to the south and west where Germany's large industrial operations are located.

# Regulatory sandboxes help drive innovation by enabling small-scale policy and business model experimentation

CfDs
Sector deals
Grid infrastructure
<b>Regulatory sandboxes</b>

## Overview

- ▶ The UK's energy markets regulator, Ofgem, has run several rounds of its energy regulation sandbox service, which was launched in 2017.
- ▶ Regulatory sandboxes provide a safe space for innovators to test new ideas and business models that may be only partially compatible with the existing legal and regulatory environment, with reduced uncertainty and risk.
- ▶ The sandboxes have proved successful in driving entrepreneurship and innovation in renewable energy.
- ▶ Ofgem attracted over 50 applications for its sandbox trials, and supported smaller players as well as larger incumbents such as BP and EDF.

## Policy description

- ▶ Innovators benefit from guidance and support from energy market regulators and industry bodies, as well as relaxation of rules around licencing, zoning, energy law, tariffs, etc.
- ▶ Sandboxes allow regulators to learn about new ideas and the challenges faced by innovators, in order to develop an accommodating regulatory environment.

## Notable impact



- ▶ A consortium led by EDF was granted a regulatory sandbox to trial a peer-to-peer local energy trading platform that allows residents in urban areas to source their energy from local renewables and trade with their neighbours.
- ▶ EDF was successful in piloting the technology in 2019.

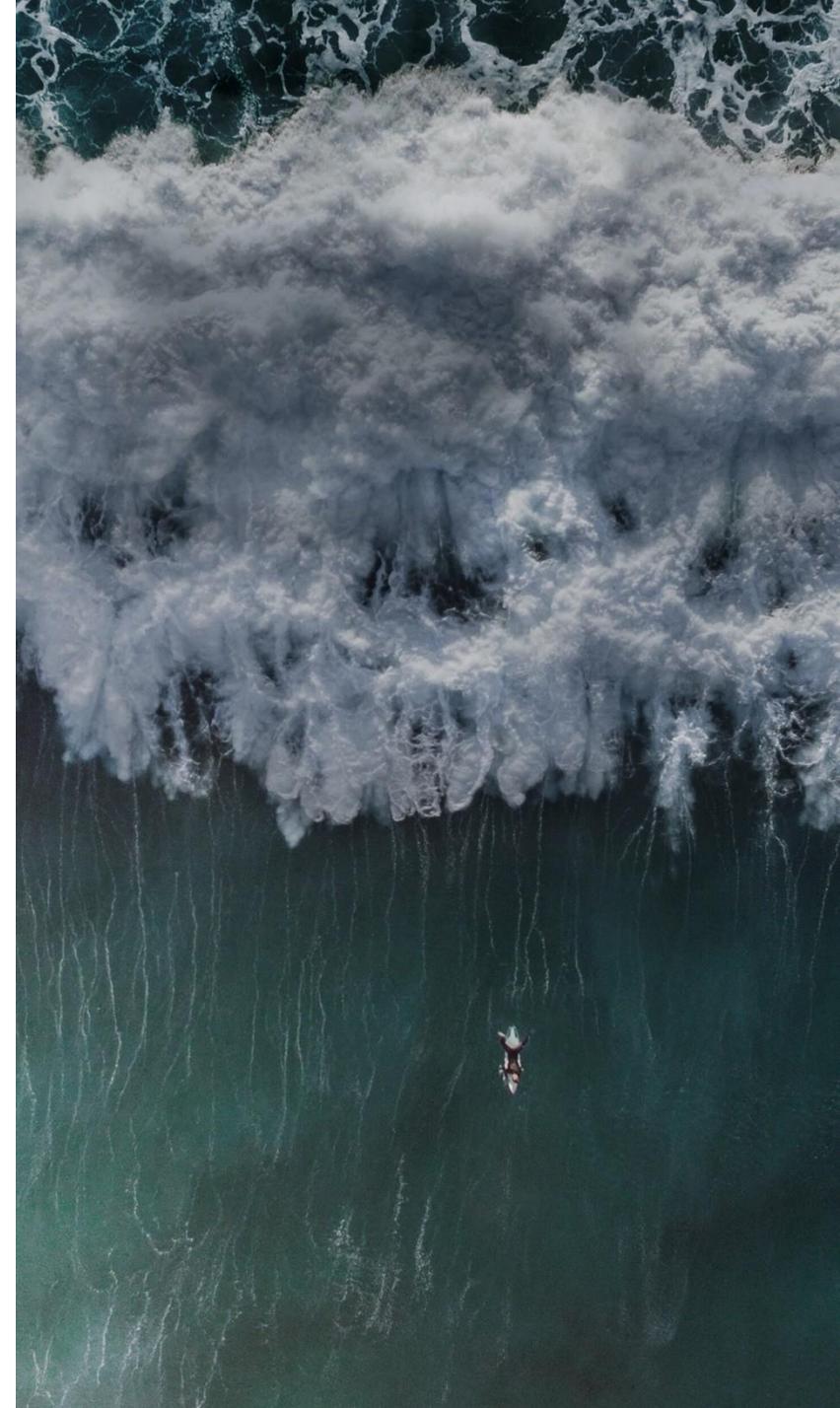


## International examples

- ▶ Regulatory sandboxes are a relatively new policy innovation for energy markets; aside from the UK, they have also been adopted by several governments globally, including in Singapore, Austria and Germany.
- ▶ There is a high potential for replication, as regulatory sandboxes do not often involve providing grant funding to participating entrepreneurs.

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# The bottlenecks for further investment in the UK are permitting, the scale and scope of the CfDs and inadequate transmission infrastructure

## National ambition and targets

- ▶ Strong will in government to achieve net neutrality has been met by ambitious targets and detailed road maps for energy transition.
- ▶ The CCC has been instrumental in guiding policy on carbon budgets and targets.
- ▶ Bolder targets might be required to achieve the required run rate of renewable energy development to meet Intergovernmental Panel on Climate Change (IPCC) targets.

## Supporting policy and market framework

- ▶ The CfD mechanism has been a key driver of offshore wind deployment - CfD support for onshore wind, solar and hydrogen remains insufficient.
- ▶ The carbon price floor, in conjunction with the EU ETS, has been crucial in creating a strong carbon price signal in the power sector.
- ▶ Cross-party commitment to coal phase-out by 2025 has provided a greater level of market certainty.

## Land allocation and permitting

- ▶ Permitting is the main blocker of onshore deployment of renewable energy in the UK.
- ▶ A promising development is the Crown Estate showing willingness to engage with developers to improve the permitting process.

## Availability of domestic capital

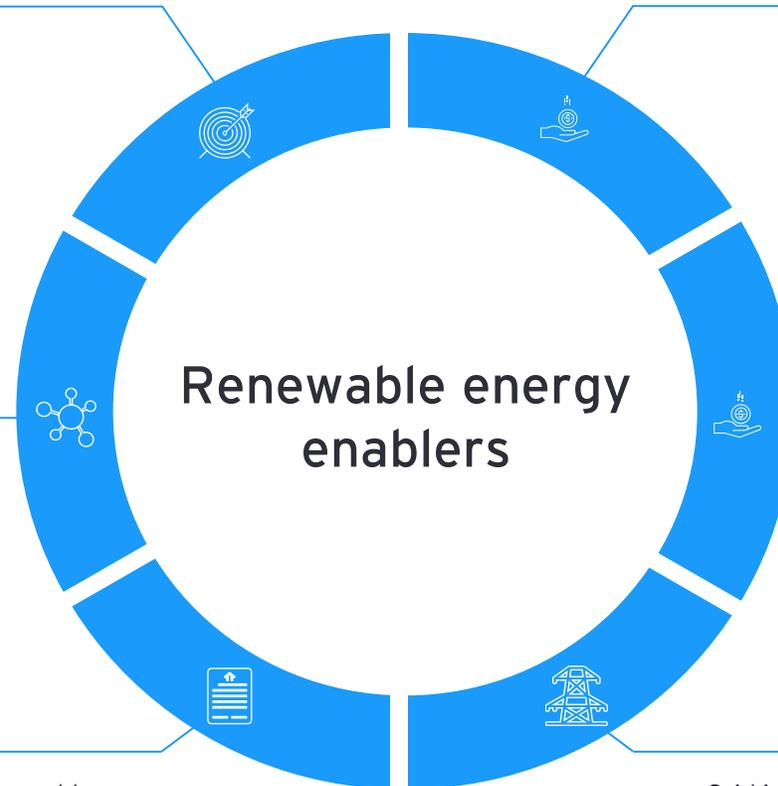
- ▶ Deep domestic capital markets create relative ease of access to capital for developers.
- ▶ Banks are willing to provide project financing and debt for developments.

## Availability of international capital

- ▶ The UK's position as a global financial centre is supportive of access to international capital for developers.
- ▶ There is strong interest from international financiers to invest in UK developments.

## Transmission infrastructure

- ▶ Grid infrastructure is largely robust, but inadequate in its current form to support the pipeline of renewable energy projects.
- ▶ Improvements are required to integrate the pipeline of renewable energy developments.



Key policy recommendations

# There are several policy levers that need to be pulled in order to overcome blockers and unlock the vast potential of the identified project pipeline (1/3)

Policy	Recommendations	Enablers impacted
<p><b>1</b> Increase renewable energy ambition and specify bold targets for onshore wind and solar PV</p>	<p>Develop bolder targets which are specific to offshore wind, onshore wind and solar PV (a no regrets policy action, and that will help to increase power generation in the long term, to meet increased needs arising from the electrification of adjacent sectors such as transport and heating)</p> <p>Set these bold, specified targets to help reduce uncertainty around long-term government support for onshore wind and solar developments</p>	
<p><b>2</b> Extend CfDs more ambitiously across onshore wind, solar PV and solar</p>	<p>Extend CfDs (the key driver of offshore wind investment and development) and more ambitiously across onshore wind and solar PV in order to support the UK meeting its net zero ambition</p> <p>Put price floors in place to prevent a race to the bottom - and maintain developer and investor confidence</p>	



Key policy recommendations

# There are several policy levers that need to be pulled in order to overcome blockers and unlock the vast potential of the identified project pipeline (2/3)

Policy	Recommendations	Enablers impacted
<p><b>3</b> Expand and upgrade grid network</p>	<p>Expand and upgrade grid network through infrastructure projects that are transformative in nature, such as the North Sea offshore grid, and that have the potential to support and accelerate new renewables capacity deployment</p> <p>Stimulate sustained investment in smart grid development, to ensure the UK’s transmission and distribution network is able to manage multiple sources of energy, which will be vital as the UK moves to a more distributed generation model</p>	
<p><b>4</b> Regional industry cluster investment</p>	<p>Actively use green investments as a means to strategically strengthen and build new industry clusters and level up UK regions, with a particular focus on offshore wind</p> <p>Support the development of local supply chains to improve competitiveness and UK content on projects (this has the potential to help drive job creation and cluster formation in regions such as the Humber and East Anglia)</p> <p>In consultation with local communities, consider mechanisms to accelerate land allocation and permitting for onshore developments in specific areas</p>	



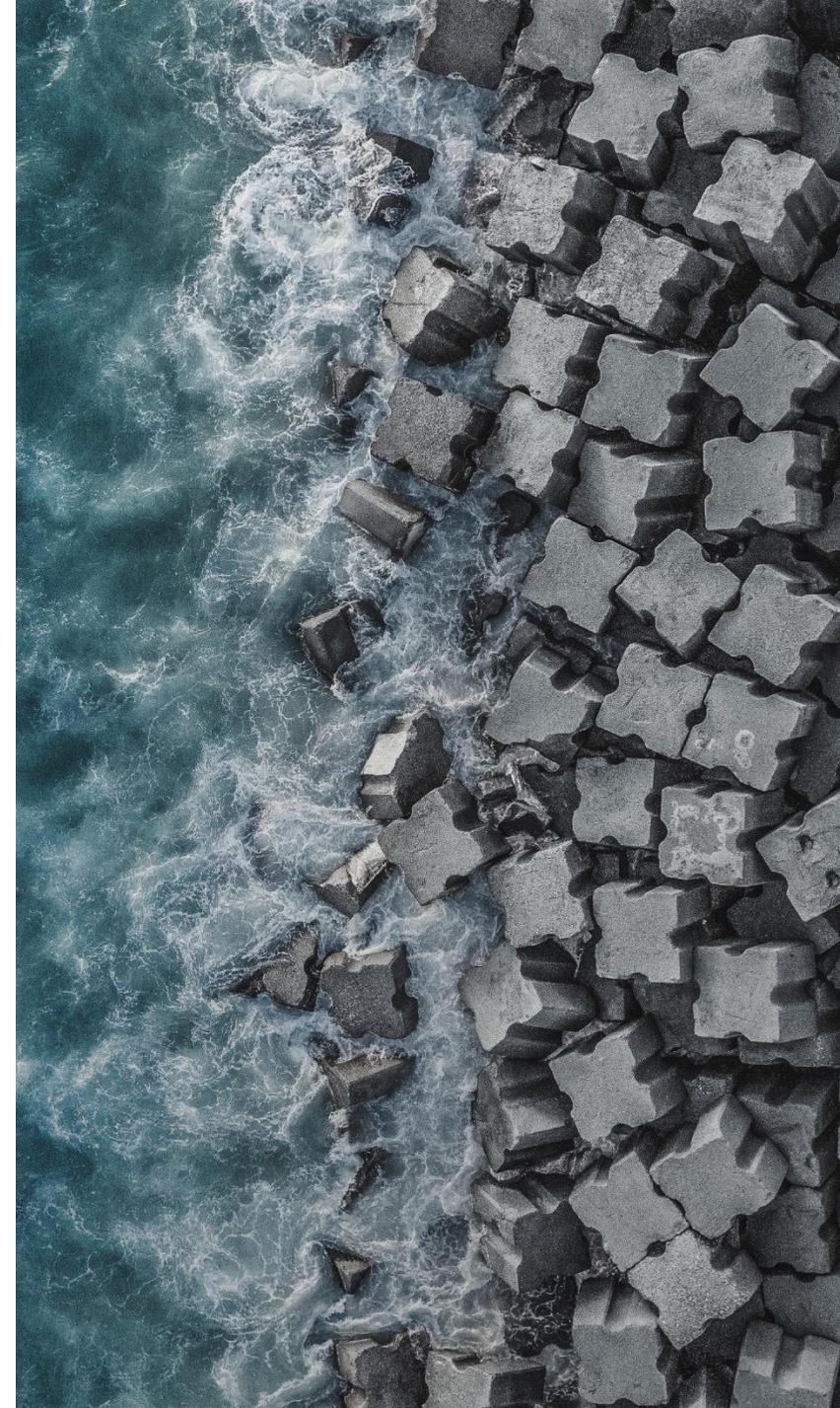
# There are several policy levers that need to be pulled in order to overcome blockers and unlock the vast potential of the identified project pipeline (3/3)

Policy	Recommendations	Enablers impacted
<p><b>5</b> EU ETS Cap at 39 MtCO<sub>2</sub>e</p>	<p>Set the EU ETS cap in line with the CCC recommendation of 39 MtCO<sub>2</sub>e for the power sector in 2023, falling to 14 MtCO<sub>2</sub>e by 2030 (this will ensure the carbon price continues to help drive zero emission power investments)</p>	
<p><b>6</b> Sector deal for hydrogen</p>	<p>Pursue an ambitious sector deal for hydrogen supported by both government and private investment, with an explicit ambition to make the UK a global leader in the development, production and use of this technology as a means to unlock the broader potential of a green economy</p> <p>Establish a talent group as part of the sector deal to identify skills needs across the sector, and develop curricula and accreditation to deepen the skills base</p>	

Pipeline impact: ■ Supportive ■ Major blocker

# Agenda

- ▶ Executive summary
- ▶ Scale of the opportunity
- ▶ The UK's renewables journey so far
- ▶ Key policy recommendations
- ▶ [Appendix](#)



# Project pipeline summary – generation: offshore wind



23 projects in the pipeline



47 MtCO<sub>2</sub>e avoided



US\$111bn investment required



23GW of renewable generation capacity



55,000 local jobs  
241,000 jobs in the supply chain

Offshore wind-based projects are the main driver of the shovel-ready project pipeline in the UK in terms of estimated capacity, investment required, full time employees (FTEs) created and MtCO<sub>2</sub>e avoided

### Project maturity

- ▶ The overall number of offshore wind generation projects is 23, accounting for 4% of the total number of generation projects and 53% of total generation pipeline capacity.
- ▶ Of these 23 projects, the majority are in early stages of maturity - 48% (6.8GW) are in the 'announced' stage, 39% (14.1GW) are in the 'permitting' stage, 9% (0.9GW) are in the 'launched' stage and 4% (1.2GW) are in the 'financing' stage.

### Investment size and developers

- ▶ The aggregated investment required amounts to US\$111bn, accounting for 72% of the total investment identified for generation projects.
- ▶ The average investment size of projects is US\$4.8bn, ranging from multiple large scale projects over \$1bn down to small-scale projects requiring less than US\$10mn funding.
- ▶ Project developers are mainly consortiums (50% of projects) and large corporations (40% of projects), as well as some public entities and SMEs.
- ▶ The type of financing required has been identified as a mix of project debt and project equity.

### Economic impact

- ▶ There is potential to create ca. 900k jobs which accounts for 70% of the total job creation potential from generation projects.

### Environmental impact

- ▶ There is potential for 47 MtCO<sub>2</sub>e to be avoided annually, which accounts for 57% of the total annual generation emission abatement potential.

# Project pipeline summary – generation: onshore wind



**213 projects in the pipeline**



**21 MtCO<sub>2</sub>e avoided**



**US\$5.1bn investment required**



**11.5GW of renewable generation capacity**



**38,000 local jobs  
19,000 jobs in the supply chain**

Onshore wind-based projects are a key driver of the shovel-ready pipeline in the UK in terms of estimated capacity, investment required, FTEs created and MtCO<sub>2</sub>e avoided

### Project maturity

- ▶ The overall number of onshore wind generation projects is 213 (including 8 with storage), accounting for 39% of the total number of generation projects and 27% of total generation pipeline capacity.
- ▶ Of these 213 projects, the majority are in early stages of maturity - 89% (9GW) are in the 'permitting' stage, 7% (1.8GW) are in the 'announced' stage and 4% (0.8GW) are in the 'launched' stage.

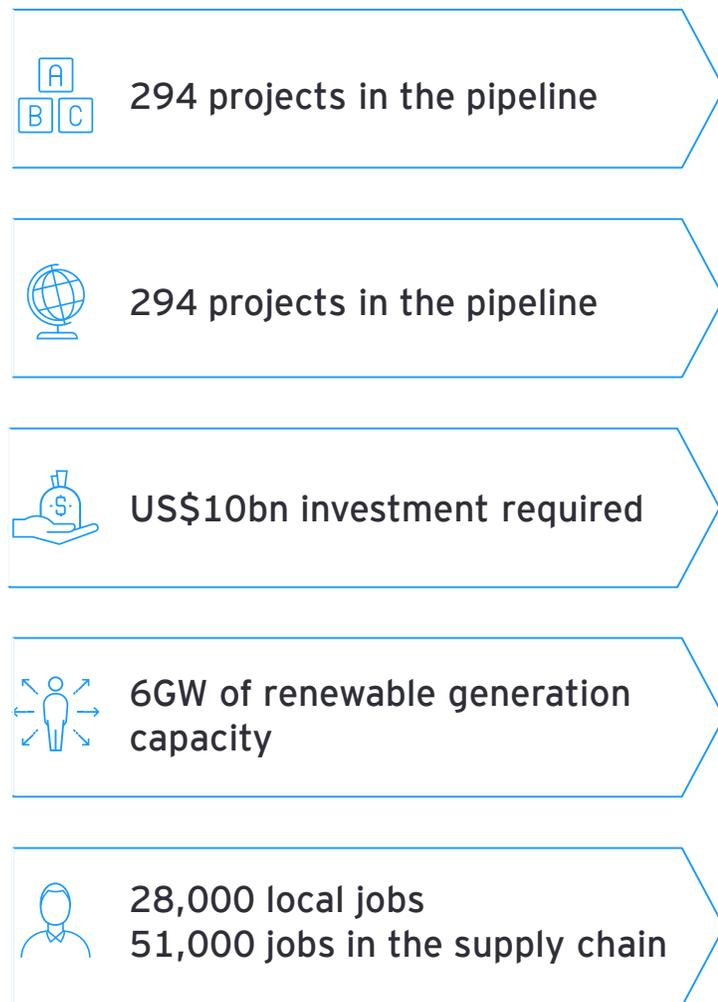
### Investment size and developers

- ▶ The aggregated investment required amounts to US\$22bn, accounting for 14% of the total investment identified for generation projects.
- ▶ The average investment size of projects is US\$103mn, ranging from large-scale projects over US\$1bn down to small-scale projects requiring less than US\$5mn funding.
- ▶ Project developers are mostly large corporations (68% of projects and 64% of investment), international consortiums (18% of projects / 23% of investment) and local consortiums (10% of projects / 9% of investment), as well as some public entities and SMEs.
- ▶ The type of financing required has been identified as a mix of project debt, project equity and support subsidy.

### Environmental impact

- ▶ There is potential for 21 MtCO<sub>2</sub>e to be avoided annually, which accounts for 25% of the total annual pipeline emission abatement potential.

# Project pipeline summary – generation: solar



Solar-based projects are the main driver of the shovel-ready pipeline, and play an important role in terms of estimated capacity, investment required, FTEs created and MtCO<sub>2</sub>e avoided

### Project Maturity

- ▶ The overall number of solar generation projects is 294 (including 18 solar and PV projects), accounting for 54% of the total number of generation projects and 14% of total generation pipeline capacity.
- ▶ Of these 294 projects, the majority are in early stages of maturity - 82% (3.5GW) are in the 'permitting' stage, 13% (1.9GW) are in the 'announced' stage and 5% (0.6GW) are in the 'launched' stage.

### Investment size and developers

- ▶ The aggregated investment required amounts to US\$10bn, accounting for 7% of the total investment identified for generation projects.
- ▶ The average investment size of projects is US\$36mn, ranging from larger-scale projects over US\$400mn down to many small-scale projects requiring less than US\$5mn funding.
- ▶ Project developers are mostly large corporations (91% of projects) as well as some public entities, SMEs and local consortiums.
- ▶ The type of financing required has been identified as a mix of project debt, project equity and support subsidy.

### Environmental impact

- ▶ There is potential for 9 MtCO<sub>2</sub>e to be avoided annually which accounts for 11% of the total annual generation emission abatement potential.

# Project pipeline summary – storage



62 projects in the pipeline



US\$5bn investment required



10,000 local jobs  
16,000 jobs in the supply chain

Storage projects are split across battery and hydrogen technologies

### Project maturity

- ▶ Of the 62 projects, the majority are in early stages of maturity - 63% are in the 'planned' stage, 35% are in the 'announced' stage and 2% are in the 'under procurement' stage.

### Investment size and developers

- ▶ The total estimated investment required amounts to US\$5bn, accounting for 3% of the total investment identified for projects.
- ▶ The average investment size of projects is US\$86mn, ranging from US\$1mn to US\$900mn.

# Project pipeline summary – transmission and distribution



**66 projects in the pipeline**

T&D projects connect to a number of plant types including: substations, wind and solar plants

#### Project maturity

- ▶ Of the 66 projects, the majority are in early stages of maturity - 59% are in the 'planned' stage and the remaining 41% are in the 'proposed' stage.
- ▶ The voltage levels of projects vary from 33kV through to 400kV.

#### Investment size and developers

- ▶ The estimated total investment required amounts to US\$32bn, accounting for 17% of the total investment identified for projects in the pipeline.
- ▶ The average investment size of projects is US\$490mn, ranging from US\$1mn to US\$11bn.



**US\$32 bn investment required**



**110,000 local jobs  
51,000 jobs in the supply chain**

# Project pipeline summary – notable projects identified

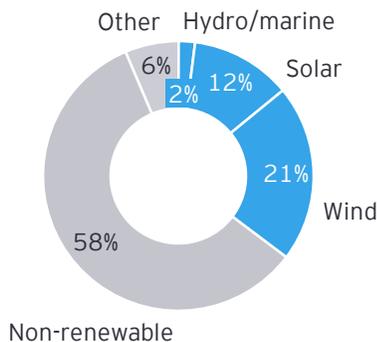
Sub-Sector	Technology	Project name	Developer	Capacity / Voltage
Generation	Offshore wind	Firth of Forth (Berwick Bank and Marr Bank)	Seagreen Wind Energy	4,150MW
Generation	Offshore wind	East Anglia offshore wind - Vattenfall	Norfolk Boreas / Vattenfall	3,600MW
Generation	Offshore wind	Hornsea Three	Ørsted Hornsea Project Three	2,400MW
Generation	Hydro	Coire Glas	SSE	1,500MW
Generation	Solar PV	Sunnica Energy Farm	PS Renewables / Tribus Clean Energy	500MW
Storage	Hydrogen energy storage	Gigastack	Element Energy / Ørsted / Phillips 66 / ITM Power	5MW
Storage	Hydrogen energy storage	Dolphyn Project	Nel ASA / Doosan Corporation	2MW
Transmission and distribution	Offshore wind	Killingholme - Hornsea Platform 2A Line	National Grid	400kV
Transmission and distribution	Offshore wind	Killingholme - Hornsea Platform 2B Line	National Grid	400kV

# Climate policy overview

## Key national targets

68%	GHG emissions reduction by 2030, compared with 1990 levels
Net zero	by 2050
40GW	offshore wind capacity by 2030
5GW	low-carbon hydrogen production capacity by 2030

## Generation



## Major policy

### Climate Change Act (2008)

- ▶ Sets in legislation the UK's approach to tackling and responding to climate change
- ▶ Long-term legally binding 2050 target to reduce greenhouse gas emissions to net zero - this target was made more ambitious in 2019, replacing the previous target of an 80% reduction relative to 1990 levels
- ▶ The CCC's recommended target carbon budgets covering the period from 2008 to 2032 have been established in law, with the sixth carbon budget of 78% recommended for 2037

### Ten Point Plan for a Green Industrial Revolution (2020)

- ▶ £12 billion of government investment
- ▶ Stated RE targets of 40GW for offshore wind and 5GW for hydrogen

### CfDs (launched in 2015)

- ▶ PPA scheme that pays developers a flat (indexed) rate for the electricity they produce over a 15-year period
- ▶ Currently supports 49 renewable electricity projects across a range of technologies, totalling 15.5GW - with plans for the next allocation round in 2021 to support up to 12GW

### Energy White Paper (2020)

- ▶ Sets out the Government's policies and commitments that will enable the UK to become net zero by 2050

# COVID-19 recovery and resilience plan

## COVID-19 recovery plan

As a result of the COVID-19 pandemic, the UK economy is expected to contract by 10%. The UK Government put in place a £280bn recovery package to stabilise the economy. Included in the recovery plan are policies to 'build back greener', supporting the transition to net zero by 2050.

### Key long-term actions

- ▶ £1 billion Net Zero Innovation Programme to accelerate the commercialisation of innovative low-carbon technologies, systems and processes in power; priority areas include hydrogen and floating offshore wind
- ▶ £134m sustainable innovation fund (SIF) to help businesses build back greener
- ▶ £240m funding for green hydrogen projects announced in the Ten Point Plan in 2020, to support economic recovery and the Government's 5GW target for 2030
- ▶ £160 million scheme to support the development of offshore wind manufacturing infrastructure
- ▶ Renewed ambition to create four low-carbon clusters by 2030, and one net zero cluster by 2040 (these will be focused on areas such as the North East, the Humber, North West, Scotland and Wales)

## Key figures

£280bn

recovery package

£1bn

net zero Innovation Programme

£240m

funding for green hydrogen projects announced in Ten Point Plan

£160m

funding to support offshore wind manufacturing infrastructure

£134m

sustainable innovation fund to help businesses build back greener

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EYG no. 005156-21Gbl

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