HM Government

United Kingdom's first Biennial Transparency Report

December 2024

Ministerial Foreword

The RT Hon Ed Miliband MP

Minister Kerry McCarthy MP

We are halfway through the critical decade for tackling climate change, but the world is off-track to limiting global warming to 1.5°C. We are facing a triple planetary crisis of climate, biodiversity loss and pollution posing critical threats to the UK's national interests across security, resilience, health, the economy and partnerships with other countries. That is why the UK is re-establishing itself as a climate leader on the global stage. The net zero transition is critical to both national and global security. There is no global stability without climate stability, and Britain must play its part by resetting at home and reconnecting abroad. We remain committed to the United Nations Framework Convention on Climate Change (UNFCCC)'s ambitions on transparency in reporting, in particular on implementing the Enhanced Transparency Framework (ETF) and stand ready to lead by example, where we can. This report covers the period of 2021-2022 and we also set out our approach going forwards.

The UK has made progress in cutting emissions. Between 1990 and 2022, we grew our economy by around 80% and cut our emissions by 50%.

In 2020, the UK communicated an ambitious Nationally Determined Contribution (NDC) target to reduce greenhouse gas emissions by at least 68% by 2030 on 1990 levels. In 2022 in response to the Glasgow Climate Pact at COP26, this target level was reconfirmed and strengthened by increasing its scope to include some Crown Dependencies and Overseas Territories and by saying more about implementation. This report sets out the progress made to meeting our 2030 NDC through policies implemented between the years 2021 and 2022 and our plans going forward.

Our Third Climate Change Risk Assessment (CCRA3), published in 2022, has presented strong evidence that even under low warming scenarios the UK will be subject to a range of significant and costly impacts, including identified risks to health and productivity, the built environment, businesses, the natural environment, and to public services, unless further action is taken to adapt to climate change. Our plan to address these risks is set out in our latest National Adaptation Programme (NAP) published in 2023. The UK government also submitted its first Adaptation Communication to the UNFCCC in December 2020 and updated it in 2021. The Communication set out our plans to prepare for the impacts of climate change in the UK and to support climate change adaptation overseas.

The UK has continued to deliver on our International Climate Finance (ICF) commitments. We exceeded our pledge to spend £5.8bn ICF between April 2016 and March 2021. Through our COP26 presidency, the UK led work on a $100bn climate finance delivery plan to provide clarity on how and when developed countries would meet their finance goal. In 2024 the

Organisation for Economic Co-operation and Development (OECD) reported that in 2022, this goal was achieved with $115.9bn in climate finance mobilised for developing countries.

Looking ahead, we know we need to do more. We are committed to achieving our NDC commitments under the Paris Agreement, and net zero target by 2050.This is no small feat requiring urgent action, but there are huge opportunities. Meeting these targets requires a wide-reaching transformation of the UK economy, with consumers, businesses and Government all having a role to play. That is why making Britain a clean energy superpower is one of the five missions of this Government - delivering clean power by 2030 and accelerating to net zero across the economy. We can only deliver energy security and good jobs for todays' generations if we deliver clean energy. And we can only deliver climate security for future generations if we show global leadership. This is why the Prime Minister announced at COP29 the UK's ambitious and credible NDC target to reduce all greenhouse gas emissions by at least 81% by 2035, compared to 1990 levels, excluding international aviation and shipping emissions. In 2025, we will publish a detailed plan, updating the policies and proposals that will enable us to meet carbon budgets 4 to 6 and our 2030 and 2035 NDCs.

On climate adaptation, we are committed to improving the evidence base and further strengthening our approach across government and local communities and will bring forward plans in due course.

Our leadership at COP29 demonstrates that the UK is a global leader in the fight against climate change, and this remains a core pillar of our approach to development spending. We will continue to prioritise Climate Finance which will help vulnerable countries adapt to climate impacts and support a transition to low-carbon economies. At COP29, parties agreed that all actors should scale up financing to $1.3 trillion on the New Collective Quantified Goal (NCQG) on Climate Finance. The UK is committed to delivering climate finance to keep 1.5°C alive in line with our international commitments. This is why we are honouring the existing commitment to spend £11.6bn in International Climate Finance between April 2021 and March 2026 including at least £3bn on nature, from which £1.5bn will be dedicated to protecting and restoring forests. We will also treble our spend, from our ICF commitment, for adaptation to £1.5bn in 2025.

We look forward to our upcoming expert technical review and the Facilitative, Multilateral Consideration of Progress (FMCP) to improve our practice. We encourage all Parties to come forward with their first Biennial Transparency Reports (BTRs) by the 31 December deadline.

The Rt Hon Ed Miliband MP, Secretary of State for Department of Energy Security and Net Zero & Minister Kerry McCarthy MP, Minister for Climate for Department of Energy Security and Net Zero

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Acronyms

AAC	Adaptation Action Coalition
ACE	Africa Clean Energy Programme
AOSIS	Alliance of Small Island States
ARA	Adaptation Research Alliance
ARP	Adaptation Reporting Power
ASPIRE	Accelerating Smart Power and Renewable Energy in India
AURN	Automatic Urban and Rural Network
BASIC	Better Assistance in Crisis
BECCS	Bioenergy with Carbon Capture and Storage
BGTW	British Gibraltar Territorial Waters
BII	British International Investment
BOS	Basic Oxygen Steel
BTR	Biennial Transparency Report
CaaS	Cooling-as-a-service
CAP	Climate Action Plan, Northern Ireland Executive
CARIB	Climate Adaptation Research and Innovation Board
CARIF	Climate Adaptation Research and Innovation Framework
CaVex	Carbon Value Exchange
CB	Carbon Budget
CBD	UN's Convention on Biological Diversity
CCC	Climate Change Committee
CCG	Clean Climate Growth
CCG	Climate Compatible Growth
CCRA	Climate Change Risk Assessment

CCRA3	Third Climate Change Risk Assessment
CCRA4	Fourth Climate Change Risk Assessment
CCTB	Climate Change Transformation Board
CCTT	Climate Change Transformation Team
CCUS	Carbon Capture, Usage and Storage
CDM	Clean Development Mechanism
CDOTs	Crown Dependencies and Overseas Territories
CEIF	Clean Energy Innovation Facility
CET	Central England Temperature
CFN	Climate Finance Network
CH_4	Methane
CIPF	Climate Innovation Pull Facility
CLARE	Climate Adaptation and Resilience
CNI	Critical National Infrastructure
CNPA	Cairngorms National Park Authority
CO_2	Carbon Dioxide
COP28	The 28th Conference of Parties at UNFCCC
COSLA	Convention of Scottish Local Authorities
CPI	Consumer Price Index
CREWS	Climate Risk and Early Warning Systems Initiative
CRS	Creditor Reporter System
CSP	Common Strategic Policy
CTF	Common Tabular Format
DAC	Development Assistance Committee
DACCS	Direct Air Carbon Capture and Storage
DAERA	Department of Agriculture, Environment and Rural Affairs, Northern Ireland

DDM	Dynamic Dispatch Model
DEC	Disasters Emergency Committee
DEFA	Department of Environment, Food and Agriculture
Defra	Department for Environment, Food & Rural Affairs
DESNZ/BEIS	Department for Energy Security and Net Zero, previously knows as Business, Energy & Industrial Strategy (BEIS)
DevTracker	Development Tracker
DfE	Department for the Economy, Northern Ireland
DfE	Department for Education, England
DfI	Department for Infrastructure, Northern Ireland
DfT	Department for Transport
DNP	Ministry of National Planning
DSIT	Department for Science, Innovation and Technology
DUKES	Digest of UK Energy Statistics
EDM	Energy Demand Model
EEP	Energy and Emissions Projections
EIP	Environmental Improvement Plan
ELMs	Environmental Land Management Schemes
EPC	Energy Performance Certificate
ESMAP	Energy Sector Management Assistance Programme
ETF	Enhanced Transparency Framework
ETP	Uganda's Energy Transition Plan
EV	Electric Vehicle
EWEA	Early Warning Early Action
FAPRI	Food and Agricultural Policy Research Institute
FCDO	Foreign, Commonwealth and Development Office
FCERM	Flood and Coastal Erosion Risk Management

FCRIP	Flood and Coastal Resilience Innovation Programme
FE	Further Education
F-gases	Fluorinated gases
FLS	Forestry and Land Scotland
FMCP	Facilitative Multilateral Consideration of Progress
FSP	Flexible Skills Programme
G7	The Group of Seven is an intergovernmental political and economic forum consisting of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States; additionally, the European Union (EU) is a "non-enumerated member".
GCE	Global Climate Emergency
GCF	Green Climate Fund
GCRF	Global Challenges Research Fund
GDP	Gross Domestic Product
GEOGLAM	Group on Earth Observations Global Agricultural Monitoring Initiative
GES	Good Environmental Status
GFC	Global Financial Crisis
GFDT	Global Facility to Decarbonise Transport
GGA	Global Goal for Adaptation
GGGI	Global Green Growth Institute
GGR	Greenhouse Gas Removals
GHG	Greenhouse Gas
GMPP	Government’s Major Projects Portfolio
GNI	Gross National Income
GOA&DC	Gurnsey Overseas Aid & Development Commission
GSP	Gender-responsive social protection

GVA	Gross Value Added
GWLs	Global Warming Levels
GWP	Government Work Plan
HAIRS	Human Animal Infections Risk Surveillance
HFCs	Hydrofluorocarbons
HGVs	Heavy Goods Vehicles
HM	His Majesty
HMG	His Majesty's Government
HMT	His Majesty's Treasury
IAS	International Aviation and Shipping
IATI	International Aid Transparency Initiative
ICAI	Independent Commission for Aid Impact
ICF	International Climate Finance
IDS	Industrial Decarbonisation Strategy
IEA	International Energy Agency
IfATE	Institute for Apprenticeships and Technical Education
IMF	International Monetary Fund
IMPACT	Isle of Man Programme for Achievement of Climate Targets
INNS	Invasive Non-Native Species
IOM	Isle of Man
IPA	Infrastructure and Projects Authority
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
ISPF	International Science Partnership Fund
JOA	Jersey Overseas Aid
KPIs	Key Performance Indicators

LDCs	Least Developed Countries
LDPs	Local Development Plans
LGV	Light Good Vehicles
LiDAR	Light Detection and Ranging
LIFE-AR	Least Developed Countries Initiative for Effective Adaptation and Resilience
LLTNPA	Loch Lomond and Trossachs National Park Authority
LNRS	Local Nature Recovery Strategies
LULUCF	Land Use, Land Use Change and Forestry
M&E	Monitoring and Evaluation
MACC	Maximising UK Adaptation to Climate Change
MADS	Ministry of Environment and Sustainable Development
MAED	Model for Analysis of the Energy Demand
MECS	Modern Energy Cooking Services
MEL	Monitoring, evaluation and learning
MHCLG	Ministry of Housing, Communities and Local government
MoA	Ministry of Agriculture
MOHCCP	Met Office Hadley Centre Climate Programme
MPA	Marine Plan Authority, Northern Ireland
MPA	Marine Protected Area, Scotland
MRV	Monitoring, Reporting and Verification
$MtCO_2e$	Megatonnes of Carbon Dioxide Equivalents
mtoe	Megatonnes of Oil Equivalent
MVI	Multidimensional Vulnerability Index
N_2O	Nitrous Oxide
NAEI	National Atmospheric Emissions Inventory
NAP	National Adaptation Programme

NAP3	The third National Adaptation Programme
NCQG	New Collective Quantified Goal
NDC	Nationally Determined Contribution
NDCP	Nationally Determined Contribution Partnership
NF_3	Nitrogen trifluoride
NGOs	Non-Governmental Organisations
NHS	National Health Service
NI	Northern Ireland
NIC	National Infrastructure Commission
NICCAP	Northern Ireland Climate Change Adaptation Programme
NID	National Inventory Document
NIO	Northern Ireland Office
NISC	National Inventory Steering Committee
NPPF	National Planning Policy Framework
NPSs	National Policy Statements
NS	NatureScot
NSIPs	Nationally Significant Infrastructure Projects
NSTA	North Sea Transition Authority
NTM	National Transport Model
NZGP	Net Zero Growth Plan
OBR	Office for Budget Responsibility
ODA	Official Development Assistance
ODS	Ozone-Depleting Substances
OECD	Organisation for Economic Co-operation and Development
OECD-DAC	Organisation for Economic Co-operation and Development's Development Assistance Committee
ONS	Office for National Statistics

PA	Paris Agreement
PAMs	Policies and Measures
PFCs	Perfluorocarbons
PIMA	IMF's Public Investment Management Assessment
PSBs	Public Service Boards
PSV	Public Service Vehicles
QA/QC	Quality Assurance/Quality Control
R&D	Research and development
R&I	Research and innovation
RD&D	Research, Development and Demonstration
REAP	Risk-informed Early Action Partnership
REEE	Resource and Energy Efficiency
REM	REDD+ Early Movers Programme
REPP	Renewable Energy Performance Platform
RESI	Resilient and Sustainable Islands Initiative
RSS	Rural Support Scheme
RTFO	Renewable Transport Fuel Obligation
SAF	Sustainable Aviation Fuels
SCCCS	Sustainable Cooling and Cold Chain Solutions programme
SDG(s)	Sustainable Development Goal(s)
SDR	Sustainability Disclosure Requirements
SF_6	Sulphur hexafluoride
SFS	Sustainable Farming Scheme
SHS	Plug and Play solar home systems
SIC	Standard Industrial Classification
SICE	Science and Innovation for Climate and Energy

SIDAR	Small Island Developing States Capacity and Resilience Programme
SIDS	Small Island Developing States
SIETF	Scottish Industrial Energy Transformation Fund
SMEs	Small and medium sized businesses
SNAP	Scottish National Adaptation Plan
SNBS	Scottish Nitrogen Balance Sheet (“
SPOKES	Specialised Outreach and Knowledge Establishments
SW	Scottish Water
TCFD	Taskforce on Climate-related Financial Disclosures
TEA	Transforming Energy Access
UAE	United Arab Emirates
UK ETS	UK Emissions Trading Scheme
UK PACT	UK Partnering for Accelerated Climate Transitions
UK SHORE	Shipping Office for Reducing Emissions
UKCCRA	UK Climate Change Risk Assessment
UKCEH	UK Centre for Ecology and Hydrology
UKCP/UKCP18	UK Climate Projections
UKRI	UK Research and Innovation
UNDESA	United Nations Department for Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nationals Framework Convention on Climate Change
USAID	United States Agency for International Development
VBDs	Vector-borne diseases
VETs	Vehicle Emissions Trading
VRA	Gibraltar’s Vulnerability and Risk Assessment

WAM	With additional measures
WEEE	Waste from Electrical and Electronic Equipment
WEM	With existing measures
WISER	Weather and Climate Information Services
WOM	Without Measures
WP-STAT	Working Party on Development Finance Statistics
WRMPs	Water Resources Management Plans
WWF	World Wildlife Fund
ZEB	Zero Emissions Buses
ZE-Gen	Zero Emissions Generator
ZEV	Zero Emissions Vehicles

Introduction

Scope

The Biennial Transparency Report (BTR) is a progress report, agreed under the Enhanced Transparency Framework (ETF) under the Paris Agreement[1]. Its purpose is to present information on mitigation, adaptation and finance in a transparent and comprehensive way that can be scrutinised by parties as well as by expert reviewers. It is submitted every 2 years.

This is the UK's first biennial transparency report and provides detail on progress towards the UK's 2030 Nationally Determined Contribution (NDC)[2]. This first report focuses on greenhouse gas emissions reductions between 2021 and 2022, as well as progress towards our 2030 NDC and our emission reductions projections towards 2040. It will include an overview of our adaptation plans up to 2023 and our international climate finance contributions over 2021-2022.

The UK's 2030 NDC covers England, Scotland, Wales and Northern Ireland. It also covers the UK's Crown Dependencies of the Bailiwick of Jersey, Guernsey and the Isle of Man and the UK's Overseas Territory of Gibraltar, which have all had the UK's ratification of the Paris Agreement extended to them.

The report follows the requirements set out by the UNFCCC and therefore it does not include updates on research and systematic observation, education, training and public awareness. This will be included in our 9th National Communication to be published in 2026.

This report also reflects the recommendations made during our last Expert Review in 2023 on our 5th Biennial Report and 9th National Communication. This includes recommendations that the UK include the cost of our policies and provide clarity on the territorial scope (i.e. explain if policies applied to the Devolved Governments, Crown Dependencies and Overseas Territories, or England only).

The report is being submitted to the UNFCCC alongside our National Inventory Document (NID).

Structure of the report

The report is structured as follows:

- **Chapter 1: National Inventory Document of Anthropogenic Emissions** presents a summary of our National Inventory Document which was submitted in December 2024.
- **Chapter 2: Information to track progress in achieving the UK's Nationally Determined Contribution** presents the UK's mitigation actions

[1] Biennial Transparency reports are submitted under article 13 of the Paris Agreement in compliance with the obligations according to Decision 18/CMA.1[1] and following the Modalities, Procedures and Guidelines (MPGs).

[2] UK's 2030 Nationally Determined Contribution

and strategies implemented to achieve the UK's 2030 NDC (over the period 2021-22), and projections to 2040.

- **Chapter 3: Information related to climate change impacts and adaptation** presents the UK's adaptation measures towards adaptation.
- **Chapter 4: Information on financial, technology development and transfer and capacity-building support provided and mobilised** presents the UK's contributions to non-annex 1 parties consistent with the requirements of the Enhanced Transparency Framework.
- **Annex 1**: Support provided by the UK's Crown Dependencies.

The UK's Biennial Transparency Report submission will include our complete Common Tabular Format (CTF) tables which can be found on the submission portal. The CTF tables include information on:

- The UK's Greenhouse Gas Inventory;
- Our financial support provided and mobilised and;
- Progress made and projections.

Chapter 1: National Inventory Document of Anthropogenic Emissions

The UK's National Inventory Document (NID) is available on the UNFCCC website. This contains a full account of the UK's GHG emissions, their trends, the methodologies used to estimate them, and the institutional arrangements that underlie them.

Emissions estimates from the UK Greenhouse Gas Inventory are used to meet international reporting requirements under the Paris Agreement and UNFCCC as well as domestic reporting requirements under the Climate Change Act 2008. The geographical scope of these reporting requirements differs:

- **Climate Change Act scope**: England, Scotland, Wales and Northern Ireland.
- **Paris Agreement scope**: England, Scotland, Wales and Northern Ireland. It also includes the three Crown Dependencies (Bailiwick of Jersey, Guernsey[3], Isle of Man) and one Overseas Territory (Gibraltar), which to date, the UK's ratification of the Paris Agreement has been extended to.
- **UNFCCC scope**: England, Scotland, Wales and Northern Ireland. It also includes those Crown Dependencies and Overseas Territories have had the UK's ratification of the UNFCCC extended to them. These are the three Crown Dependencies (Bailiwick of Jersey, Bailiwick of Guernsey, Isle of Man) and four Overseas Territories (Gibraltar, Cayman Islands, Falkland Islands, Bermuda).

The Paris Agreement scope is used for emissions estimates in the Common Reporting Tables (CTF) accompanying this submission.

[3] *The UK's ratification of the Paris Agreement was extended to Guernsey in 2023 at their request but has not yet been extended to the whole Bailiwick of Guernsey which includes the islands of Alderney and Sark. The UK government remains committed to working with Alderney and Sark on their potential future inclusion in the Paris Agreement.*

Table 1: UK greenhouse gas emissions by geographic scope, MtCO2e

Geographic coverage	1990	1995	2000	2005	2010	2015	2020	2021	2022
United Kingdom	812.4	761.2	724.4	697.5	611.6	508.0	404.0	421.1	406.2
Jersey	0.6	0.7	0.6	0.4	0.4	0.4	0.3	0.3	0.3
Guernsey	0.5	0.6	0.6	0.4	0.4	0.4	0.3	0.3	0.3
Isle of Man	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.5	0.5
Gibraltar	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Aircraft and shipping (between UK and CDOTs party to PA)	0.3	0.3	0.3	0.4	0.4	0.3	0.1	0.2	0.3
Total (PA scope)	**814.6**	**763.5**	**726.8**	**699.6**	**613.7**	**509.9**	**405.6**	**422.7**	**407.8**
Cayman Islands	0.5	0.5	0.6	0.7	1.0	1.1	1.2	1.2	1.3
Falkland Islands	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.4	0.4
Bermuda	0.7	0.7	0.7	0.8	0.9	0.9	0.7	0.7	0.8
Aircraft and shipping (between UK and CDOTs party to UNFCCC)	0.5	0.4	0.4	0.5	0.5	0.4	0.2	0.3	0.4
Total (UNFCCC scope)	**816.4**	**765.2**	**728.6**	**701.6**	**616.0**	**512.4**	**407.9**	**425.1**	**410.3**

A summary of emissions by sector and by gas can be found in the tables below:

Table 2: UK greenhouse gas emissions by Common Reporting Tables sector (Paris Agreement scope), MtCO2e

CRT sector	1990	1995	2000	2005	2010	2015	2020	2021	2022
1. Energy (non-transport)	478.2	431.1	421.7	414.3	374.2	279.9	214.4	223.2	209.4
1. Energy (transport)	123.1	125.8	130.4	134.2	123.0	123.0	97.9	108.0	110.1
2. Industrial Processes and Product Use (IPPU)	80.0	73.4	52.8	49.2	40.1	41.1	31.0	29.5	26.9
3. Agriculture	50.3	49.3	48.0	45.9	43.4	44.0	42.1	42.7	41.9

4. Land Use Land Use Change and Forestry	10.7	8.4	5.8	3.0	1.1	0.5	0.7	0.4	0.7
5. Waste	72.4	75.5	68.1	53.1	31.8	21.5	19.5	18.9	18.8
Total	**814.6**	**763.5**	**726.8**	**699.6**	**613.7**	**509.9**	**405.6**	**422.7**	**407.8**

Table 3: UK greenhouse gas emissions by gas (Paris Agreement scope), MtCO2e

GHG Grouped	**Base year**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2021**	**2022**
Carbon dioxide (CO_2)	605.5	605.5	567.4	567.7	566.3	506.3	415.5	320.3	338.3	325.5
Methane (CH_4)	150.4	150.4	143.7	123.9	100.9	75.4	62.7	57.8	57.1	56.5
Nitrous oxide (N_2O)	43.9	43.9	35.1	26.4	22.8	20.4	19.9	18.6	19.0	18.1
Hydrofluorocarbons (HFCs)	15.5	12.1	15.5	6.4	8.1	10.6	11.1	8.3	7.7	7.2
Perfluorocarbons (PFCs)	0.5	1.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2
Sulphur hexafluoride (SF_6)	1.3	1.2	1.3	1.9	1.1	0.7	0.4	0.4	0.4	0.3
Nitrogen trifluoride (NF_3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**817.1**	**814.6**	**763.5**	**726.8**	**699.6**	**613.7**	**509.9**	**405.6**	**422.7**	**407.8**

Total UK greenhouse gas emissions in 2022 (Paris Agreement scope) are estimated to be 407.8 million tonnes CO_2 equivalent ($MtCO_2e$), a decrease of 50% from 817.1 $MtCO_2e$ in 1990. The breakdown of gases in 2022 is as follows:

- CO_2 contributed 80%;
- CH_4 contributed 14%;
- N_2O contributed 4%; and
- Fluorinated gases (F-gases) contributed 2%.

The sectoral breakdown in 2022 is:

- Non-transport emissions from the energy sector contributed 51% to the total net emissions.
    - CO_2 is the dominant gas consisting of 97% of emissions.
    - Since 1990, emissions have declined by 56%.
- Transport emissions from the energy sector contributed 28%.
    - CO_2 is the dominant gas consisting of 99% of emissions.
    - Since 1990, emissions have declined by 11%.

- The agricultural sector contributed 12%.
    - CH_4 and N_2O contributed 67% and 30% respectively, with the remainder made up by CO_2.
    - Since 1990, emissions from this sector have declined by 17%.

- Industrial processes and product use contributed 7%.
    - CO_2 and F-gases contributed 68% and 29% respectively, with the remainder made up by CH_4 and N_2O.
    - Since 1990, emissions have declined by 66%.

- The waste sector contributed 5%.
    - CH_4 is the dominant gas consisting of 90% of all emissions.
    - Since 1990, emissions have declined by 74%.

- The Land-Use, Land-Use Change, and Forestry (LULUCF) sector contains sinks as well as sources of CO_2 emissions. LULUCF was a net source in both 1990 and 2022, and in 2022, contributed less than 0.2% to total net emissions.
    - Emissions from this sector occur for CO_2, N_2O and CH_4.
    - Since 1990, net emissions from this sector have declined by 94%.

Chapter 2: Information necessary to track progress made in implementing and achieving NDCs

2.1 National circumstances and institutional arrangements

2.1.1 Government structure

The United Kingdom of Great Britain and Northern Ireland is a Party to the UNFCCC and the Paris Agreement. The UK employs a range of institutional structures – at national, sub-national and local level - to enable economy-wide emissions mitigation, as well as numerous policies and measures to underpin delivery. The UK consists of England, Scotland, Wales and Northern Ireland, with aspects of government policy responsibility devolved to the democratically accountable governments within each, namely the Scottish government, the Welsh government and the Northern Ireland Executive. The UK government has overall responsibility for implementation and delivery of the UK's climate commitments under the UNFCCCC, the Kyoto Protocol, and the Paris Agreement, as well as our targets for net zero by 2050, our domestic carbon budgets, and our 2030 and 2035 Nationally Determined Contributions. However, all the Devolved Governments play a part in this process. The approach taken by each administration will differ, drawing on the range of policies at their disposal. As explained in Chapter 1, the UK's ratification of the Paris Agreement has to date been extended the three Crown Dependencies, and the Overseas Territory of Gibraltar – so these are in scope of the UK's NDC. Climate policy is devolved to the Crown Dependencies and Overseas Territories and so they are responsible for setting their own emission reduction targets and climate policies and laws.

The Climate Change Act 2008 established the world's first legally binding framework of national emissions targets. The Act required the UK to set carbon budgets which impose legally binding limits on emissions across five-year periods. The first six carbon budgets have so far been set in law. The Climate Change Committee (CCC) is an independent, statutory body established under the Climate Change Act 2008. Their purpose is to advise the UK and Devolved Governments on emissions targets and to report to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change. More information on the Climate Change Act can be found in section 2.8.1.

The UK government is split into 24 ministerial departments and 20 non-ministerial departments. Each department focuses on a different aspect of government policy, the following of which fed into this report:

- The Department for Energy Security and Net Zero (DESNZ), which leads the mission to make Britain a Clean Energy Superpower, achieving clean power by 2030 and accelerating to net zero.
- The Department for Environment, Food and Rural Affairs (Defra), the department responsible for policy and regulations on environmental, food and rural issues including domestic adaptation.

- Department for Education (DfE), the department responsible for children's services and education, including early years, schools, higher and further education policy, apprenticeships and wider skills in England.
- The Department for Transport (DfT), which supports the transport network to help the UK's businesses and get people and goods travelling around the country.
- Foreign, Commonwealth and Development Office (FCDO), leads on the UK's diplomatic, development and consular work around the world.
- Department for Science, Innovation and Technology (DSIT), ensures that new and existing technologies are safely developed and deployed across the UK and drive forward a modern digital government for the benefit of its citizens.
- Ministry of Housing, Communities and Local government (MHCLG), lead on affordable homes and handing power back to communities and rebuilding local governments.

Further information about the UK government can be found at GOV.uk[4]

2.1.2 Northern Ireland Executive

In January 2020 the 'New Decade, New Approach[5]' was published, which set out a commitment to tackle climate change head-on using a coordinated and strategic approach.

On behalf of the NI Executive the Department for Agriculture, Environment and Rural Affairs (DAERA) has led on the development of a draft Green Growth Strategy[6], collaborating with other departments, local government and key stakeholders from across the business, voluntary and community sectors in its development.

To ensure that there is a coordinated and strategic approach to deliver a Green Growth Strategic Oversight Group, which is a group of senior officials from all nine Northern Ireland (NI) Government departments, provides overall strategic direction for the Executive's Green Growth and climate change commitments.

2.1.3 Scottish Government

The Scottish Government has a range of responsibilities, including climate change policy and many of its constituent lever policies. The Scottish Parliament passes laws on devolved matters, which includes a statutory framework for Scotland's approach to tackling climate change.

The Scottish Government remains absolutely committed to ending Scotland's contribution to global emissions as soon as possible, and by 2045 at the latest (through a statutory net zero target). Scotland's emissions halved between 1990 and

[4] https://www.gov.uk./
[5] Northern Ireland: New Decade, New Approach
[6] Northern Ireland: A Green Growth Strategy

2022, while our economy has grown by 67%, proving that tackling climate change and growing our economy go hand in hand.

Climate change is embedded across the Scottish Government through a robust ministerial and corporate governance framework. Accountability for climate action is led by the Cabinet Secretary for Net Zero and Energy and supported by the Cabinet Sub-Committee for the Climate Emergency which provides cross-government leadership, assurance and coordination of efforts.

At a corporate level, oversight and assurance of climate policy delivery is provided by the Global Climate Emergency (GCE) Board of senior officials, with responsibility to ensure a whole-systems approach to delivering a just transition to net zero and strengthening climate adaptation. The GCE Board is overseen by the Scottish government's Executive Team and Corporate Board. Both the GCE Board and Corporate Board include non-executive directors as members.

2.1.4 Welsh Government

Within the Welsh Government, the Deputy First Minister and Cabinet Secretary for Climate Change and Rural Affairs lead on the net zero agenda, although the Cabinet has collective responsibility for achieving Wales' statutory emissions targets.

The Climate Change Portfolio Board of senior civil servants supports Cabinet decision-making. Further support is provided by the Climate Change Committee,[7] which is the Welsh government's statutory independent advisor on climate change.

The Welsh Government's response to the climate emergency is framed by the Well-being of Future Generations (Wales) Act (2015).[8] This requires the Welsh Government to take long-term policy decisions, involve people in the government decisions that affect them, and seek out opportunities to address the underlying causes of change. The Welsh Government's Programme for government contains ten well-being objectives, including "Embed our response to the climate and nature emergency in everything we do".[9]

2.2 Population profile

This section discusses demographic characteristics of the UK, to provide context on the population-related drivers that affect the UK's Greenhouse Gas (GHG) emissions. Unless stated otherwise, the following statistics have been produced from data collected by the Office for National Statistics (ONS), who produce the official population estimates for the UK and its constituent countries.

The total population of the UK was estimated to be 67.6 million in mid-2022, which was 10.4 million more (18% more) than in mid-1990. **Table 4** shows that the

[7] https://www.theccc.org.uk/
[8] Well-being of Future Generations (Wales) Act 2015: guidance
[9] Welsh Government Programme for government: update

population of the UK is increasing and ageing with the median age in the UK increasing from 35.8 in 1990 to 40.7 in 2022. The population aged greater than 65 years increased from 15.7% in 1990 to 18.8% in 2022. The male to female ratio of the UK population has remained broadly steady between 1990 and 2022 at approximately 49% to 51%, though within these broad percentages the gap is narrowing[10].

Table 4: Mid-year population estimates, UK 1990-2022

	1990	2000	2010	2015	2020	2022
Total population (thousands)	57,237	58,886	62,759	65,088	66,744	67,603
Male population (thousands)	27,819	28,690	30,805	31,859	32,682	33,108
Female population (thousands)	29,419	30,196	31,954	33,129	34,062	34,495
Median age (years)	35.8	37.6	39.5	40.1	40.6	40.7
Percentage of population aged 15 years and under (%)	20.2	20.3	18.8	18.7	18.5	18.3
Percentage of population aged 16 to 64 years (%)	64.0	63.9	64.8	63.5	62.9	62.8
Percentage of population aged 65 years and over (%)	15.7	15.8	16.4	17.8	18.5	18.8

According to ONS projections, the UK is expected to see a continued growth in population, as shown in **Figure 1**. The population is projected to increase to 76.3 million by mid-2045, an increase equivalent to an average annual rate of growth of slightly over 0.5% between 2022 and 2045. Assumed net migration accounts for the projected increase over the next 25 years, with projected annual deaths higher than births for most of this period. ONS note that the projections do not attempt to predict the impacts of the UK leaving the EU or the lasting effects of the coronavirus pandemic.

[10] Estimates of the population for the UK, England, Wales, Scotland, and Northern Ireland

Figure 1: UK population estimates, mid-1996 to mid-2021, and projections to mid-2046 population projections in the UK by country, 2022-2046 (in millions)

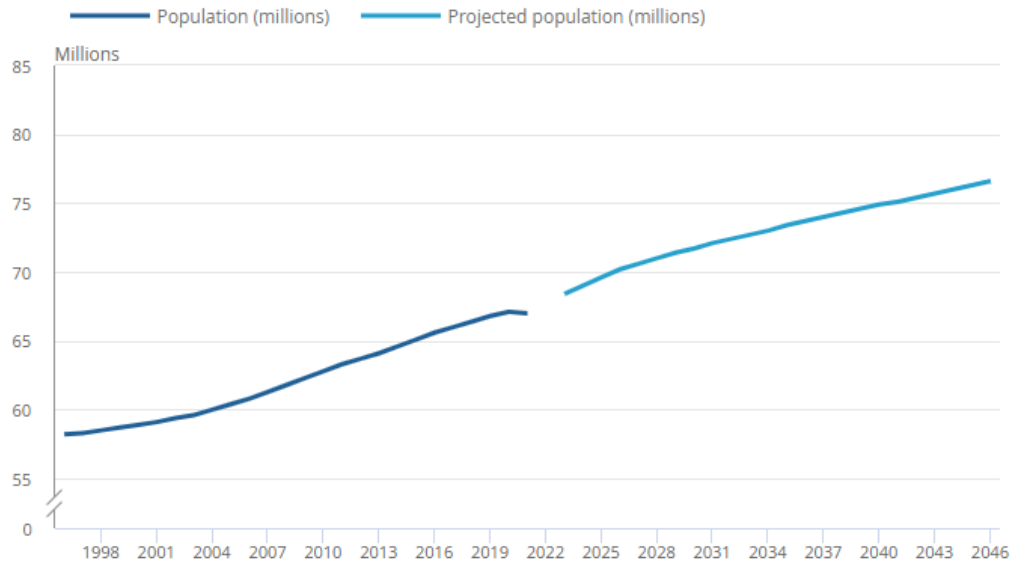
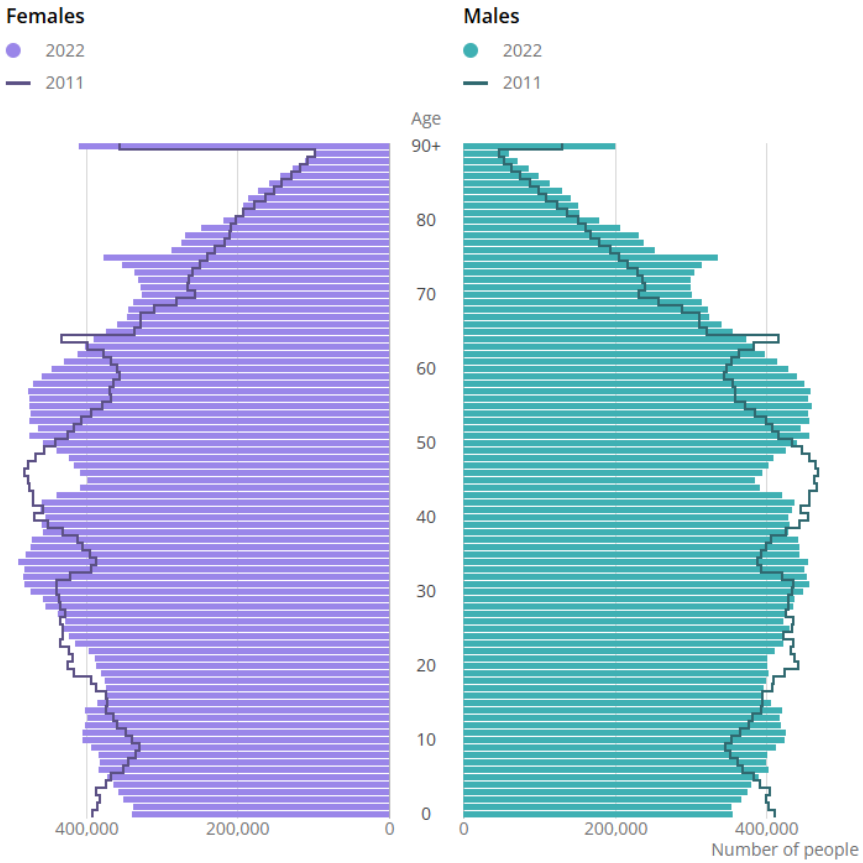


Figure 2: Population pyramid for the UK mid-2022 (purple and green bars) compared with mid-2011 (purple and green lines)



Each line in Figure 2 represents a single year of age. The length of the line relates to the number of people of that age in the population. The size and composition of the population is determined by the pattern of births, deaths and migration which have taken place in previous years. The main details illustrated by the pyramid for mid-2020 include the following:

- The peaks and wide areas of the pyramid reflect the high numbers of births in the years after the Second World War and during the baby boom of the 1960s.
- The sharp narrowing of the pyramid for people aged between 15 and 20 years is a consequence of low numbers of births just after the turn of the century. There followed an increase in birth rates peaking around 2008 to 2012. Since 2016, birth rates have fallen more rapidly.
- Females outnumber males at older ages, reflecting the higher life expectancy of females, though the gap has narrowed over time.

2.2.1 Sex & youth

The male to female ratio of the UK population has remained broadly steady between 1990 and 2022 at approximately 49% to 51% respectively, though within these broad percentages the gap is narrowing.

2.2.2 Building stock & urban structure profile

In 2022, the most common types of dwellings in England were terraced houses (29%) followed by semi-detached (25%), detached (17%), purpose-built flats (17%) and all other types of dwellings (12%)[11].

2.3 Geographical profile

The UK lies between latitude 49ºN and 61ºN and longitude 8ºE and 2ºW, positioned in north-western Europe. There are three UK Crown Dependencies (the Bailiwick of Jersey, Bailiwick of Guernsey and the Isle of Man) and fourteen Overseas Territories (listed below).

- Anguilla
- Bermuda
- British Antarctic Territory
- British Indian Ocean Territory
- Virgin Islands (commonly known as the British Virgin Islands)
- Cayman Islands
- Falkland Islands
- Gibraltar
- Montserrat
- Pitcairn Islands

[11] English Housing Survey Headline Report, 2022-23

- Saint Helena, Ascension and Tristan da Cunha
- South Georgia and the South Sandwich Islands
- Sovereign base areas of Akrotiri and Dhekelia
- Turks and Caicos Islands.

2.4 Economic profile

In 2022, the UK had a Gross Domestic Product (GDP) of $3.1 trillion, making it the world's 6th largest economy[12]. It is the 14th largest exporter of goods ($534 billion in 2022) and second largest exporter of services ($507 billion in 2022)[13].

The level of real GDP in Q1 of 2022 was 1.3% higher than in Q4 of 2019[14], broadly in line with other G7 countries. Up until the Global Financial Crisis (GFC), the rate of growth in UK real GDP had exceeded the rate of population growth – leading to rising GDP per capita. Since then, GDP per capita growth has slowed, and fell as a result of Covid-19, mirroring the fall in GDP. As of 2022, GDP per capita was around 0.6% above 2019 (pre-Covid) levels.

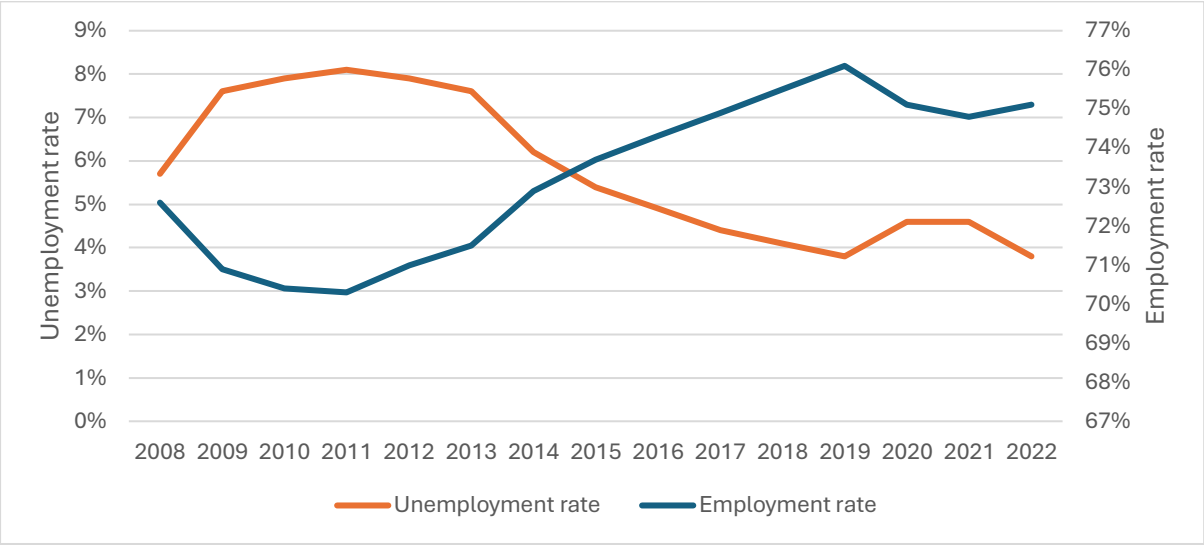
According to the International Monetary Fund (IMF)[15] real GDP growth in the UK was 4.8% in 2022. This compares with 2.5% for the USA, 1.4% for Germany, 2.6% for France, 4.7% for Italy, and 1.2% for Japan.

The last decade has been characterised by high employment and low unemployment, and stagnant wage growth. The employment rate peaked at 76.5% in December to February 2020, which was the highest rate since comparable records began in 1971[16]. The employment rate in 2022 was 75.1%. Similarly, the unemployment rate dropped to 3.7% in October to December 2019, the lowest since 1974, and was 3.8% in 2022[17]. Due to the furlough scheme and other interventions the impact of the Covid-19 pandemic on employment and unemployment was relatively limited. Since the start of 2010, annual real regular pay growth has averaged just 0.3%[18] and UK wage growth since the financial crisis has been one the slowest rates among G7 nations.

As shown in **Figure 3**, the (relatively small) rise in unemployment resulting from the Covid-19 pandemic has largely unwound. There has been a degree of tightness in the labour market, due to record high vacancies. Job vacancies reached 1,304,000 in the second quarter of 2022, however since then the total number of vacancies has declined by nearly 400,000[19].

[12] International Monetary Fund: GDP, current prices
[13] https://unctad.org/statistics
[14] ONS: Gross Domestic Product (GDP)
[15] International Monetary Fund: World Economic Outlook
[16] Employment and Employee Types
[17] ONS: Unemployment rate (aged 16 and over, seasonally adjusted): %
[18] Employment and Employee Types
[19] Employment and Employee Types

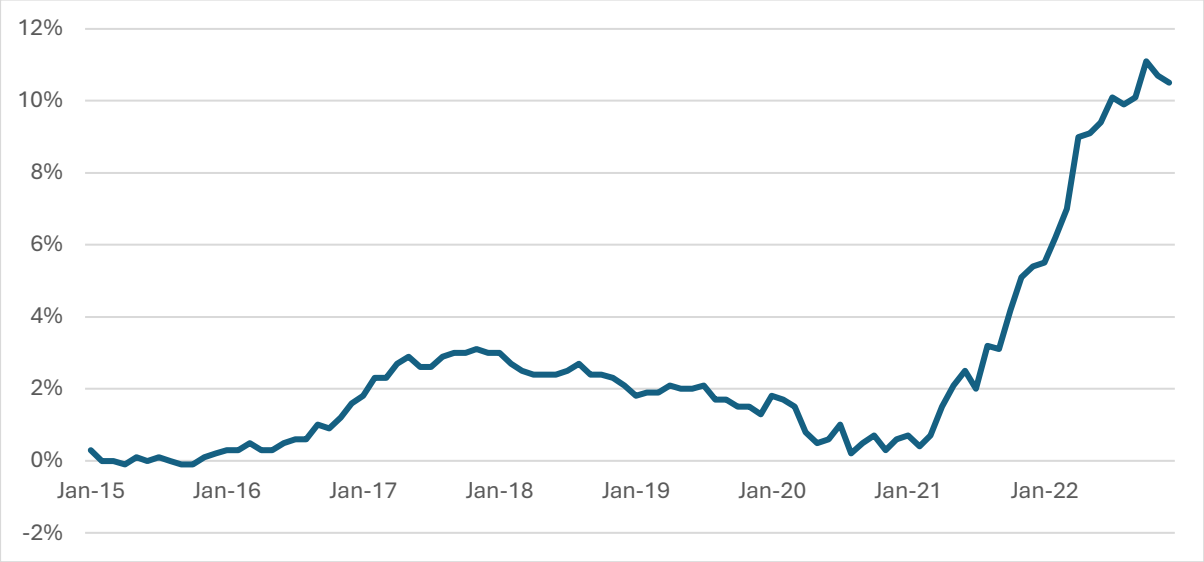
Figure 3: Unemployment rate (left hand axis) and employment rate (right hand axis), ONS



Prior to the Covid-19 pandemic, the UK had generally enjoyed low and stable inflation, broadly in line with the Bank of England's 2% target. Since summer 2021 however, the UK like other developed nations, experienced a rapid rise in inflation driven by mostly external factors. These include high prices for energy and other commodities, exacerbated recently due to the war in Ukraine, a mismatch of global supply and demand, as well as base effects – abnormally low inflation in 2020 due to the pandemic.

Consumer Price Index (CPI) inflation, see **Figure 4**, reached 11.1% in October 2022. This is the highest level of price inflation in the UK for more than 40 years. As a result, real pay growth returned to being negative for the first time since 2017. CPI inflation returned to the target of 2% in May 2024.

Figure 4:CPI Annual Inflation (%)[20], ONS



The UK economy is dominated by the service sector, accounting for over 80% of gross value added (GVA) and employment[21]. Prior to the Covid-19 pandemic, the fastest growing sector in the economy since the global financial crisis was the information and communication sector, which grew by around 130% between Q3 2009 and Q4 2019, largely as a result of technological progress within the sector.

Looking at more recent data, GDP grew by 0.7% in Q1 2022. Services grew by 0.8% on the quarter meaning it was 2.5% above pre-pandemic (Q4 2019) levels. Construction grew by 3.0%, and is 1.7% above pre-pandemic levels, while production fell by 1.9% and remains 5.8% below pre-pandemic levels.

UK government consumption and investment are the only expenditure component of GDP (the others being household consumption, business investment and net exports) that has risen since the start of the coronavirus pandemic, largely driven by health spending, and mirroring the growth seen in the health sector on the output measure. UK government consumption has grown by 8.5% since the start of the coronavirus pandemic. Conversely, private consumption (-1.3%), business investment (5.0%) and net trade have all detracted from GDP growth since Q4 2019.[22]

2.5 Climate profile

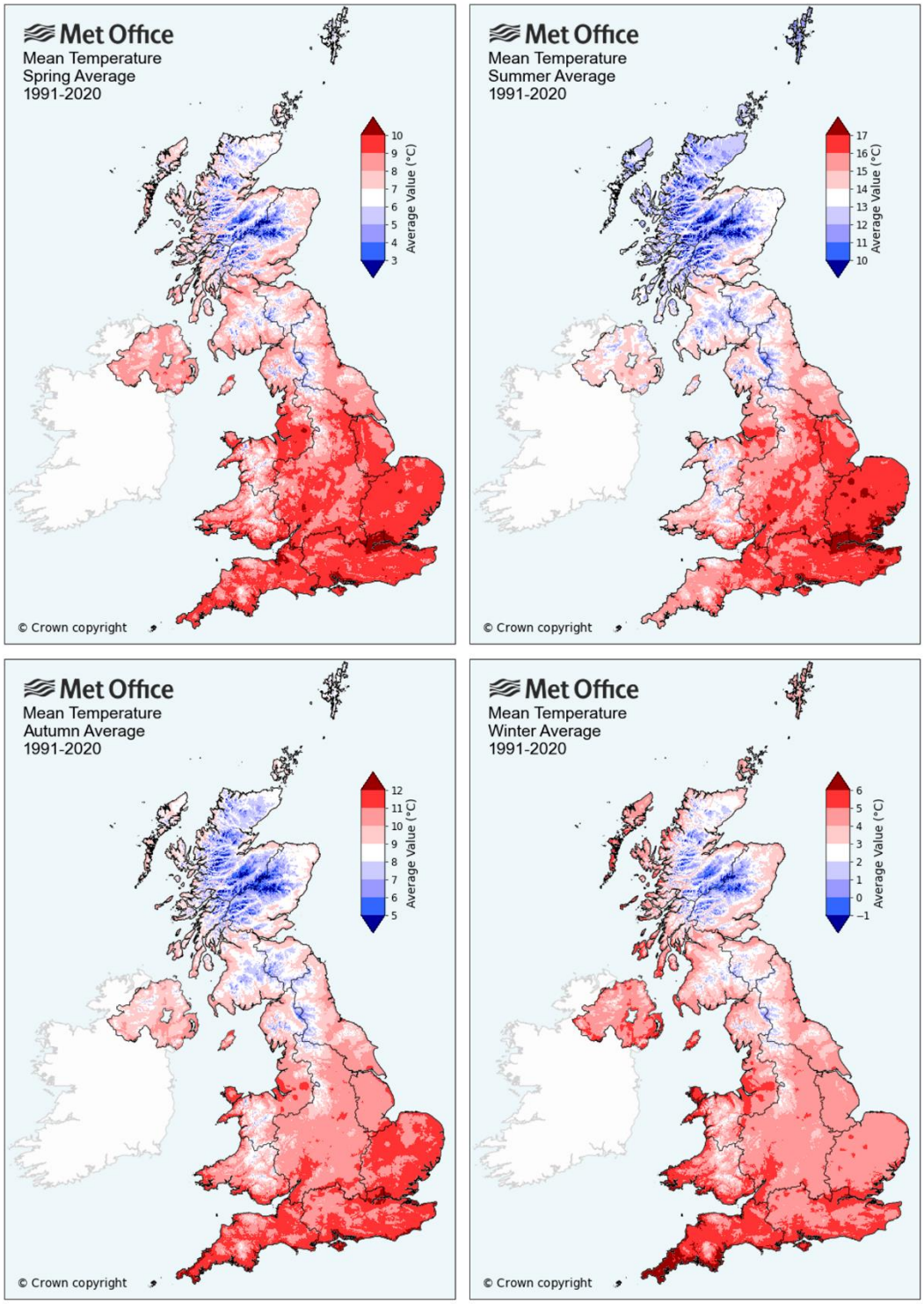
The UK's climate is maritime, moist and temperate, with a winter mean temperature of 4.1 °C and summer mean temperature of 14.6 °C. The influence of the Atlantic Ocean means that the UK's annual temperature range is smaller than for more continental countries at the same latitude. Average annual precipitation in the UK

[20] ONS: Consumer price inflation tables
[21] Commons Library: Service industries: Key Economic Indicators
[22] First Quarterly Estimate, Q3 (July to Sept) 2024

typically ranges from approximately 800 mm to 1400 mm, but with significant regional variations with western upland regions experiencing in excess of 2000 mm and parts of low-lying south-east England less than 600 mm. The UK climate is heavily influenced by its proximity to the Atlantic Ocean and the Gulf Stream / North Atlantic Drift which brings warm water into high northern latitudes. Prevailing winds are westerly, and UK regional climates vary with distance from the Atlantic as well as with local topography. Continental influences are most strongly seen in the southeast of the country.

Variations in the strength and position of the jet stream strongly influence UK weather. Sometimes the jet stream is directed close to or over the country, bringing extended periods of stormy, wet weather. At other times, a blocked pattern steers the jet stream away to the north or to the south, bringing generally settled, dry conditions, either warmer or colder than average. Space heating is required in most buildings throughout the winter months and the use of air conditioning in the summer months is increasing. In the UK, GHG emissions are strongly influenced by weather conditions. In winter, cooler-than-average temperatures increase demand for space heating; and in summer, warmer-than-average temperatures increase demand for space cooling. **Figure 5** shows the average daily mean temperature for the UK by season.

Figure 5: Average (1991-2022) daily temperature (°C) by season, UK (source: Met Office)

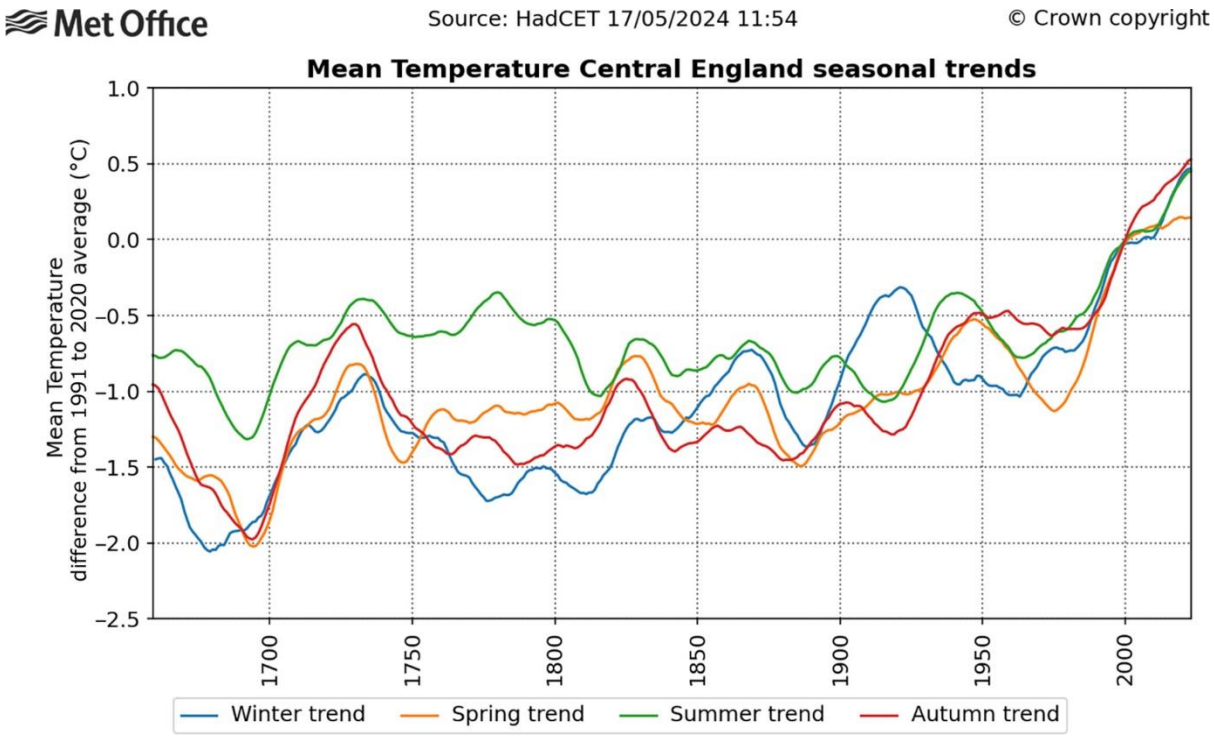


2.5.1 UK climate trends[23]

2.5.1.1 Temperature

The Central England Temperature (CET) series is the longest-compiled instrumental temperature record in the world, beginning in 1659. **Figure 6** shows that the CET for the early 21st century has been warmer than the previous three centuries for all seasons of the year.

Figure 6: Seasonal Central England Temperature Anomaly series, 1659 to 2023, relative to 1991-2020 average[24]



The UK-wide national temperature series begins in 1884, showing an increase in temperature from the 1970s to the 2000s with the most recent decade (2014-2023) on average 0.42 °C warmer than the 1991-2020 average and 1.25 °C warmer than 1961-1990. All ten warmest years recorded for the UK have been since 2003. Evidence from attribution science shows that the increasing trend in temperatures is overwhelmingly a result of human activities, in particular emissions of greenhouse gases.

[23] Met Office: State of the UK Climate
[24] Met Office, State of the UK Climate 2023 report

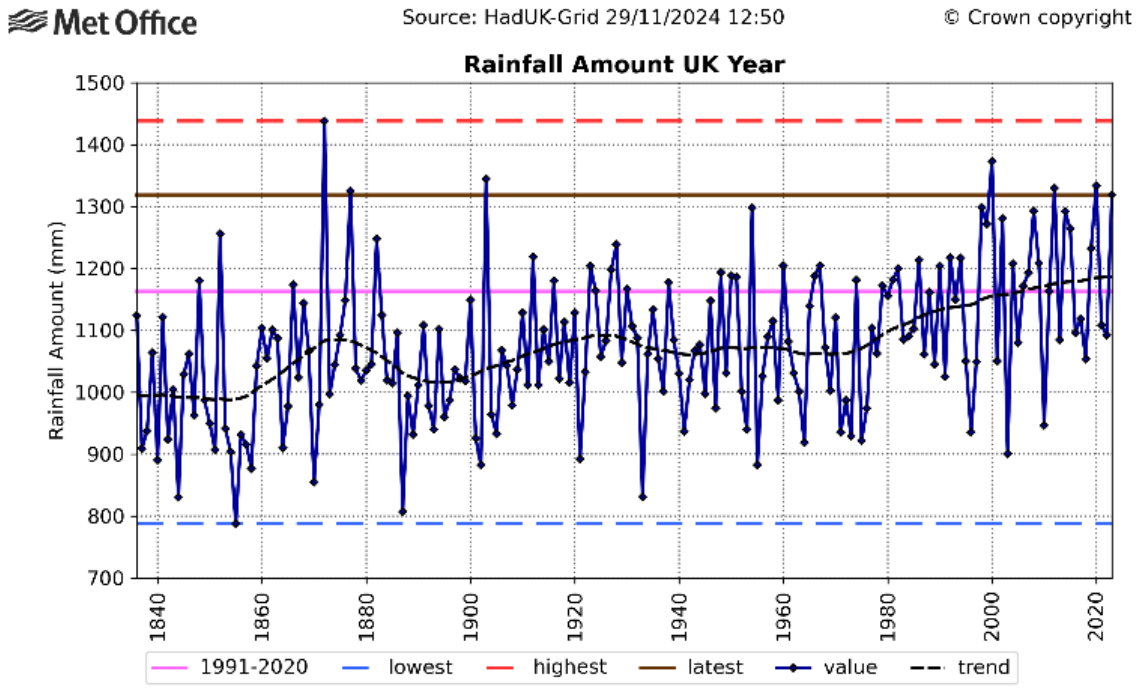
Cold years are still observed despite the warming trend, but they are less frequent and less severe than in the historical record: 2010 was the coldest year recorded since 1986 and the 22nd coldest in the UK series since 1884.

2.5.1.2 Precipitation

Precipitation data for the UK show a slight increase from the 1970s onwards (**Figure 7**) that is most pronounced for Scotland. The most recent decade (2014–2023) has been on average 2% wetter than 1991-2020 and 10% wetter than 1961–1990. Five of the ten wettest years for the UK have occurred since 2000, in a series beginning in 1836.

The largest increases in rainfall have been during the winter season, with the most recent decade (2014-2023) having winters 24% wetter than 1961-1990. This period includes the two wettest winters on record in 2013-2014 and 2015-2016, with winter 2019-2020 as the fifth wettest in a series from 1836. Summers of the most recent decade (2014-2023) have also been 10% wetter than 1961-1990. This changing trend in rainfall in the UK is a result of both human influence and large-scale natural variability in the climate system, which can occur over time periods of decades.

Figure 7: Annual precipitation, UK, 1836–2023[25]



[25] Met Office

2.5.1.3 Sea level

Since 1900 sea level around the UK has risen by about 18.5 cm when corrected for vertical land movement, which is comparable to the global sea level rise estimate of 20 cm. There is evidence from the observational records that the rate of sea level rise is increasing from a long-term estimate of 1.5 mm/yr, with the period 1993-2023 increasing by around 4.6 mm/year. Sea surface temperatures around the UK for the most recent decade (2014-2023) have been on average 0.3 °C warmer than the 1991-2020 average and 0.9 °C warmer than 1961-1990.

2.5.2 Climate projections

The latest UK Climate Projections (UKCP18) provide the most up-to-date assessment of how the UK climate is projected to change in the future and includes modelling projections for three spatial resolutions (60km, 12km and 2.2km), probabilistic projections including extremes, and projections of sea-level rise, storm surges and waves.

One strand of the modelling projections is UKCP Local; the first time a climate model with a resolution similar to weather forecasting models has been used to explore national climate scenarios. This is a step forward in the ability of the climate model to simulate small-scale behaviour seen in the real atmosphere, particularly for the representation of the heavy rainfall associated with showers that affect flooding in summer. In this section, UKCP information is used to summarise the projected effects on UK climate, both in terms of averages and extremes[26], followed by impact metrics. UKCP data were used in the most recent UK Climate Change Risk Assessment (UKCCRA) and are being applied by the more than seven thousand registered users to quantify and manage physical climate risks.

2.5.2.1 UK future climate overview

The headline findings of UKCP18 state that future UK climate change will result in warmer, wetter winters and hotter, drier summers. Annual temperatures for the UK for a medium emissions scenario[27] from the UKCP Probabilistic Projections suggest warming of 2.3°C (1.1°C to 3.6°C)[28] by the end of the century (2080- 2100) compared to the 1981-2000 baseline period. Warming is projected to be greater in summer (3°C; 1.3°C to 4.8°C) than in winter (2°C; 0.6°C to 3.5°C). UK-wide, summer precipitation decreases are expected to be -19% (-36% to -2%) while winter precipitation is projected to increase 10% (-2% to 25%) by the 2090s.

Notable UK-wide features, such as warming being greater in the summer compared to the winter are projected to occur across all regions of the UK for both low and high emissions scenarios[29]. Similarly, the majority of UK regions are projected to

[26] Unless stated otherwise, all results discussed here are from the UKCP18 Summary Report, where further details can be found.
[27] Using the Representative Concentration Pathway (RCP) 4.5.
[28] Median value (10th – 90th percentile range).
[29] RCP2.6 and RCP8.5 respectively.

experience a decrease in summer precipitation and an increase in winter precipitation. Across both seasons and emissions scenarios, regional variations are generally modest within each metric, with differences usually within 1°C or 10%, the high emissions scenario winter precipitation showing the greatest spread between regions.

Sea level is projected to rise around the UK compared to a 1981-2000 baseline period although the amount of sea level rise is higher in the south and increases with higher emissions scenarios. For the medium emissions scenario (RCP4.5), the UKCP Marine Projections give rises of 0.55 m (0.40 m to 0.75 m)[30] in London compared to lower values of 0.33 m (0.18 m to 0.53 m) in Edinburgh in 2100. Based on exploratory results to 2300, sea levels continue to increase beyond 2100 even with large reductions in greenhouse gas emissions. For the same medium emissions scenario, sea level is projected to rise for London by 1.42 m (0.93m to 2.23 m) and 0.77 m (0.28 m to 1.6 m) for Edinburgh by 2300. However, the uncertainty around post-2100 simulations remain large due to gaps in understanding related to the role of the large ice sheets.

2.5.2.2 UK future climate extremes

For day-to-day extremes, UKCP18 provides extremes in terms of return periods (the average time between events) for maximum temperatures and heavy rainfall. These results project increases in both the values and range over the course of the 21st century.

The median values of high temperature and heavy rainfall expected to occur once every 50 years are projected to increase in all seasons under an illustrative high emissions scenario (RCP8.5). For example, by 2070 with a high emissions scenario, the daily maximum temperature of a 1-in-50-year event is projected to be 2.5°C (winter) and 3.7°C to 4.3°C (spring, summer, autumn) warmer than in 1990. For rainfall, the median 1-in- 50-year event is expected to have 12-19% (daily rainfall) or 11-13% (5-day accumulated rainfall) more rainfall in 2070 than in 1990 in autumn, winter or spring, with smaller increases expected in summer[31].

UKCP Local models have better representation of how rainfall varies day-to-day and hour-to- hour. For hourly rainfall that is expected to occur once every two years, UKCP Local projects that this will be 29% heavier in the summer under a future climate with a high emissions scenario (2060-2080, RCP8.5). Similar increases are projected for rarer events and in the autumn, with smaller increases projected in spring and winter.

2.5.2.3 UK climate impact metrics

UKCP18 data has also been translated into metrics that quantify the expected future impacts of weather on society at different Global Warming Levels (GWLs), ranging

[30] Median value (10th and 90th percentile range).
[31] UKCP Additional Land Products: Probabilistic Projections of Climate Extremes report.

from 1.5°C above the pre-industrial level (consistent with a low emissions scenario by 2100) to 4°C (consistent with a high emissions scenario by 2100). Projections show increases for temperature metrics related to hot events, accompanied by reductions in metrics related to cold events.

The number of hot days (over 25°C) in the UK is projected to increase by between 5 days and 39 days per year. This could mean increased hospital admissions for those vulnerable to heat and increased transport disruption, for example from railway track buckling at higher temperatures. The projections show a 2 to 7-fold increase in an indicator of the energy demand for cooling (known as cooling degree days). Increases are also projected in an indicator of the energy available for plant growth over a year (growing degree days) of 19% to 60%. Occurrences of tropical nights, when the temperature falls no lower than 20°C, are rare in the current climate but become more frequent in a warmer climate, particularly in southeast England and in urban areas.

Conversely, the projections show a reduction in the number of frost days (below 0°C) of between 10 and 49 days per year. Decreases are also found in an indicator of energy demand for heating (known as heating degree days) of 11% to 32%, implying a decrease in the adverse effects of cold weather.

Impacts related to rainfall include projected increases in heavy rainfall events that could cause flooding and increases in average drought severity. The projections show an increase in occurrence of high-impact levels of daily rainfall from 1 day to 8 days per year. Average drought severity is projected to increase at most GWLs but with a small decrease possible with a low 1.5°C GWL, with changes of -3% to 19% for 12-month drought duration, and -2% to 54% for 36-month drought duration.

2.6 Sector details

2.6.1 Energy

The UK published its Net Zero Strategy in 2021, which included its commitment to decarbonise the electricity sector by 2035, subject to security of supply. This was submitted to the UNFCCC as the UK's Long Term Low Emissions Development Strategy in 2021. Policies to support this and increase energy security were set out in this document and in the subsequent British Energy Security Strategy which was published in 2022 following Russia's invasion of the Ukraine. The main policy focus was to increase energy efficiency and accelerate the transition away from fossil fuels through the decarbonisation of the power sector and increased electrification of heat, transport and industry.

2.6.1.1 Energy production

Total UK energy production increased rapidly between 1990 and 2000, mainly due to the growth of oil and gas. Production in 2000 was at record levels for natural gas, while in 1999 it was at record levels for overall energy and petroleum. Energy production has since been on a general decline, however energy production levels increased between 2014 and 2019, as new oil fields opened, combined with the

growth in output from bioenergy and waste and the increased capacity of wind and solar technologies.

In 2022, total energy production was 110.2 million tonnes of oil equivalent, 3.1% higher than the record low level of 106.8 million tonnes of oil equivalent in 2021. Production levels for all fuels except coal, oil and bioenergy & waste are up on 2021, with oil output at a record 21st century low level. UK energy production had fallen year on year since 2018 before the rise in 2022, and energy production is now 63 per cent below the peak recorded in 1999.

In 2022, coal production fell by 39 per cent to a record low level, whilst production of oil fell by 7.6 per cent to a record low level, with output down by 28 per cent on pre-pandemic (2019) levels; conversely production of natural gas rose by 16 per cent in 2022.

2.6.1.2 Energy consumption & transformation

In 2022[32] total primary energy consumption was 168.6 mega tonnes of oil equivalent (mtoe), 1.3 per cent lower than in 2021, with record high temperatures and higher energy prices a key factor in the reduced consumption levels. The level of primary energy consumption in 2022 was 21% lower than in 1990; primary energy consumption levels peaked in 2001 and since then there has been a general downward trend. In the last 33 years, consumption of natural gas and primary electricity have risen, whilst consumption of oil and coal have fallen. However, over the past decade, the growth in consumption of bioenergy and waste has more than doubled.

In 2022[33] total final energy consumption including non-energy use was 130.9 mtoe, 2.1 per cent lower than in 2021, and 11 per cent lower than pre-pandemic (2019) levels. The level of final energy consumption in 2022 was 17% lower than in 1990. The largest fall in final energy consumption since 1990 has occurred in the industrial sector, mainly due to structural change in the period before 2000; in the domestic sector there has been a general downward trend in consumption due to improvements in energy efficiency measures, and more recently due to the impact of higher energy prices.

2.6.1.3 Electricity

Between 1990 and 2022 electricity supply emissions have reduced by 73%. This decrease has resulted mainly from changes in the mix of fuels being used for electricity generation, including the growth of renewables; together with greater efficiency resulting from improvements in technology. The electricity supply sector historically had the largest emissions of the sectors presented in these statistics. However, these reductions mean that since 2014 this has no longer been the case

[32] DUKES 1.1.1
[33] DUKES 1.1.5 final consumption by sector and DUKES 1.1.2 non-energy use

and there are now several sectors with higher emissions (the largest being transport).

Since 1990 there has been a decline in the use of coal at power stations and an increase in the use of gas, which has a lower carbon content so results in fewer emissions. Coal use in generation reduced by 97% between 1990 and 2022, making up only 3% of the fuel used for UK electricity generation in 2022 compared to 65% in 1990. Electricity supplied was 4% higher in 2022 than in 1990, having grown to a peak in 2005 and decreased since then. In 2022 the use of gas for electricity generation increased 1% from 2021 and the use of renewables and nuclear both by 5%, whereas coal saw a 16% decrease[34].

The British Energy Security Strategy published in 2022 included ambitions for up to 50GW of offshore wind by 2030, including up to 5GW of floating wind; up to 70GW of solar by 2035; up to 10GW of hydrogen by 2030, with up to 6GW from electrolytic ('green') hydrogen; and up to 24GW of nuclear by 2050.

The share of electricity generated from renewable sources remained stable through 2020-22.

2.6.1.4 Fuel Supply

UK offshore oil and gas production started sixty years ago. This long history of oil and gas production in the UK means our offshore basin is mature and production is naturally declining. Through the North Sea Transition Deal, the oil and gas industry is committed to reducing its production emissions by 10% by 2025, 25% by 2027 and 50% by 2030, against a 2018 baseline[35]. Transparency is also important: since 2021, the North Sea Transition Authority (NSTA) has published annual Emissions Monitoring Reports, which present a wide range of data on overall greenhouse gas emissions, methane emissions, performance benchmarking and flaring and venting to track industry's progress. The NSTA's 'OGA Plan' on emissions reduction, published in March 2024, sets out requirements for the oil and gas industry to decarbonise and makes it clear that for production to continue in the North Sea, it must also continue to become cleaner.

The sector's emissions reductions will be delivered through a mixture of decreasing oil and gas production from the basin and decarbonisation measures such as ending routine flaring and venting and platform electrification. Good progress has been made in recent years - the NSTA estimates that between 2018 and 2022, emissions from upstream oil and gas production decreased by approximately 23% and industry almost halved methane emissions[36]. The UK oil and gas sector has one of the lowest upstream methane emission intensities globally, having achieved the Oil and Gas Climate Initiative's 0.2% intensity target for 2025 early, in 2021[37]. We continue to support the North Sea Transition Deal, including the important decarbonisation

[34] Final UK greenhouse gas emissions national statistics: 1990 to 2022
[35] North Sea Transition Deal
[36] Emissions Monitoring Report 2023
[37] OGCI Methane emissions report;

targets it set for the sector, working together to make sure the next chapter of oil and gas is also the cleanest in its history.

2.6.2 Transport

Domestic transport accounted for around 28% of all UK greenhouse gas emissions in 2022, almost entirely through carbon dioxide emissions. The main source of domestic transport emissions comes from the use of petrol and diesel fuels in road transport.

In 2020, transport was significantly impacted by COVID-19, as people were instructed to stay at home as much as possible. This led to an annual decrease in distance travelled by cars, vans and taxis of 28% in 2020 and an 80% decrease in distance travelled by rail, both when compared with 2019. COVID-19 restrictions were eased in 2021 and the last restrictions removed in 2022, resulting in consecutive years of increasing greenhouse gas emissions from domestic transport to 113.2 MtCO2e in 2022, a 2% rise from 2021 and 12% higher than 2020, although this was still 10% lower than 2019. In 2021/22 and 2022/23, rail passenger kilometres increased incrementally, but still remained 20% below pre-pandemic levels[38].

Road vehicles remained the most significant source of domestic transport GHG emissions (89%), making up 25% of economy-wide domestic emissions in 2022. Cars and taxis account for the bulk of this figure at 53% of domestic transport emissions, with Heavy Goods Vehicles (HGVs) contributing 17% and vans representing 16%[39].

[38] Transport Statistics Great Britain: 2022 Domestic Travel
[39] UK Greenhouse Gas Emissions, Final Figures

Figure 8: Passenger kilometres by mode in Great Britain, since 2012

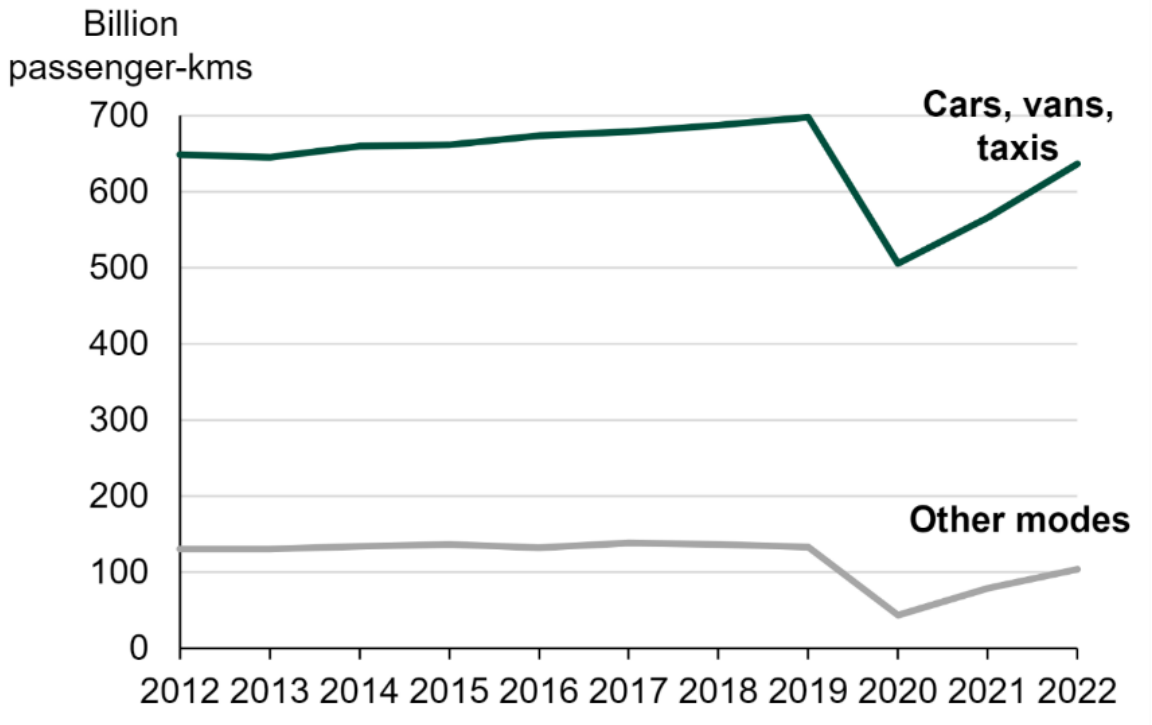
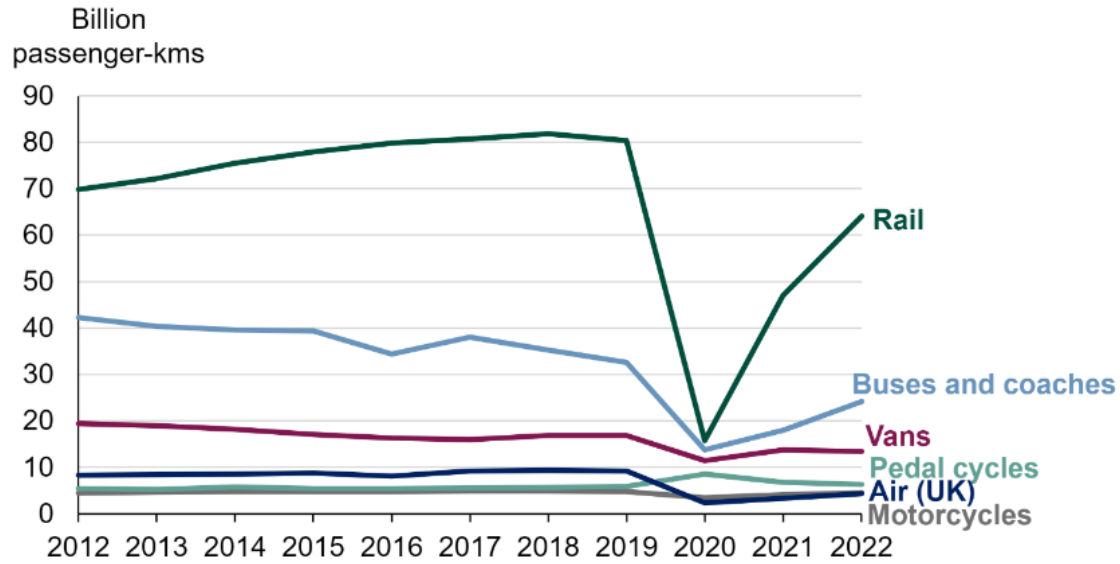


Figure 9: Passenger kilometres by mode (excluding cars and taxis) in Great Britain, since 2012



Public transport use was heavily impacted by COVID-19. Between 2019 and 2020, passenger kilometres travelled on buses and rail fell from 33 billion to 14 billion and

80 billion to 16 billion respectively[40]. In contrast, active travel spiked significantly in 2020 when compared with previous years. Increases were seen in walking trips, stages and miles travelled compared to 2021, with average trips and miles above pre-pandemic levels[41].

The freight sector is vital for the UK, with 216 billion tonne-kilometres of domestic freight moved in the UK in 2022. Road freight made up the largest proportion of domestic freight being moved in the UK in 2022, accounting for 81%[42]. Road freight has seen consistent increases from 2015 onwards. The COVID-19 pandemic interrupted this trend, with an 11% decrease in road freight traffic in 2020[43].

The maritime sector remains crucial for UK transport. In total, there are 51 major seaports in the UK[44]. In 2022, a total of 458.9 million tonnes of cargo were handled at all UK sea ports (98% at the 51 major ports); this is a 3% increase on 2021 but 5% lower than in 2019[45]. An estimated total of 86,600 cargo vessels arrived at UK major seaports during 2022, 1.6% more than the 2021 level[46].

The UK aviation sector supports global travel, connectivity and trade. UK airports provide direct flights to over 100 countries and served over 195 million terminal passengers in 2022. Around 2 million commercial flights depart from or arrive at UK airports annually[47].

Domestic aviation emissions fell by more than half in 2020 compared to 2019 due to the COVID-19 pandemic, the largest fall of any mode of transport, and in 2022 were still 20% lower than in 2019. Emissions from waterborne transport were 11% lower in 2022 than in 2019, having remained at a similar level to their 2020 low.

The proliferation of future green technology is advancing, supported by investment in research and development (R&D), alongside incentives and other existing efficiency regulations across all modes of transport. In May 2022, £200m was announced to provide support for the rollout of zero emission HGVs and their associated infrastructure as part of the zero emission HGV and infrastructure demonstrator programme. In 2022, the UK committed £180m to support the development of UK sustainable aviation fuels (SAF) plants, building on the progress made in previous advanced fuels competitions. Additionally, the UK committed to a £206m R&D programme focused on maritime decarbonisation, which is being delivered through the UK Shipping Office for Reducing Emissions (UK SHORE) between 2022 until 2025.

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[40] The impact of the coronavirus pandemic on walking and cycling statistics, England: 2020
[41] Walking and cycling statistics, England: Introduction and main findings
[42] Transport Statistics Great Britain: 2022 Freight
[43] Transport Statistics Great Britain: 2021 Freight
[44] Port freight annual statistics 2021: Overview of port freight statistics and useful information
[45] Port freight annual statistics 2022: Overview of port freight statistics and useful information
[46] Port freight annual statistics 2022: Arrivals.
[47] Annual airport data 2023

2.6.3 Industrial processes & product use

The UK's industrial sector plays an important role in society, contributing £210 billion to the overall UK economy in 2022[48]. It is a high value area of employment, directly accounting for 10%[49] of the UK's total GVA in 2022 and providing 2.7 million[50] direct jobs across the country, rising to around 5 million jobs[51] if including indirect jobs across the value chain.

Industry is also a major source of CO_2 emissions, producing 17% (68.3 $MtCO_2e$)[52] of UK's total in 2022. Roughly half of these emissions are concentrated in specific 'clusters'[53] – geographical areas with large concentrations of industry. The seven UK clusters are: Humberside, the North-West, Grangemouth in Scotland, South Wales, Teesside, Southampton and the Black Country. The remaining emissions can be found in 'dispersed' sites, which are industrial regions scattered around the UK. Most emissions are from energy and carbon intensive sectors including cement, chemicals, food and drink, iron and steel, non-ferrous metals, non-metallic minerals, paper and pulp and refining. Industry emissions reduced by 57% between 1990 and 2022[54], due mainly to the changing structure of the UK's manufacturing and refining sector, efficiency improvements, and a shift to low carbon fuels[55]. Refer to **figures 10** and **11** below for an illustration of UK industrial emission and UK industrial process emission reductions from 1990 – 2022.

[48] Low-level aggregates of UK output gross value added (GVA), ONS (2024)
[49] Gross Value Added (Average) at basic prices: CP SA £m, ONS (2024)
[50] Employee jobs by industry (JOBS03), Self-employment jobs by industry (JOBS04), both ONS (2024)
[51] FTE multipliers and effects, reference year 2015, bespoke industry groups (2019) ,Manufacturing After Brexit, page 7, UKICE (2022)
[52] Final UK greenhouse gas emissions national statistics: 1990 to 2022, DESNZ (2024)
[53] National Atmospheric Emissions Inventory large point source emissions, NAEI (2023)
[54] Final UK greenhouse gas emissions national statistics: 1990 to 2022, DESNZ (2024)
[55] Digest of UK Energy Statistics (DUKES) table 1.1, DESNZ (2023)

Figure 10: UK industrial emissions from 1990 - 2022[56]

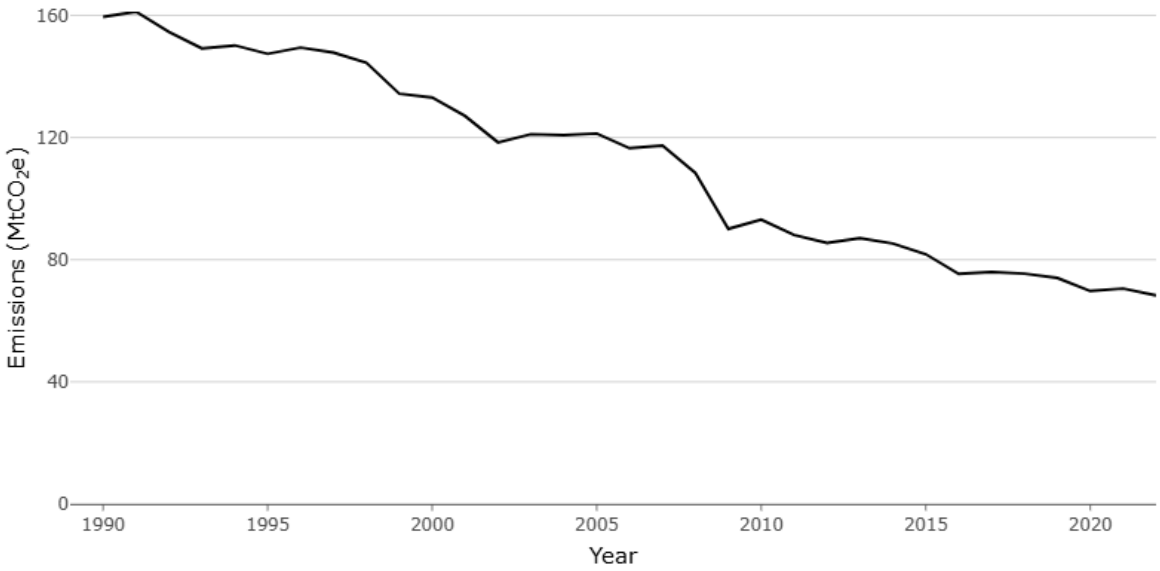
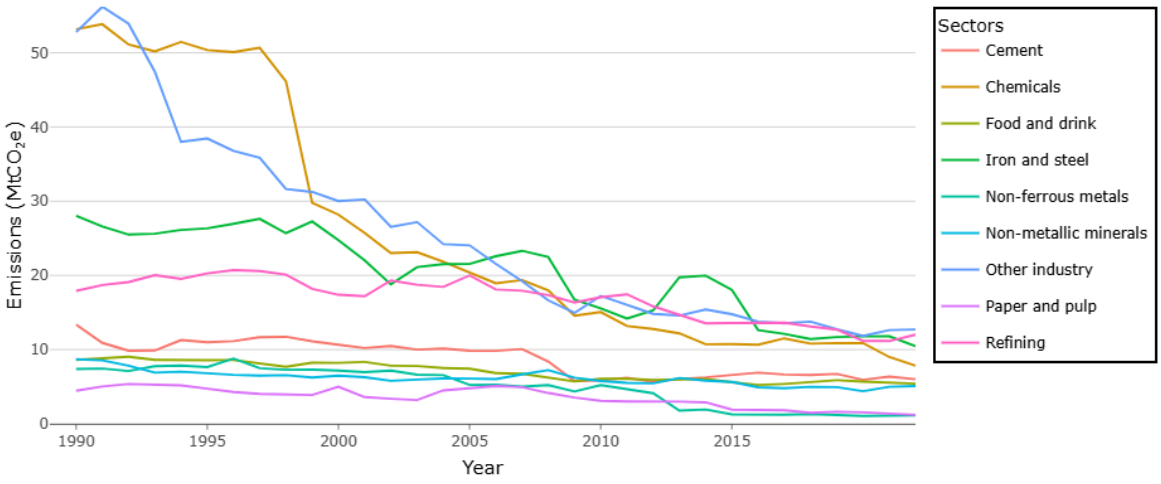


Figure 11: Breakdown of emissions UK industrial processes from 1990 - 2022[57]



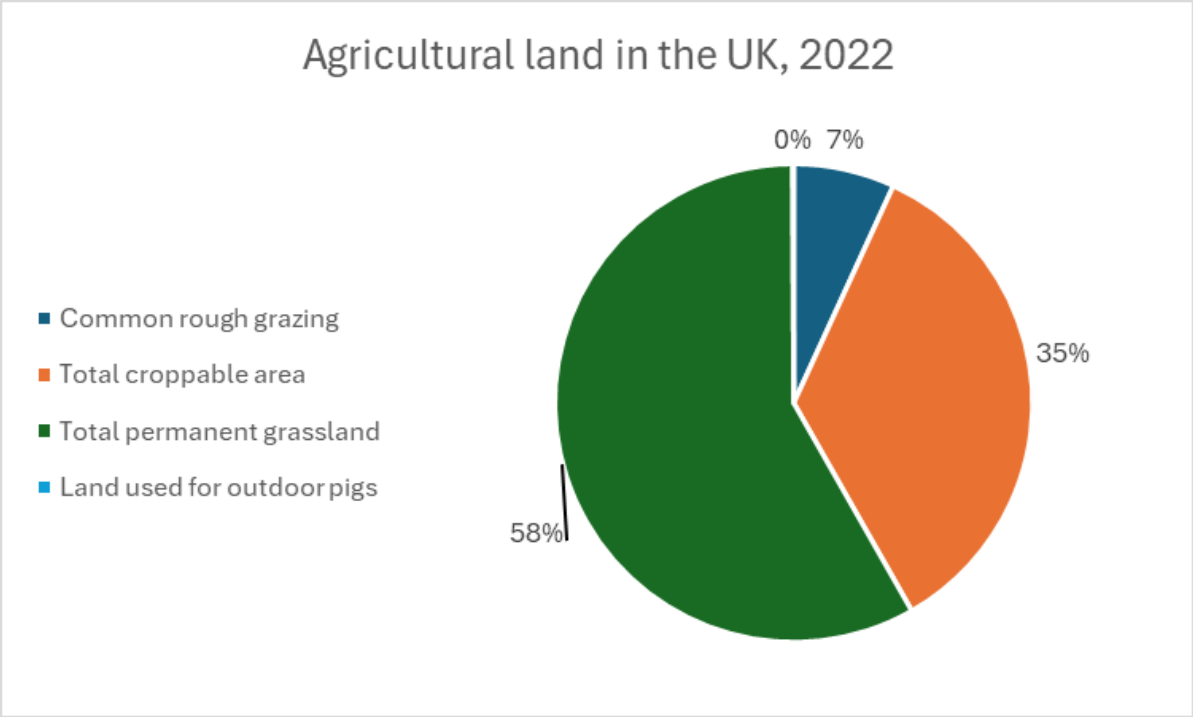
2.6.4 Agriculture

In 2022, around 71% (17.4 million hectares) of total UK land was used for agriculture. **Figure 12** shows UK land use data for the total utilised agricultural area as of June 2022[58]. About 4.4 million hectares of this was arable, of which around two thirds were under cereal production and 11.4 million hectares was under grass. The remainder was common rough grazing (1.2 million hectares) and land for outdoor

[56] UK greenhouse gas emissions: final figures - dataset of emissions by source
[57] UK greenhouse gas emissions by Standard Industrial Classification
[58] Agricultural Land Use in United Kingdom at 1 June 2023 - GOV.UK (www.gov.uk)

pigs (12,000 hectares)[59]. Total agriculture area saw a 0.4% increase between 2016 and 2022, and total croppable area increased by 0.2%. The biggest change in agricultural land use was seen in uncropped arable land which saw an 8.4% increase since 2016.

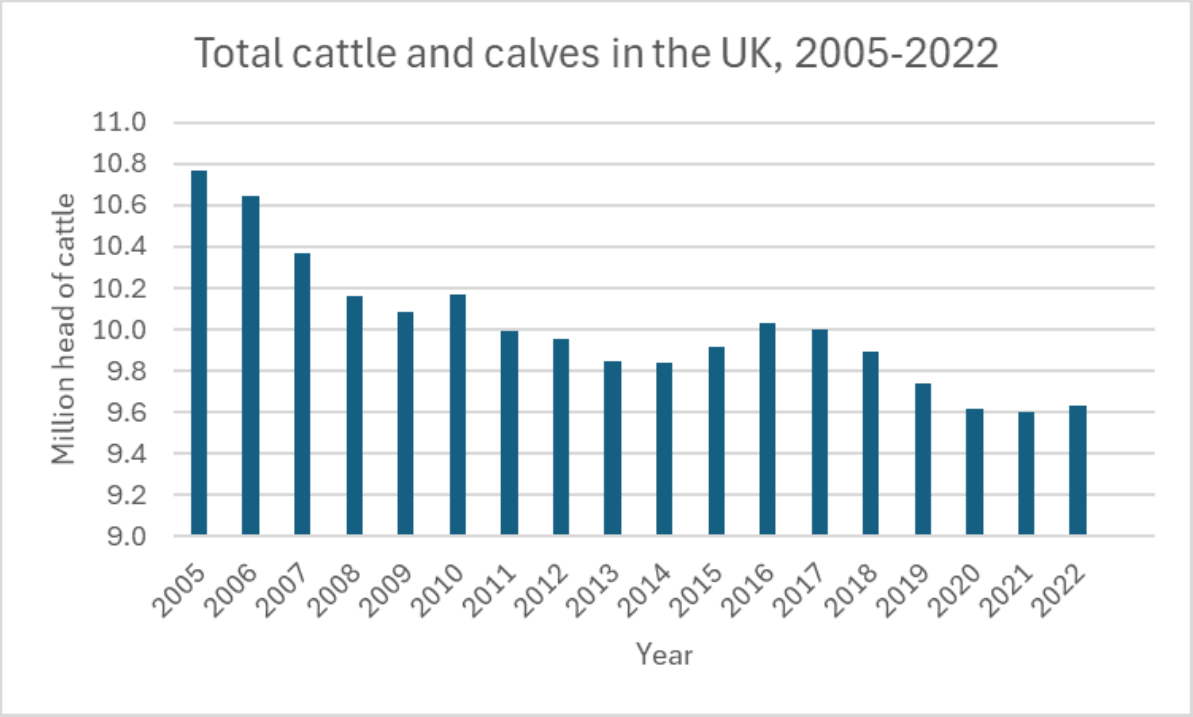
Figure 12: Total utilised agricultural land in the UK, 2022; Defra 2022



Livestock produce greenhouse gas emissions via processes such as enteric fermentation. The total number of cattle and calves in the UK decreased by 4% between June 2016 and June 2022 to around 9.6 million. The UK's dairy herd has decreased by 2.9%, and the UK beef herd has decreased by 8.3% over the same period. Total cattle and calf numbers in the UK during the period 2005-2023 are shown in **Figure 13**.

[59] Agricultural Land Use in United Kingdom at 1 June 2023 - GOV.UK (www.gov.uk)

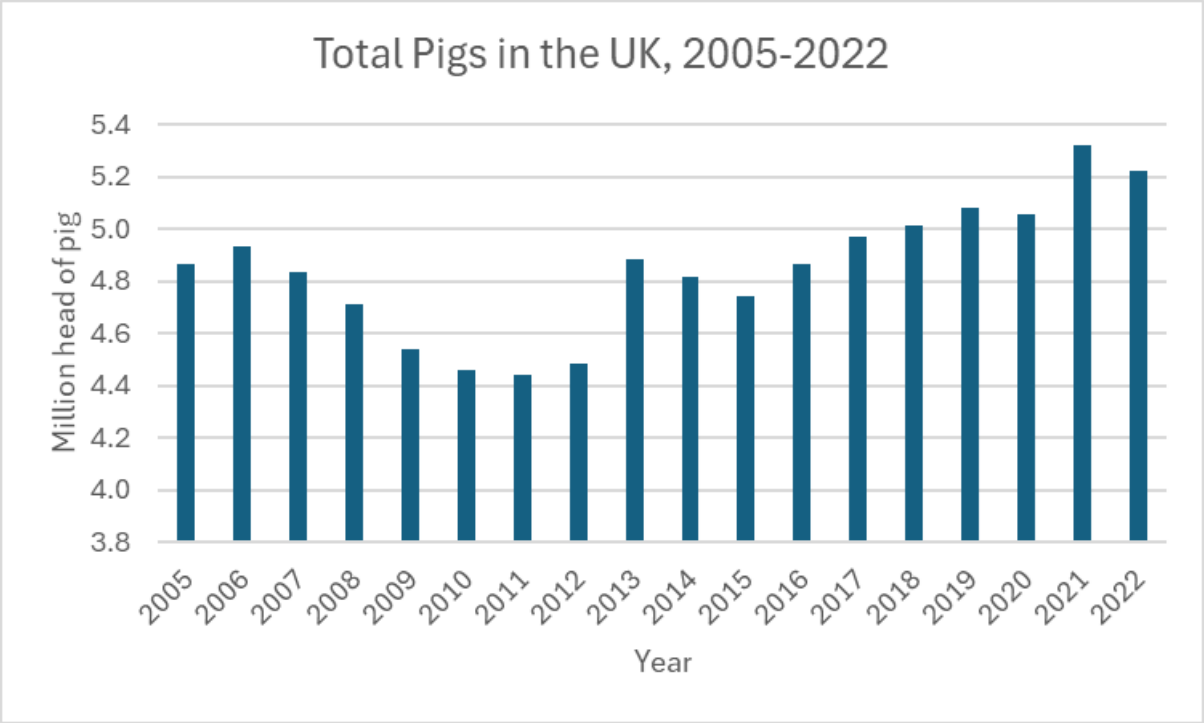
Figure 13: Total cattle and calves in the UK, June 2005-June 2022[60]



The total number of pigs in the UK in June 2022 increased by 7.3% since June 2016, to 5.2 million. There was a 16% decrease in the total number of breeding pigs in the UK over the same period. This decrease was a reaction to the large backlog of pigs on farm in England at the end of 2021 and start of 2022. Total pig numbers in the UK during the period 1996-2022 are shown in **Figure 14**.

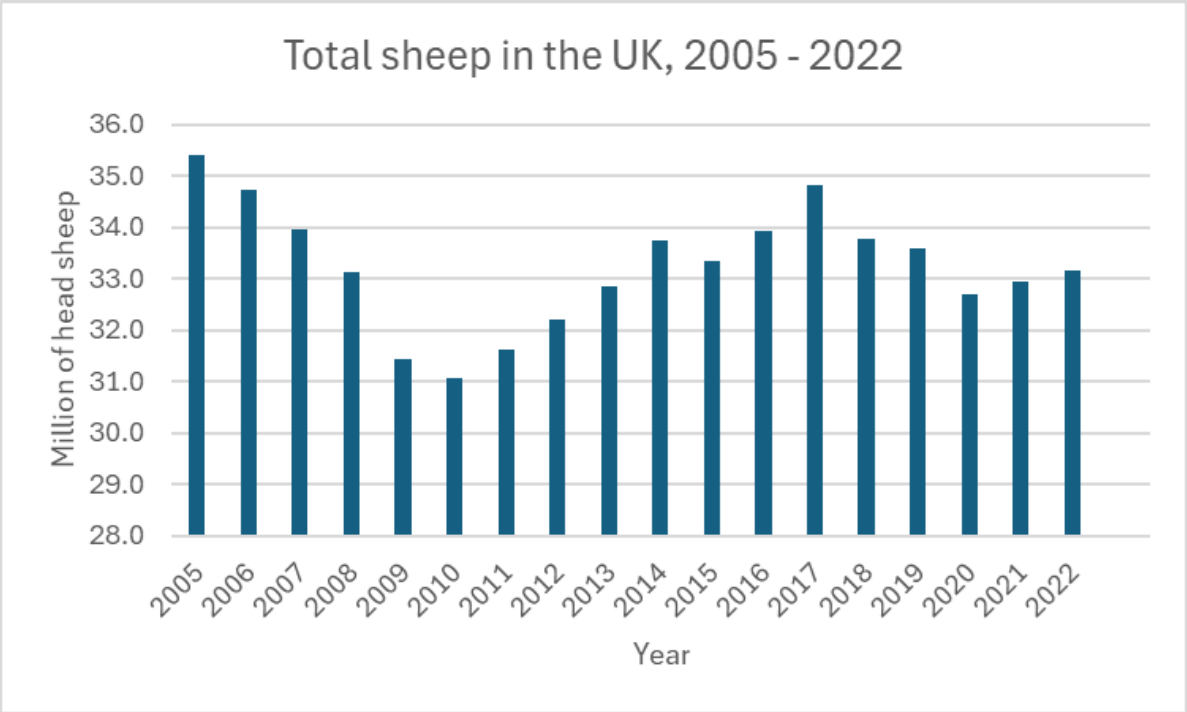
[60] Defra 2022

Figure 14: Total pigs in the UK



The total number of sheep and lambs in the UK decreased by 2.3% between June 2016 and June 2022, to 33.2 million. The UK's female breeding flock decreased by 2.93% to 15.8 million over the same period. Decreases were also seen in other sheep and lambs for the UK falling 1.6%. Total sheep and lamb numbers in the UK during the period 2005-2023 are shown in **Figure 15.**

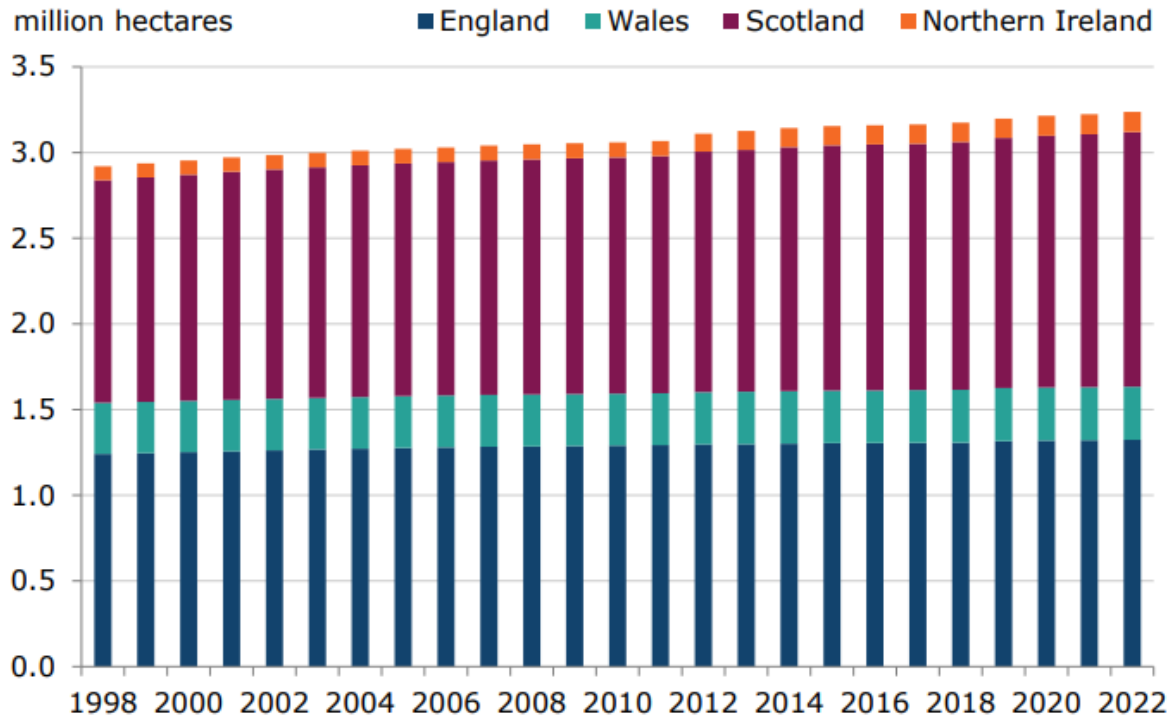
Figure 15: Total sheep in the UK, 2005-2022



2.6.5 Land use, land use change and forestry

The area of woodland in the UK on 31 March 2022 was 3.2 million hectares. Of this total, 1.5 million hectares (46%) was in Scotland, 1.3 million hectares (41%) was in England, 0.3 million hectares (10%) was in Wales and 0.1 million hectares (4%) was in Northern Ireland. This has changed relatively little over the period 2007 to 2022 as can be seen in **Figure 16**. Publicly owned forests still account for 0.9 million hectares[61].

Figure 16: Area of woodland, 1998-2022[62]



Around 50% of the total UK woodland is made up predominantly of conifer species, the remainder being broadleaved.

The total area of new planting and restocking in the UK was 27.2 thousand hectares in 2020-21. Restocking accounted for 51% of this total. Broadleaved species accounted for 45% of the new planting area but just 18.5% of the restocked area in 2020-21[63].

A total of 10.0 million green tonnes of softwood was produced in the UK in 2020 and accounted for 92% of timber removals from UK woodland. UK hardwood production totalled 0.8 million green tonnes in 2020[64].

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[61] Forestry Facts & Figures 2023
[62] Forestry Statistics 2023
[63] Forestry Statistics 2021
[64] Forestry Statistics 2023

Estimated consumption of wood in the UK amounted to 48.3 million m^3 wood raw material equivalent in 2022, made up of 9.8 million m^3 UK production, 43.1 million m^3 imports and 4.5 million m^3 exports[65].

This sector can act as both a source and a sink for GHG emissions.

2.6.6 Waste management

In 2022, GHG emissions from waste contributed around 5% of total UK emissions, representing an emissions reduction of 74% since 1990. Approximately 90% of emissions from this sector are attributable to methane[66].

The UK government and the Devolved Governments published their individual waste strategies aiming to reduce the quantity of waste produced and to increasingly recover value from it. The strategies set out ambitions to reduce the amount of waste sent to landfill and to increase the amount of recycling or composting.

In 2021, households in the UK produced 27.7 million tonnes of waste, an increase of 4.6% since 2019[67].

In 2021, 44.6% of waste from households was recycled in the UK; this is a decrease from the peak of 46.0% achieved in 2019[68].

The UK commercial and industrial sectors generated 40.4 million tonnes of waste in 2020, of which 33.8 million tonnes (around 84%) was produced in England. By comparison, the 2018 UK commercial and industrial waste arisings totalled 43.9 million tonnes, of which 37.2 million tonnes was generated by England. Over two thirds of commercial & industrial waste is generated by the commercial sector, in both the UK and England.

Local authorities in England recycled, composted or reused 10.8 million tonnes in 2021-22[69]. The amount of local authority collected waste sent to landfill and incineration in 2021-22 was 2.1 million tonnes and 12.4 million tonnes, respectively. Concerning landfill, it is a reduction from 22 million tonnes sent to landfill in 2000-01.

[65] Forestry Statistics 2023- 3 trade
[66] Final UK greenhouse gas emissions national statistics: 1990 to 2022 - GOV.UK (www.gov.uk)
[67] ENV23 - UK statistics on waste - GOV.UK (www.gov.uk)
[68] Presented recycling rates include incinerator bottom ash (IBA) metal
[69] Local authority collected waste management - annual results 2022/23 - GOV.UK (www.gov.uk)

2.6.7 Other: Buildings

There are about 30 million buildings in the UK[70]. In total, these buildings are responsible for around 30% of our national emissions[71]. The vast majority of these emissions are specifically from heating: 79% of buildings emissions and about 23% of all UK emissions[72].

The UK has some of the oldest building stock in the world. 81% of UK homes were built before 1990 and over a third before 1945. Since 2012, the proportion of homes in EPC bands A-C has risen. However, 52% of homes in England remain below EPC C. The owner occupier tenure is the worst performing with around 57% of homes at EPC D or below.

2.7 National circumstances of GHG emissions and removals over time

For full details of the UK's emissions trends, please see the UK National Inventory Document (NID).

Despite rises in some sectors as the UK continued to recover from the coronavirus (COVID-19) pandemic, 2022 saw a fall in greenhouse gas emissions in the UK, largely due to a reduction in fuel use to heat buildings. In 2022, net territorial greenhouse gas emissions in the UK were estimated to be 407.8 million tonnes carbon dioxide equivalent ($MtCO_2e$), a decrease of 3.5% from the 2021 figure of 422.7 million tonnes, and 9.3% lower when compared to 2019, the most recent pre-pandemic year. Total greenhouse gas emissions were 50.0% lower than they were in 1990. Carbon dioxide made up 80% of the 2022 total[73].

The fall in 2022 is primarily due to a reduction in gas use for heating buildings, as a result of warmer weather than in 2021. Emissions from the buildings and product uses sector fell 13.3%. Higher energy prices may have also caused people to reduce their energy use. Falls in emissions from industry and agriculture also contributed to the overall reduction.

In comparison, emissions from the domestic transport sector rose 1.6%. This follows a period of reduced domestic travel in 2020 and 2021 due to COVID-19 restrictions. Domestic transport was the largest emitting sector, responsible for 28% of all greenhouse gas emissions in the UK. Emissions from electricity supply also rose by 0.6%.

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[70] ONS (2020), 'Households projections for England' Table 401 and BEIS (2020) 'Non-domestic National Energy Efficiency Data-Framework (ND-NEED), 2020 based on 2018 data.
[71] BEIS (2021), 'Final UK greenhouse gas emissions national statistics: 1990 to 2019' . And BEIS (2020), 'Energy consumption in the UK 2020'. This figure includes indirect and direct emissions but excludes international aviation and shipping.
[72] BEIS (2021), 'Final UK greenhouse gas emissions national statistics: 1990 to 2019. Includes indirect and direct emissions but excludes international aviation and shipping.
[73] Final UK greenhouse gas emissions national statistics: 1990 to 2022

2.8 Institutional arrangements in place to track progress made in implementing and achieving its Nationally Determined Contribution (NDC)

2.8.1 Information on legal, institutional, administrative and procedural arrangements related to the NDC

2.8.1.1 United Kingdom climate change legislation and targets

The Climate Change Act 2008 established the world's first legally binding framework of national emissions targets.[74] The Act originally committed the UK to a statutory target to reduce greenhouse gas emissions to 80% lower than its 1990 baseline by 2050. In 2019, the UK amended the Act to require the net UK carbon account to be at least 100% lower than its 1990 baseline by 2050. In doing so, the UK became the first major economy to legislate for net zero emissions.

The UK's carbon budgets impose legally binding limits on emissions across five-year periods. The first six carbon budgets have so far been set in law. In 2021, the UK set its Sixth Carbon Budget for the period 2033-2037 with a target of reducing greenhouse gas emissions to 965 megatonnes of carbon dioxide equivalents ($MtCO_2e$), which is approximately 77% lower than 1990 levels. It will be the first carbon budget to include emissions from international aviation and shipping. Looking forward, the UK's Seventh Carbon Budget will put into law an emissions target for 2038 and 2042 and will set out the next phase of the government's strategy for achieving net zero emissions by 2050.

Further information on carbon budget accounting and performance can be found in the Annual Statement of Emissions.[75]

2.8.1.2 Northern Ireland Executive

The Climate Change Act (Northern Ireland) 2022[76], which received Royal Assent on 6 June 2022, committed the region to net-zero greenhouse gas emissions target by 2050.

The Act requires the Department of Agriculture, Environment and Rural Affairs (DAERA) to bring forward Regulations to set specific emissions reduction targets for 2030 and 2040 and to bring forward Regulations to set the first three carbon budgets (2023-2027, 2028-2032 and 2033-2037).

The Act places a further duty on DAERA to prepare and publish a Climate Action Plan (CAP) and to bring forward Regulations under the Act to place statutory climate change reporting duties on specified public bodies. The CAP will set out how the first

[74] Climate Change Act 2008
[75] Annual statement of emissions for 2022
[76] Northern Ireland: Climate Change Act (2022)

carbon budget will be achieved and provide a pathway towards achieving the interim emissions reductions targets and the overall net zero target by 2050. Subsequent CAPs will be published every five years, in line with carbon budget periods. The Act places a duty on all Northern Ireland Executive Departments to assist DAERA in preparing the CAP and to ensure that in exercising their functions they do so, in so far as it is possible to do so, in a manner which is consistent with the achievement of net zero by 2050.

2.8.1.3 Scottish Government

The statutory framework for reducing greenhouse gas emissions in Scotland is set out in the Climate Change (Scotland) Act 2009. In 2019, the Climate Change (Emissions Reduction Targets) (Scotland) Act amended the 2009 Act and established Scotland's target of net zero emissions by 2045. The Climate Change (Emissions Reduction Targets) (Scotland) Act 2024 amends the 2009 Act, replacing the annual emissions reduction target framework with five-yearly carbon budgets. The target of net zero emissions in 2045 remains unchanged, and Ministers are still required to produce annual reports on emissions progress. The new Act enables the levels of carbon budgets to be set once the latest advice has been received from the Climate Change Committee. Our next Climate Change Plan will cover the period 2026-2040.

The Scottish Government also recognises the importance of working closely and collaboratively with the UK Government and other devolved governments to deliver a net zero that is mutually beneficial both in economic and social terms. We regularly engage with the UK Government and other Devolved Governments through the Net Zero, Energy and Climate Change Interministerial Group to discuss interdependencies between all four nations and opportunities to work collaboratively. Engagement will also remain an important part of our development of the next Climate Change Plan.

2.8.1.4 Welsh Government

The statutory framework for reducing greenhouse gas emissions in Wales is set out in Part 2 of the Environment (Wales) Act (2016).[77] Wales has a series of 5-yearly carbon budgets and interim decadal targets to 2050. Progress is measured against a 1990 or 1995 baseline, depending on the gas in question. For each carbon budget, the Senedd Cymru (Welsh Parliament) must set a limit on the amount of international offsets that may be used.

In March 2021, the Senedd formally committed Wales to achieving net zero emissions in 2050. It also passed regulations in relation to Carbon Budgets 2 and 3, and the 2030 and 2040 interim targets, as follows:

- **Carbon Budget 2 (2021-25):** 37% average reduction (with no international offsets)

[77] Environment (Wales) Act 2016

- **Carbon Budget 3 (2026-30):** 58% average reduction
- **2030**: 63% reduction
- **2040**: 89% reduction. Before the end of the second year after each carbon budget, the Welsh Government must publish a final statement on progress against that budget. The Climate Change Committee must then publish its own progress report, with the Welsh Government required to respond to that report in the Senedd.

2.8.1.5 Jersey

The Carbon Neutral Roadmap[78] was agreed by the States of Jersey in 2022. This commits Jersey to net zero emissions by 2050 and sets out the first steps to net zero through the delivery plan which covers the period 2022-2025. The first target of a 68% reduction for 1990 levels needs to be met by 2030. Jersey's commitment to emissions reduction is not bound by legislation.

2.8.1.6 Guernsey

In August 2020, Guernsey's climate change policy, "Mitigating Climate Change - States of Guernsey Climate Change Policy & Action Plan"[79], received political approval. The policy sets the target to be carbon neutral by 2050, with an interim target of reducing emissions by 57% on 1990 levels by 2030. In doing so, Guernsey's government also agreed that the climate targets should be legislated for.

2.8.1.7 Isle of Man

The Climate Change Act 2021[80] contains the Isle of Man's net zero by 2050 emissions reduction target and provides the basis of the Isle of Man's statutory framework for climate action planning, delivery and monitoring. In addition, the Isle of Man has two statutory interim emissions reduction targets of 35% by 2030 and 45% by 2035[81] (against a 2018 baseline). The Act requires a statutory climate change plan to be in place at all times, with the current plan being the Isle of Man Climate Change Plan 2022-2027[82]. Prior to the current Climate Change Plan, Council of Ministers' Climate Action Plan Phase 1[83] was in effect, between January 2020 and October 2022.

2.8.1.8 Gibraltar

Gibraltar declared a climate emergency in 2019 and followed this up with the publication of the Gibraltar Climate Change Act[84] later that same year. The Act sets legally binding carbon emissions reduction targets against a 1990 baseline of 42%

[78] Jersey's Carbon Neutral Roadmap
[79] Guernsey: Climate Change
[80] Isle of Man: climate change act 2021
[81] Climate Change (interim target) regulations 2022
[82] Isle of Man: Climate Change Plan 2022-2027
[83] Isle of Man: Phase One Action Plan
[84] Gibraltar: Climate Change Act 2019

by 2030 and 100% by 2045. The Climate Change Strategy[85] published in 2021 sets out the main policies and strategies by which Gibraltar will meet these targets.

2.8.2 Institutional arrangements

2.8.2.1 United Kingdom

The Climate Change Act 2008 is the legislative framework that holds the UK accountable for achieving our domestic climate target. The 2030 NDC falls in the same time period as the fifth carbon budget (2028-2032) but on a higher ambition.

To help track our progress, the Climate Change Committee publishes annual progress reports which provide an independent assessment of the government's progress in reducing emissions, which the government responds to by the statutory date.

2.8.2.2 Northern Ireland Executive

The Department of Agriculture, Environment and Rural Affairs (DAERA) on an annual basis publishes the Northern Ireland Greenhouse Gas Inventory[86]. The latest inventory covers the period 1990-2022, with the focus on 'by source' emissions. As part of this process DAERA also produces a set of Carbon Intensity Indicators on an annual basis. These are designed to complement the greenhouse gas inventory and allow the NI Departments to track the effectiveness of their carbon reduction policies and measures.

The Climate Change Act (Northern Ireland) 2022 (the Act) placed a duty on DAERA to prepare and publish a report before the end of each 5 yearly carbon budget period, setting out what progress has been made in implementing the policies and proposals contained within the associated 5 year Climate Action Plan. As part of this requirement, all NI Departments have a duty to provide details of progress in implementing the policies and proposals within their areas of responsibility. Furthermore, the Act places a duty on DAERA to lay a report before the NI assembly, before the end of the second year after each carbon budget period, setting out a final statement on the total amount of NI emissions, removals and net emissions for the period. The statement must include an assessment of the extent the policies and proposals contained in the Climate Action Plan have contributed towards the achievement of the carbon budget for the given 5-year carbon budget period.

2.8.2.3 Scottish Government

The Scottish Government has put in place a National Performance Framework to achieve its purpose, and this framework sets out 'National Outcomes' to describe the kind of Scotland it aims to create and to help it monitor progress.

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[85] Gibraltar: Climate Change Strategy
[86] Northern Ireland: Greenhouse Gas Inventory

In addition to this, cross-government climate change activity is governed by the Global Climate Emergency Board through the Climate Change Programme. This programme monitors progress on a monthly basis

The Climate Change Programme consists of three pillars, these are The Climate Change Plan, the Scottish National Adaptation Plan 3 and Just Transition plans. Each of these plans have or will have (for those still in development) their own monitoring and evaluation frameworks. In addition to this each of these three pillars is required to report progress to the Scottish Parliament on an annual basis.

There are also two statutory nitrogen reports that the Scottish Government must update annually: the Scottish Nitrogen Balance Sheet ("SNBS") and the Nitrogen use efficiency in Scotland progress report ("progress report").

The SNBS provides a powerful new source of evidence to track how efficiently nitrogen is used in Scotland and helps to identify further opportunities to improve this. In particular, it will help support progress towards Scotland's national climate change targets.

The progress report supports the SNBS. This reports on progress towards relevant actions to improve nitrogen use and identify opportunities for future improvements.

2.8.2.4 Welsh Government

Under the Environment (Wales) Act 2016, Welsh Ministers must prepare and publish a plan ("report") for each budgetary period, setting out their policies and proposals for meeting the carbon budget. The first of these reports was published in March 2019[87]. Throughout the delivery of its second plan (Carbon Budget 2 (CB2))[88], Welsh Government is tracking and driving forward its implementation to ensure progress is made towards targets and budgets in a fair and just way. To track progress, a comprehensive system has been developed to monitor delivery which includes the following:

- **Legislation** – An assessment against targets and budgets every five years. The report[89], formally referred to as Statement of Progress, was published in December 2022, summarising progress for Carbon Budget 1. The next Statement of Progress (for CB2) is due in 2027.
- **Indicators –** Tracking progress towards targets and budgets on an annual basis.
- A **monitoring and reporting system**, which looks more in depth at the implementation progress of Welsh policies and proposals within the Plan.

[87] Wales: Low Carbon Delivery Plan
[88] Wales: Net Zero Wales Carbon Budget 2 (2021 to 2025)
[89] Wales: Carbon Budget 1 (CB1): Final Statement of Progress (2016 to 2020)

- **Internal Governance** arrangements, such as an internal Climate Change portfolio board and cross-Government Cabinet, oversee progress and drive action.
- **Independent Progress reports** from the Climate Change Committee. **Scrutiny** from the Senedd and Senedd committees.

2.8.2.5 Jersey

The government of Jersey is made up of the Council of Ministers, comprising of the Chief Minister and 12 portfolio Ministers. The Council of Ministers has the responsibility for all of Jersey's domestic and fiscal affairs and, increasingly, the Island's international affairs. One of the first tasks of the Council is to draw up a Common Strategic Policy (CSP). The CSP outlines the Council's aims and objectives and gives a timetable for implementation. Once the CSP is approved by the States Assembly (the legislature), it is the role of the Council to make sure it is properly and efficiently delivered. The current CSP (2024-2026) commits to continuing to address climate change through the Carbon Neutral Roadmap, which aims to fulfil Jersey's commitments under the Paris Agreement.

2.8.2.6 Guernsey

The States of Guernsey is the decision-making government body for the island, which includes climate matters. It has responsibility for all island affairs, both domestic and international. The States of Guernsey has a Government Work Plan (GWP) which sets out the priorities of the government over the term. The GWP outlines the States of Guernsey's commitment to climate change. Within the current GWP (2023-2025) there is commitment to develop a detailed plan for the mitigation of emissions and it notes the need to address the island's exposure to the effects of climate change.

2.8.2.7 Isle of Man

Governmental climate action in the Isle of Man is primarily the responsibility of the Council of Ministers, with their responsibilities set out in the Climate Change Act 2021[90]. The Climate Change Transformation Board (CCTB), supported by the Climate Change Transformation Team (CCTT), report to the Council of Ministers. The CCTT sits within the Department of Environment, Food and Agriculture (DEFA) and is responsible for the management and administration of the programme, acting as a central hub to support delivery of the Isle of Man Climate Change Plan 2022-2027[91] by the government departments responsible for the individual actions, and directly delivering some cross-government actions. Key climate change related documents, including legislation, are approved by Tynwald (the Manx parliament). Annual climate change reporting by Manx public bodies to the Council of Ministers (via CCTT and CCTB) provides a framework for compliance across the Manx public sector.

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[90] Isle of Man: Climate Change Act 2021
[91] Isle of Man: Climate Change Plan (2022-2027)

2.8.2.8 Gibraltar

The government of Gibraltar is made up of the Chief Minister and up to nine other elected members of Parliament. Gibraltar is self-governing in all areas except defence and foreign policy. The government's responsibilities in respect of climate action are set out in the 2019 Climate Change Act[92]. In 2022 the Net Zero Delivery Body[93] was established. This Body is chaired by the Deputy Chief Minister and is designed to guide implementation of the Climate Change Strategy across all government bodies.

2.9 Stakeholder engagement related to the UK's 2030 Nationally Determined Contribution (NDC)

2.9.1 Cross-cutting engagement

When setting the 2030 NDC, the UK consulted with a range of stakeholders such as businesses, civil society groups, local government and the Devolved Governments to capture their views on scope and target. It was also covered in correspondence with representatives of these groups and interested Parliamentarians. A copy of the UK's updated NDC was laid in the UK's Houses of Parliament. For more information, please see section 4a(i) of the UK's 2030 NDC.[94] When the UK set its 2030 NDC, we have considered the impact of climate policy more broadly on groups protected under the 2010 Equality Act.

We are committed to ensuring that everyone has the opportunity to contribute to the transition to net zero, supporting people and communities to take action and demonstrating the benefits of the transition. We will set out the government's approach to engaging the public in a Public Participation Strategy, to be published in 2025. This will include how we support people to adopt new technologies, as well as opportunities to ensure that public views are considered in the development of policy

2.9.2 Net Zero engagement by sector (England)

2.9.2.1 Energy

The UK works closely with industry, regulators, sector bodies, and other stakeholders to ensure that our energy system is resilient and secure, including to the impacts of climate change.[95]

To deliver production levels needed for Carbon Budget 6 (2033-2037) and net zero by 2050, the UK government is working closely with industry and other stakeholders to overcome the barriers to growing a new low carbon energy vector for the UK.[96]

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[92] Gibraltar: Climate Change Act 2019
[93] Gibraltar: Climate Change (Net Zero Delivery Body) Regulations
[94] UK's 2030 Nationally Determined Contribution
[95] Net Zero Strategy: Build Back Greener
[96] Uk Hydrogen Strategy

The 2021 Hydrogen Strategy, as well as underpinning policies such as the Hydrogen Production Business Model and Hydrogen Storage Business Model, have been developed through close engagement and collaboration with stakeholders across the sector.

2.9.2.2 Transport

When developing the Transport Decarbonisation Plan in 2021, the UK undertook extensive stakeholder engagement including: eight workshops with 49 local government representatives and 59 virtual policy workshops with knowledge experts, innovators, businesses, non-governmental organisations, and civil society representatives.[97] The Department for Transport received over 300 written submissions and evidence on measures needed to decarbonise transport. The Department for Transport also formed the Net Zero Transport Board which was a Ministerial-led external advisory board providing independent, objective, and impartial advice on transport decarbonisation to the Department for Transport.

The Department for Transport also engages internationally on domestic efforts including at United Nations Framework Convention on Climate Change Conference of the Parties (UNFCCC COPs).

2.9.2.3 Industrial processes and product use

The UK is committed to having a thriving industrial sector aligned with our net zero target, without pushing emissions and business abroad.[98] The UK has successfully engaged with a wide range of stakeholders to date, including business representative organisations, think tanks and academics, industry bodies and trade associations to develop policies supporting UK industrial decarbonisation, and to develop the market for low carbon industrial products.[99][100] This included a comprehensive programme of stakeholder engagement to support the development and launch of the Industrial Decarbonisation Strategy (2021).

2.9.2.4 Agriculture

In 2021-2022 the UK continued a significant reform of agricultural policy in England phasing out subsidies and expanding schemes to boost Britain's food security and accelerate the transition to a more resilient and sustainable farming sector. The Sustainable Farming Incentive (SFI) opened in 2021 with a pilot scheme, with a wider rollout to farmers in 2022 to make their businesses more sustainable and resilient. The focus in 2022 was on moorlands, arable and horticultural soils, and improved grassland soils. In addition, in 2022 the UK launched a call for evidence exploring the potential opportunities and challenges associated with the use of methane suppressing feed products.

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[97] Transport Decarbonisation Plan
[98] Industrial Decarbonisation Strategy
[99] Enabling Industrial Electrification: A Call for Evidence
[100] Addressing Carbon Leakage Risk to Support Decarbonisation

2.9.2.5 Land Use, Land Use Change and Forestry (LULUCF)

The UK continues to engage with stakeholders, industry bodies and landowners on a range of challenges across forestry, peatlands and other land use sectors. As part of the Environment Act 2021, we legislated for a long-term statutory tree target in England to increase tree canopy and woodland cover to 16.5% of land area in England by 2050.

2.9.2.6 Waste management

The Collection and Packaging Reforms were introduced in the Environment Act 2021 Throughout the development of these reforms, the UK engaged with stakeholders through different working groups, events and forums to develop the policies further. These included the monthly Resources & Waste forums and newsletters open to all stakeholders which cover recycling collections and wider resources and waste topics.

2.9.2.7 Other sectors

- **Buildings**: Progress is being made to ensure secure, affordable and clean heating for UK homes and businesses.[101] government has taken key steps towards improving energy efficiency and deploying low-carbon heating - by engaging industry, consumers, and businesses, with targeted regulation and new market-based mechanisms, help to heat schemes, and work to increase public awareness.[102] Together this all helps to reduce costs for consumers and businesses, attract greater private investment and strengthen supply chain resilience – to ensure UK buildings are able to transition towards a greener future.

- **Greenhouse Gas Removals**: In 2023, the UK set out the proposed commercial frameworks for the greenhouse gas removals (GGR) business model and standards[103] following extensive engagement with industry and academia. The Carbon Capture Usage and Storage Cluster process allowed GGR and large-scale Power Bioenergy with carbon capture and storage (BECCS) projects to apply for access to the Hynet cluster in the North West of England as part of the Track 1 Hynet expansion process. The UK Emissions Trading Scheme Authority published a consultation seeking input on the integration of GGRs into the UK Emissions Trading Scheme.[104] Commercial and economic regulatory frameworks for Carbon Capture, Utilisation and Storage (CCUS) have been developed through extensive engagement and collaboration with representatives from the many sectors and industries for whom CCUS is critical to achieve their decarbonisation objectives.[105]

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[101] Heat And Buildings Strategy
[102] Energy Efficient Home
[103] Greenhouse Gas Removals (GGR): Business Model
[104] Integrating Greenhouse Gas Removals in The UK Emissions Trading Scheme
[105] Carbon Capture, Usage and Storage: A Vision to Establish a Competitive Market

2.9.3 Northern Ireland Executive

DfE operated a thematic approach to Stakeholder Groups in the development of the Path to Net Zero Energy Strategy. Five working groups were convened across the areas of Consumers, Energy Efficiency, Heat, Power, and Transport to provide further analysis and evidence on potential policy options, with the Transport theme led by the Department for Infrastructure. The new Strategy was published in December 2021[106].

The Department for Agriculture, Environment and Rural Affairs (DAERA) in line with the 'New Decade, New Approach' commitment to bring forward climate change legislation for Northern Ireland, led on the development and progression of the Climate Change Act (Northern Ireland) 2022 which received Royal Assent in June 2022[107]. In progressing the legislation development in December 2020 DAERA provided an opportunity for stakeholder involvement through launching a public consultation 'Discussion Document on a Climate Change Bill'[108]. Further stakeholder engagement took place when the Northern Ireland Assembly's Agriculture, Environment and Rural Affairs Committee launched a call for evidence in August 2021 seeking views from both individuals and stakeholder organisations to feed into its scrutiny process of the Bill passage. In keeping with the legislative commitment set in the Act, DAERA, in conjunction with other Executive Departments, commenced the development of Northern Ireland's first Climate Action Plan (CAP).

2.9.4 Scottish Government

In 2020, the Scottish Government published an update to the 2018 Climate Change Plan to account for the new targets set out within the Climate Change (Scotland) Act 2009 (as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019), which includes its commitment to reaching net zero greenhouse gas emissions by 2045[109].

The Plan update also reflects that the 2019 Act enshrined the Scottish Government's commitment to a just transition into law, ensuring that everyone can access the opportunities of the transition and that no one is left behind. The Plan update sets out the Scottish Government's strategic direction, containing the policies and proposals that will put Scotland on a pathway to meet its emissions reduction targets. Collectively these policies will require societal changes, impacting how the population will travel, heat its homes and how the Scottish people consume goods and services.

The Scottish Government puts people, places and business at the heart of their open, transparent, and participatory approaches to policy development and government decision making. The Public Engagement Strategy is a key part of the

[106] Northern Ireland: Energy Strategy - Path to Net Zero
[107] Northern Ireland: Climate Change Act (2022)
[108] https://www.daera-ni.gov.uk/consultations/climatechangediscussion
[109] Scotland: Climate Change - Net Zero Nation: Public Engagement Strategy

Scottish Government's approach to delivering upon the ambition of the updated Climate Change Plan. A broad approach to public engagement will be required in order to include people and communities in the national effort required to reach climate change goals.

The Scottish Government is committed to ensuring that everyone in Scotland recognises the implications of the global climate emergency, fully understands and contributes to Scotland's response, and embraces their role in the transition to a net zero and climate ready Scotland.

Widespread participation and engagement are essential if we are to successfully limit the effects of climate change by reducing greenhouse gas emissions, preparing for the impacts that are already locked in, and harnessing the opportunities to innovate during the net zero transition.

62% of changes needed to achieve net zero can only happen with societal or individual behaviour change (Climate Change Committee) and achieving our climate targets fundamentally depends upon the involvement and support of the people of Scotland in all aspects of their lives

The Scottish Government is a member of the international Open Government Partnership. Scotland's Open Government Action Plan commits the Scottish Government to our Open Government climate commitment, and to the values of openness, accountability, transparency, and involving people

2.9.5 Welsh Government

Following a consultation held between October and December 2022 (supported by outreach engagement activity during Wales Climate Week), the Welsh Government published its public engagement strategy[110] in July 2023. Climate Action Wales explains how the Welsh Government will work with its delivery partners to ensure that people and communities are involved in climate decision-making and supported and encouraged to make green choices in relation to home energy, travel, food and consumption. The strategy conveys a vision of a fairer society driven by improved health, wellbeing and fairness and where no-one is left behind. Its guiding principles are structured around the '5 ways of working' in the Well-being of Future Generations (Wales) Act 2015 and uses a '5 Es framework' (i.e. exemplify, engage, enable, encourage and evaluate) to convey how the programme will be delivered. The Welsh Government is now focussed on ensuring delivery of the commitments within the strategy.

2.9.6 Jersey

A people-powered approach was prioritised through the development of the Carbon Neutral Roadmap. This included Jersey's first citizens' assembly held on climate change alongside a public campaign, the 'Climate Conversation' carried out in 2021.

[110] Wales: Climate Action Wales: Public engagement strategy 2023 to 2026

This informed the level of ambition of the roadmap and led to the second most responded to consultation in Jersey. There is a specific climate change and sustainability engagement team within government who continue to engage with key stakeholders, industry and the public. For example, carbon literacy training has been facilitated across government and industries that are signed up to Jersey's eco active business network.

2.9.7 Guernsey

In December 2019, an external consultancy was commissioned to facilitate a workshop with officers from across Guernsey's government and stakeholders from local organisations. The workshop aimed to pilot and give feedback on an in-depth independent survey that was later launched in January 2020. The workshop and survey focused on heating and on-island travel, which are two of the biggest contributors to greenhouse gas emissions locally. Results were published online[111].

2.9.8 Isle of Man

Following the approval of the Council of Ministers' Climate Action Plan Phase 1[112], and formal acknowledgment of the climate crisis by Tynwald in 2019, development of the Climate Change Bill began. Targeted engagement with key stakeholders was held in February 2020, followed by a full public consultation[113] on the Bill in July 2020.
A comprehensive public consultation was held during 2021 on the content for the Isle of Man Climate Change Plan 2022-2027[114]. This ran alongside a Citizens' Forum[115] and engagement with key stakeholders. The Citizens' Forum was made up of 36 individuals who represented interest groups and wider public of the Isle of Man. The group was instrumental in the formation of the principles for the Green Living Grant[116]. The first of regular public insight surveys relating to climate change was launched in 2021. Section E of the Isle of Man Climate Change Plan 2022-2027 sets out actions relating to engagement and awareness, including developing awareness and educational campaigns to help ensure people understand the climate emergency, reduce climate anxiety, empower positive action and increase awareness of the Isle of Man government's actions in addressing climate change.

2.9.9 Gibraltar

Gibraltar consulted with non-governmental organisations as well as business representatives on the development of its climate change strategy. It also underwent internal consultation across government.

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[111] Guernsey: Climate Change Research
[112] Isle of Man: Phase One Action Plan
[113] Isle of Man: Environment Food and Agriculture Climate Bill
[114] Isle of Man Climate Change Plan 2022-2027
[115] Isle of Man: The Citizens Forum
[116] Isle of Man: Green Living Grant Scheme

2.10 Description of the UK's NDC

2.10.1 Scope and targets

Parties agreed in the Paris Agreement to keep the increase in global average temperature to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C. In December 2020, the UK announced its 2030 Nationally Determined Contribution (NDC) which commits to reducing UK net greenhouse gas emissions by at least 68% by 2030 on 1990 levels. It represents a significant step forward in our ambition to tackle climate change over the next ten years, as we accelerate towards meeting our legally binding commitment to net zero by 2050.

2.10.2 Identified indicators selected to track progress & information

Reference indicator: Net[117] greenhouse gas (GHG) emissions in MtCO2e.

The reference indicator (MtCO2e) in the reference years (1990 and 1995) will be based on the 1990-2030 UK GHG Inventory submitted to the UNFCCC in 2032. The value for the target year (2030) will be based on applying a 68% fixed percentage reduction target to the reference indicator value.

2.10.3 Accounting approach & methodologies

This section presents information on UK GHG emissions and the National System established to produce and quality assure the UK GHG Inventory. A fuller description of this National System can be found in the UK's National Inventory Document (NID), submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in 2022[118]. The UK is obliged to produce an annual GHG inventory, containing an estimate of all anthropogenic GHG emissions across the UK to meet its commitments under the UNFCCC and the Kyoto Protocol; it will continue to do so to meet its commitments under the Paris Agreement. Data from the GHG inventory are also used to monitor progress against Carbon Budgets under the UK Climate Change Act 2008. The methodologies used in the NIR are used across all emissions reporting in the UK to ensure consistency between estimates, only geographic scope changes.

The GHG inventory covers the seven direct GHGs under the Paris Agreement. These are collectively known as the 'basket' of GHGs and are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). The last four gases are collectively referred to as fluorinated gases (F gases). In accordance with international reporting and carbon trading protocols, emissions from each of the

[117] Net emissions mean total anthropogenic emissions minus total anthropogenic removals of greenhouse gases. GHG sinks are defined by the UNFCCC as "any process, activity or mechanism which removes a greenhouse gas from the atmosphere".
[118] National Inventory Report (NIR) 2022

gases are weighted by its global warming potential (GWP), so that total greenhouse gas emissions can be reported on a consistent basis. The GWP for each gas is defined as its warming influence in relation to that of CO_2 over a 100- year period. Greenhouse gas emissions are then presented in carbon dioxide equivalent units (CO_2e).

The UK's base year for assessing emissions of CO_2, CH_4, and N_2O is 1990. The UK uses 1995 as the base year for emissions of the fluorinated gases: HFCs, PFCs, SF_6 and NF_3. This is in line with most European states, and in accordance with the Paris Agreement. Land use, land-use change and forestry (LULUCF) emissions and removals are reported in the UK's GHG inventory in accordance with the rules for reporting this sector under the UNFCCC. The UNFCCC reporting basis includes an estimate of all anthropogenic sources minus sinks from the LULUCF sector.

The UK elects Cropland Management, Grazing Land Management, and Wetland Drainage and Rewetting, as LULUCF activities. The UK does not elect Revegetation, as the eligible land area for Revegetation within the UK is estimated to be very small, and therefore the associated potential sink will also be very small. In addition to the provision of a national inventory covering the whole of the UK and British Crown Dependencies and Overseas Territories, the UK also produces annual spatially disaggregated inventories to provide geographical breakdown to England, Scotland, Wales and Northern Ireland, and to the 374 local authorities that make up the UK. Trends in UK GHG emissions between 1990 and 2022, disaggregating overall emissions by gas and by source sector can be found in section **2.7 National circumstances of GHG emissions and removals over time**. More information on UK GHG emissions trends can be found in the Common Tabular Format tables.

2.10.4 National System

Section 1.2 of the National Inventory Document presents the full details of the UK's institutional arrangements for inventory preparation[119].

The UK's GHG inventory is compiled and maintained by a consortium led by Ricardo Energy and Environment– the Inventory Agency – under contract to the Science and Innovation for Climate and Energy (SICE) Directorate in the Department for Energy Security and Net Zero (DESNZ). Ricardo Energy and Environment is directly responsible for producing the emissions estimates for the following categories: Energy, Industrial Processes and Product Use (IPPU), and Waste. Ricardo Energy and Environment is also responsible for inventory planning, data collection, Quality Assurance (QA)/Quality Control (QC) and inventory management and archiving. Aether, a member within the consortium, is responsible for compiling emissions from railways and for the UK's Overseas Territories and Crown Dependencies. Gluckman Consulting advises on fluorinated gas (F-gas) emissions.

Forestry emissions and removals in the Land-Use, Land-Use Change and Forestry (LULUCF) sector are calculated by Forest Research and the remainder of the sector

is calculated and compiled by the UK Centre for Ecology and Hydrology (UKCEH), both partners within the consortium. Agricultural sector emissions estimates are produced by Rothamsted Research, under contract to the UK Department for Environment, Food and Rural Affairs (Defra).

Improvements to the inventory are scrutinised by the UK's National Inventory Steering Committee (NISC). The NISC is made of key stakeholders to the GHGI including representatives from the suppliers above, representatives from each of the Devolved Governments, and representatives from key government departments including the Department for Environment, Food, and Rural Affairs, and the Department for Transport. The NISC provides an oversight function and gives approval for any proposed changes.

2.10.5 Geographical Coverage

The UK inventory provides data to assess progress of the UK's commitments under the Paris Agreement Protocol, progress towards the UK's own Carbon Budgets and to meet commitments as a Party to the UNFCCC.

The UK's 2030 NDC covers territorial emissions from the England, Scotland, and Northern Ireland as well as the three Crown Dependencies, Bailiwick of Jersey, Guernsey, Isle of Man and one Overseas Territories, Gibraltar.

2.11 Mitigation policies and measures

2.11.1 Cross-cutting policies and measures

2.11.1.1 Net Zero Strategy

The Net Zero Strategy was published in 2021 to set out how we intended to keep the UK on track for our coming carbon budgets, our ambitious Nationally Determined Contribution (NDC), and then set out our vision for a decarbonised economy in 2050.[120]

In December 2024, we published the UK government's annual response to the 2024 Progress Report from Climate Change Committee the independent body that advises the UK on its progress to reaching net zero.[121] The government's response recognises the challenging picture outlined by the Climate Change Committee. It also sets out the urgent action that has been taken alongside further commitments to accelerate to net zero and address the Climate Change Committee's recommendations. We will publish an updated cross-economy plan to meet carbon budgets and NDCs in due course, which will set out details of policies across all sectors of the economy.

Looking ahead, we will set Carbon Budget 7 by June 2026, in line with our statutory duties, for the period 2038 to 2042. This will set out the next phase of our pathway to net zero and policies to further decarbonise the UK economy.

2.11.1.2 UK Emissions Trading Scheme

The UK Emissions Trading Scheme (UK ETS) is an essential part of our approach to cutting emissions and driving green investment. The scheme is run by the four administrations of the UK (the UK government, Scottish Government, Welsh Government, and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland), collectively making up the UK ETS Authority.

Launched in 2021, the UK ETS supports decarbonisation across aviation, power, and industry by setting a limit on emissions and creating a carbon price that incentivises businesses to reduce their emissions.

In 2022 the UK ETS Authority consulted on aligning the scheme's cap – the limit on emissions from the sectors covered – with our net zero and other climate targets. In 2023 we confirmed the implementation of this new tighter cap, aligning it with our net zero targets to ensure the sectors covered decarbonise at the pace required to contribute to achieving our climate goals.

[120] Net Zero Strategy: Build Back Greener
[121] Committee on Climate Change 2024 Progress Report: Government Response

2.11.2 Energy

2.11.2.1 England

The UK government's energy policy through 2021-22 was to decarbonise the power sector by 2035, subject to security of supply. In November 2022, the ambition was announced to cut overall energy consumption by 15% by 2030. Energy is a devolved matter in Northern Ireland but mostly reserved in Scotland and Wales.

- **The British Energy Security Strategy[122] (2022):** set out how government intended to improve the UK's energy security by increasing the efficiency with which we use energy, how to increase our proportion of domestically produced energy, and how to help bring down the bills of consumers. This involved measures such a zero-rating VAT on energy efficiency and clean heat technologies.

- **Hydrogen Strategy[123] (2021):** outlined a comprehensive roadmap for the development of the wider hydrogen economy over the 2020s and early 2030s, putting the UK at the forefront of the race to develop low carbon hydrogen. It laid the foundations for a hydrogen economy by 2030 that would support innovation and stimulate investment to scale up hydrogen technologies, while helping to achieve our Sixth Carbon Budget and net zero commitments and secure the economic opportunities of the transition. It also set out an aim to provide regular updates on hydrogen policy development, with the latest published in December 2023.[124]

- **North Sea Transition Deal[125] (2021):** through the North Sea Transition Deal, the offshore oil and gas industry is committed to reducing its production emissions by 10% by 2025, 25% by 2027 and 50% by 2030, against a 2018 baseline. The government continues to support the North Sea Transition Deal, including the important decarbonisation targets it set for the sector.

2.11.2.2 Northern Ireland Executive

In 2022, the energy supply sector in Northern Ireland represented 14% of all emissions. From 1990 to 2022 the greenhouse gas emissions in the sector have reduced by 44%.

For the 12 month period January 2022 to December 2022, 51.0% of total electricity consumption in Northern Ireland was generated from renewable sources[126].

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[122] British Energy Security Strategy
[123] UK Hydrogen Strategy
[124] Hydrogen Strategy Delivery Update 2023
[125] North Sea Transition Deal
[126] Electricity Consumption and Renewable Generation in Northern Ireland (table 1)

To drive forward further action to decarbonise the energy sector, in December 2021 DfE published the Northern Ireland Executive's 'Energy Strategy- The Path to Net Zero Energy'. Following on from which, the Climate Change Act (Northern Ireland) 2022 set a legal requirement for at least 80% of electricity consumption in Northern Ireland to be from renewable sources by 2030.

2.11.2.3 Scottish Government

The electricity sector in Scotland is the most mature sector in terms of decarbonisation, with emissions falling by 13.0 mega tonnes carbon dioxide equivalent (Mt CO2e) between 1990 and 2022 to 1.7 mega tonnes carbon dioxide equivalent (Mt CO2e)– an 88.1 per cent reduction, the largest reduction of any sector.

In 2022, 87.9% of electricity generated in Scotland was from zero or low carbon sources (including nuclear and pumped hydro). Specifically, 71% of electricity generated in Scotland in 2022 was from renewable sources.

2.11.2.4 Welsh Government

The Welsh Government's policy objective is to avoid the continued extraction and consumption of fossil fuels. It expects all new development to mitigate the causes of climate change in accordance with its energy hierarchy for planning, as set out in Planning Policy Wales (2018):[127]

1. Reduce energy demand
2. Use energy efficiently
3. Renewable energy generation
4. Minimise carbon impact of other energy generation
5. Minimise extraction of carbon-intensive energy materials

In the hierarchy, the extraction of minerals for the purpose of generating energy is undesirable as it is the most carbon intensive form of production. The purpose of this hierarchy is to encourage preferred generation proposals to come forward and to discourage proposals supported by the extraction of fossil fuels. In addition to Planning Policy Wales, the Welsh Government's Coal Policy Statement (2021) is clear that it does not intend to authorise new Coal Authority mining operation licences or variations to existing licences.[128]

2.11.2.5 Jersey

Through interconnectors to the French grid, Jersey imports most of its electricity from low carbon and certified renewable sources meaning many of the decarbonisation policies focus on electrification of on-Island heating and transport.

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[127] Wales: Planning Policy Wales
[128] Wales: Coal Policy Statement

2.11.2.6 Guernsey

Guernsey's Energy Policy[129] sets out a target of net zero by no later than 2050 and will transition to a low carbon Island, supported by increased use of electricity to heat homes and power on-island travel. Guernsey's Electricity Strategy[130] outlined plans to further decarbonise the electricity sector, and how increased electrification could assist in the broader energy market underpinned by additional interconnection. The Climate Change Action Plan will explore how Guernsey can achieve this target, including more broadly across the energy sector, and how feasible it is to aim to achieve net zero before 2050. In 2019, Guernsey's government commissioned a report entitled "Future Energy Demand and Policy Considerations for Guernsey"[131]. The report forecasts a decline in total energy demand over time with an in increase in electricity demand up until 2050. The report identified the following as drivers to the predicted decline in energy and fuel demand: technological efficiencies, fuel efficiencies and the uptake of energy reduction measures such as loft insulation, hybrid vehicles, or newer more efficient gas boilers.

Guernsey has an interconnector, through Jersey, with France, which provides access to the European electricity grid. Additional interconnection will provide greater electricity supply security and will allow for development of on-Island renewables and potential export opportunities.

2.11.2.7 Isle of Man

In 2019, the Isle of Man Programme for Achievement of Climate Targets (IMPACT) Report[132] was produced. Appendices[133] 13-17 and 20 relate to energy. In 2021, the Isle of Man Future Energy Scenarios[134] report was produced, identifying potential decarbonisation routes for the Island's electricity supply. In 2022, the Isle of Man Renewable Heating Scenarios[135] report was produced, identifying potential decarbonisation routes for the Island's building energy needs. The Phase 1 Action Plan Progress Report[136] details progress made against the Council of Ministers' Climate Action Plan Phase 1[137] over the period 1 April 2021-31 March 2022, including actions relating to energy. Section 1 of the Isle of Man Climate Change Plan 2022-2027[138] sets out the Isle of Man's current, high-level policies relating to electricity decarbonisation. In particular, it sets a target of 2030 for full decarbonisation of the national electricity supply from fossil fuels and at least 20MW locally generated renewable power by 2026. Manx Utilities, the Island's publicly

[129] Guernsey: States Of Guernsey Energy Policy 2020-2050
[130] Guernsey: Electricity Strategy for Guernsey
[131] Guernsey: Annex A. Energy Demand
[132] Isle of Man: Programme for Achievement of Climate Targets
[133] Isle of Man: Impact Report
[134] Isle of Man: Future Energy Scenarios
[135] Isle of Man: Renewable Heating Scenarios
[136] Isle of Man: Phase One Action Plan Progress Report
[137] Isle of Man: Phase One Action Plan
[138] Isle of Man: Climate Change Plan 2022-2027

owned electricity company is delivering its Future Energy Delivery Strategy[139] which outlines the roadmap to the targets set out above.

2.11.2.8 Gibraltar

The Gibraltar Electricity Authority fully switched electricity generation to the North Mole Power Station in 2020. This plant runs on natural gas and represents a significant step forward for Gibraltar in terms of moving towards cleaner electricity. Although it is still a fossil fuel, it is much cleaner than the diesel oil used by the old generating stations and emissions from electricity have decreased by 37%[140] since 2015 despite the actual amount of electricity being consumed remaining fairly static.

In 2018 the government entered into a Solar Framework Agreement to promote the roll out of solar photovoltaic panels across the territory. In 2019 the first of these projects was deployed at New Harbours industrial park as part of a scheme to install over 3MW of renewable energy.

The Nearly Zero Energy Buildings[141] standards came into force in January 2021 which require all new buildings to meet very high standards of energy efficiency as well as to produce a minimum of 40% of their own energy from renewables

2.11.3 Transport

2.11.3.1 England

The **Transport Decarbonisation Plan**[142] **(2021)** sets out how to decarbonise the entire transport system in England, below are some of the areas that are covered:

- **Technical consultation on zero emission vehicle mandate policy design**[143] **(2022):** Following the announcement of the UK adopting a zero emission vehicle (ZEV) mandate in the Net Zero Strategy in October 2021, the Department for Transport published a consultation seeking views on some of the design features that could be included in a car and van regulation. A summary of responses was published in 2023[144].

- **National Bus Strategy**[145] **(2021):** committed to make buses more frequent, more reliable, more comprehensive, easier to understand and use, better co-ordinated and cheaper – to increase passenger numbers and reduce congestion and carbon emissions. The National Bus Strategy also re-

[139] Isle of Man: Future Generation Delivery Strategy (2022-2030)
[140] Gibraltar: Summary Inventory Report 2022
[141] Gibraltar: Nearly Zero Energy Buildings
[142] Decarbonising Transport: A Better Greener Britain
[143] Technical Consultation on Zero Emission Vehicle Mandate Policy Design
[144] Government response and outcome to technical consultation on zero emission vehicle mandate policy design
[145] National Bus Strategy for England: Bus Back Better

committed to supporting the introduction of at least 4,000 zero emission buses (ZEBs) and achieving a zero-emission fleet.

- **Jet Zero Strategy[146] (2022):** set out its approach to achieving net zero for UK aviation by 2050. The Strategy focused on the rapid development of technologies in a way that maintains the benefits of air travel, whilst maximising the opportunities that decarbonisation brings for the UK.

- **Domestic Maritime Decarbonisation[147] (2022):** This consultation sought evidence on barriers and opportunities of decarbonising the maritime sector. A summary of responses was published in 2023.

- **Cycling and Walking Investment Strategy[148] (2022):** sets the target that half of all journeys in towns and cities will be cycled or walked by 2030. It also includes the aim to deliver a world class cycling and walking network in England by 2040.

- **Renewable Transport Fuel Obligation (RTFO) Order[149] (2007)** regulates renewable fuels used for transport. The RTFO was first implemented in 2008 and was the core policy measure for meeting transport targets within the EU Renewable Energy Directive. Under the RTFO, suppliers of relevant transport fuel in the UK must be able to show that a certain percentage of the fuel they supply comes from renewable and sustainable sources. Fuel suppliers that supply at least 450,000 litres of this fuel a year are obligated under the scheme.

- **Zero emission HGV and infrastructure demonstrator programme[150]:** Research & Development funding into zero emission HGV and infrastructure demonstrators will establish new hydrogen HGV refuelling sites and the deployment of hydrogen fuel cell HGVs. In addition, the Tees Valley Hydrogen Transport Hub brings together hydrogen supply (refuelling infrastructure) and demand (transport applications) with the aim of demonstrating commercial viability of hydrogen in transport. Three projects, receiving £13m funding, are using hydrogen as a fuel with a fuel cell for a range of road vehicles, and through combustion for airside support vehicles. This is being supported by new publicly accessible hydrogen refuelling stations to be built in the region.

- **Delivering decarbonisation through places:** There is no uniform approach to decarbonisation and each place in the UK has its own role to play in helping the UK to meet its legally binding target of net zero by 2050. In 2022, through an innovation grants programme, the UK provided over £550,000 to

[146] Jet Zero Strategy
[147] Domestic Maritime Decarbonisation: the Course to Net Zero Emissions.
[148] The Second Cycling and Walking Investment Strategy
[150] Zero Emission Heavy Goods Vehicles and Infrastructure Competition Winners

develop early-stage innovative solutions to support the decarbonisation of local transport systems.

Better data can provide new policy and operational insights, drive new products and services and 'nudge' people towards lower emission journeys. The Department's annual Transport and Environment statistical release draws together various data sources on transport's environmental impact and provides guidance explaining the detail of estimating greenhouse gas emissions for different modes and journeys. Data consumers can use these data, without restrictions on use or disclosure, for journey planning applications, products and services enabling users to plan green journeys.

2.11.3.2 Northern Ireland Executive

In 2022, transport was the second largest greenhouse gas emitting sector in Northern Ireland contributing 18.1% to overall emissions. The Department for Infrastructure (DfI) is currently developing its suite of new Transport Plans through an integrated approach with local councils Local Development Plans (LDPs). This integrated approach being undertaken between DfI and local councils provides a unique opportunity to make sure that the movement and accessibility of all forms, across all modes of transport, is considered as a key component in the development of areas at a local level. DfI has also committed investment of over £100m in hydrogen zero emissions and electric buses to support the roll out of a public transport fleet with zero emissions from engine combustion.

To support the decarbonisation of transport, DfI has also published an Action Plan for Electric Vehicle (EV) Infrastructure[151] in November 2022. The plan was developed by the Electric Vehicle Infrastructure Task-Force which was set up in December 2021 to bring together representatives from government, consumers, energy providers, industry and EV drivers to consider our EV Infrastructure requirements to deliver a fit for purpose, modern EV charging network.

2.11.3.3 Scottish Government

Transport is Scotland's highest carbon emitting sector. The largest source of transport emissions is cars, which contribute almost 40% of transport emissions. This demonstrates the need to both transition to zero emission vehicles and reduce car use to combat climate change in a way that is consistent with our just transition principles.

Scottish Government and Convention of Scottish Local Authorities (COSLA) continue to work in partnership to produce the updated route map and it will be published in due course. The route map will set out the interventions to support the scale of behavioural change required and a timeline for implementing demand management.

[151] Northern Ireland: Action Plan for Electric Vehicle Infrastructure

Additionally, Scotland has one of the most comprehensive public charging networks in the UK, with over 600 public charge points, funded through public and increasingly private sector investment. Scotland has the UK's second highest number of electric vehicle public charge points, second only to London, and has committed to enabling the delivery of approximately 24,000 additional public EV charge points by 2030.

Through the Older & Disabled and Young Persons Concessionary travel schemes over £370m is spent each year to provide free bus travel for over 2 million people in Scotland, including all children and young people under 22, eligible disabled people and everyone aged 60 and over.

Since 2020 we have invested over £150 million to put more than 800 zero emission buses and coaches on the road and install supporting charging infrastructure.

Our most recent £41.7 million investment in zero emission buses has leveraged 3.2 times the amount of private sector funding, moving the transition to a sustainable financial model that ends the need for continued public subsidy.

2.11.3.4 Welsh Government

The Welsh Government has committed to using the sustainable transport hierarchy when deciding on new transport infrastructure. This gives priority to walking and cycling, public transport and ultra-low emissions vehicles over other private motor vehicles.

- **Transport strategy[152] (2021):** identifies three priorities for the transport system
    - Bring services to people in order to reduce the need to travel
    - Allow people and goods to move easily from door to door by accessible, sustainable and efficient transport services and infrastructure
    - Encourage people to make the change to more sustainable transport

- **National Transport Delivery Plan[153] (2022-27)**: sets out how the Welsh Government will deliver against these priorities, by sector and by travel mode.

- **Electric Vehicle Charging Strategy[154] (2021):** set out its vision that by 2025, all users of electric cars and vans will be confident that they can access electric vehicle charging infrastructure when and where they need it. The associated Action Plan details the actions that will be taken to achieve this vision, grouped into four main outcomes:
    - Increased total charging provision
    - A quality charging experience
    - A sustainable approach (aligned with the decarbonisation agenda)

[152] Wales: Transport Strategy
[153] Wales: National Transport Delivery Plan
[154] Electric vehicle charging strategy for Wales

- Localised benefits

2.11.3.5 Jersey

Transport is the highest source of emissions in Jersey and has been focus of emissions reduction policies within the Carbon Neutral Roadmap[155] including incentive schemes for electric bicycles, cars and vans and the installation of charging points. Second generation biodiesel has also been subsidised within the bus and government fleet. The longer-term focus is on support for active travel and increased bus ridership.

2.11.3.6 Guernsey

Guernsey's Integrated Transport Strategy[156], approved in 2014, sets out the strategic approach to managing the transport system on the island. Principally the Strategy takes a hierarchical approach to transport, prioritising active travel over vehicular travel, and public transport over private vehicles, which will help to reduce vehicle emissions over time.

2.11.3.7 Isle of Man

In 2019, the Isle of Man Programme for Achievement of Climate Targets (IMPACT) Report[157] was produced. Appendices 23-27 and 33 relate to transport[158]. The Phase 1 Action Plan Progress Report[159] details progress made against the Council of Ministers' Climate Action Plan Phase 1[160] over the period 1 April 2021-31 March 2022, including actions relating to transport. Section 3 of the Isle of Man Climate Change Plan 2022-2027[161] sets out the current, high level policies relating to transport decarbonisation. Notably, the Plan has committed to a Transport Strategy to deliver 15% sector reduction by 2027, to be underway in 2024. An independent Strategic Transport Decarbonisation Review[162] has been prepared to inform the strategy. The Climate Change Plan makes a commitment to banning first registrations of petrol and diesel cars on the Island from 2030, and hybrids from 2035.

2.11.3.8 Gibraltar

Gibraltar published its Sustainable Traffic Transport and Parking Plan in 2017. This was done after an in-depth study of the current transport network and its problems

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[155] Jersey: Carbon Neutral Roadmap
[156] Guernsey: Integrated Transport Strategy and Action Plan
[157] Isle of Man: Programme for Achievement of Climate Targets
[158] Isle of Man: Impact Report
[159] Isle of Man: Phase One Action Plan Progress Report
[160] Isle of Man: Phase One Action Plan
[161] Isle of Man: Climate Change Plan
[162] Isle of Man: Decarbonisation Scenarios Technical Report

with a view to identifying solutions that encourage behavioural change and effect a modal shift towards walking, cycling and public transport.

Gibraltar has committed to ending the sale of internal combustion engine vehicles in line with EU targets. It also continues to promote active travel through the publication and implementation of its Active Travel Strategy[163] which seeks to make cycling and walking the natural choices for short journeys.

2.11.4 Industrial Processes and Product Use (IPPU)

2.11.4.1 England

In England, the IPPU sector is being tackled through the following strategies:

- **Industrial Decarbonisation Strategy[164] (2021):** Sets out a plan for decarbonising industry in line with net zero goals. The policy measures outlined in the IDS were: having at least two Carbon Capture Usage and Storage (CCUS) clusters in place by mid-2020s, which will increase to four by 2030, with the world's first net zero cluster in place by 2040; creating a market for low carbon industrial products through measures designed to increase demand; leveraging Resource and Energy Efficiency (REEE) measures to reduce emissions by 11 MtCO2e per year by 2035 (including 3 MtCO2e from Iron and Steel), and updating the UK's Emission Trading Scheme cap in place by January 2024 to send a strong market sign to the private sector to incentivise industry to take action to decarbonise.

- **Net Zero Strategy[165] (2021):** The industry chapter of the Net Zero Strategy sets out an indicative Carbon Budget 6 pathway for industry. This pathway and updates in the Net Zero Growth Plan (NZGP) were consistent with the expectations set out in the Industrial Decarbonisation Strategy (IDS), but went further in specific areas, including increased fuel switching and Carbon Capture, Utilisation and Storage (CCUS) ambitions, and additional contributions from Resource Efficiency and Energy Efficiency (REEE) measures.

2.11.4.2 Northern Ireland Executive

Compared to the 1990 base year, industry emissions have decreased by 3.2 MtCO2e (61.1% reduction) and now represent 9.7% of greenhouse gas emissions in Northern Ireland. This reduction is due to decreased emissions from the food and drinks industry, the chemical industry, cement production and construction industries through efficiencies in their operation and reduced usage of certain products.

[163] Gibraltar: Active Travel Strategy
[164] Industrial Decarbonisation Strategy
[165] Net Zero Strategy

Under the Northern Ireland Executive's 2021 'Energy Strategy – The Path to Net Zero Energy'[166] a key priority was made to set out an industrial decarbonisation pathway for 2022-2030.

2.11.4.3 Scottish Government

Scotland's industrial emissions fell from 21 MT CO2e in 1990 to 8.8MT CO2e in 2022. This demonstrates the significant progress made by industry so far, to embrace innovative technologies and develop more efficient processes.

Reducing industrial emissions further is central to Scotland's net zero commitment and our economic ambitions as outlined in our Green Industrial Strategy. Scottish Government works collaboratively with the UK Government and other devolved administrations to accelerate industrial decarbonisation across our devolved and reserved competencies, including within a joint authority for the UK Emissions Trading Scheme.

Effective collaboration with the UK Government is vital on issues requiring national reform and large-scale investment including CCUS, electricity pricing, grid infrastructure upgrades and hydrogen business model support.

Operating since 2020, the Scottish Industrial Energy Transformation Fund (SIETF) continues to provide match funding, boosting investor confidence to progress projects that contribute to decarbonising manufacturing.

To support the development of further evidence-based policy proposals, Scottish Government engages closely with key industry and academic stakeholders including through the Grangemouth Future Industry Board and the Industrial Decarbonisation Research and Innovation Centre.

Pipeline transportation of CO2 is vital for to support the decarbonisation of industry; the Scottish Government has announced funding to accelerate a project to repurpose an existing pipeline from transportation of gas to transportation of CO2 from industrial clusters in Scotland's central belt to Acorn, so as to ensure that this will be available at the earliest opportunity.

2.11.4.4 Welsh Government

The Welsh Government's Manufacturing Action Plan contains an objective to "Address the climate emergency by decarbonising the manufacturing sector in Wales, underpinned by circular economy practices and processes".[167] The Welsh Government is focussing on:

- Embedding low carbon and climate resilience within its Economic Contract and expanding consideration into all other aspects of Welsh Government spend, including grants and procurement

[166] Northern Ireland: Energy Strategy - Path to Net Zero Energy
[167] Wales: Manufacturing Action Plan

- Using the Circular Economy Fund[168] as a mechanism to drive forward more recycling and less landfill, including utilisation of new technologies and processes within manufacturing
- Working alongside Net Zero Industry Wales, industrial clusters and hubs as they develop their emissions reduction pathways and build a solid evidence base to better understand the potential role that fuel switching and CCUS can play in decarbonising manufacturing
- Working with Net Zero Industry Wales, the South Wales Industrial Cluster and stakeholders in North Wales, including Hynet, to understand the infrastructure necessary to decarbonise industry and maximise the benefits from relevant initiatives

2.11.4.5 Jersey

Jersey does not have significant industrial processes on the island. Work continues to reduce any emissions arising from F-gases.

2.11.4.6 Guernsey

Guernsey does not have a significant industrial basis, however the emissions from the industrial sector represent 10.7% of Guernsey's emissions in 2022. This represents a 36% reduction on 1990 levels.

2.11.4.7 Isle of Man

These sectors make up a very small proportion of the Isle of Man's GHG inventory and so have not yet been a policy focus. Very little heavy industry occurs on the Isle of Man. The Department for Enterprise offers a range of schemes, including the Business Energy Saving Scheme[169] which supports projects to improve business energy efficiency including refrigeration and air-conditioning units. The Isle of Man ratified the Montreal Protocol and made legislation[170] relating to the use and transfer of Ozone-Depleting Substances (ODS) and F-gases in 2020.

2.11.4.8 Gibraltar

Gibraltar does not have any heavy industry therefore emissions in this sector primarily arise from the use of refrigeration gases. In this respect, efforts are focused on improving building design to limit the need for air conditioning systems.

[168] Wales: Circular Economy Fund
[169] Isle of Man: Business Energy Saving Scheme
[170] Isle of Man: Ozone Depleting Substances and Fluorinated Greenhouse Gases Regulations

2.11.5 Agriculture

2.11.5.1 England

The UK set out measures to support the decarbonisation of the agricultural sector. The Plan set out emissions reductions from agriculture in England through sustainable land management practices, the uptake of innovative practices and technologies, and actions to improve the productivity and profitability of the sector. Specifically, the measures set out the potential to improve farm profitability, through increases in productivity and through opportunities for diversification on low grade land. Other measures include:

- **Environmental Land Management (ELM) schemes[171] (2022):** provide a powerful vehicle for achieving net zero, and wider environmental goals, while supporting our rural economy. The scheme is split into three parts:
    - **Sustainable Farming Incentive** - this pays farmers and land managers for actions that protect and enhance our natural environment, support the sustainable production of food, and boost farm productivity and resilience.
    - **Countryside Stewardship** - this is a targeted, place-based approach that encourages sustainable farming, promotes resilience against climate change, and enhances the beauty and diversity of the countryside.
    - **Landscape Recovery -** this is for landowners and managers who want to take a large-scale, long-term approach to producing environmental and climate goods on their land. It will facilitate and fund ambitious projects through bespoke, 20+ year agreements.

- **The UK's Agriculture Act[172] (2020):** obligates the UK government to produce a report on food security in the UK at least every three years. The UK published its first United Kingdom Food Security Report 2021[173] under the Agriculture Act in December 2021.

2.11.5.2 Northern Ireland Executive

The latest Northern Ireland Greenhouse Gas Inventory (1990-2022) reported that the agriculture sector was the largest greenhouse gas emitting sector in Northern Ireland representing 29.1% of all emissions. To drive forward action, the Department of Agriculture, Environment and Rural Affairs (DAERA) published the Future Agricultural Policy Decisions for Northern Ireland in March 2022[174]. Decisions that are central to this future policy include:

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[171] Environmental Land Management (ELM) schemes
[172] The UK's Agriculture Act
[173] United Kingdom Food Security Report 2021
[174] Northern Ireland: Future Agricultural Policy Decisions

- A Farm Sustainability Payment which recognises the need for continuation of an income support 'safety net'.
- A Beef Sustainability Package comprising two elements; Beef Carbon Reduction Scheme and Suckler Cow Scheme.
- A Farming with Nature Package to assist farm businesses and land managers across all land types to make substantial contributions to environmental improvements and sustainability.
- Farming for Carbon measures which encourage low carbon emission farming practices.

Furthermore, the Soil Nutrient Health Scheme[175] which first opened in May 2022, is a comprehensive regional soil sampling and analysis programme being funded by the department that will allow farmers to optimise crop nutrient applications, assess on-farm carbon stocks and build farm resilience through its objective to test all, or the vast majority of, the 650,000 fields used for farming in Northern Ireland to help inform their management.

2.11.5.3 Scottish Government

The Scottish Government is transforming the way we support farming and food production in Scotland to deliver our Vision for Agriculture and become a global leader in sustainable and regenerative agriculture. We want to ensure that farming across Scotland continues sustainably into the future, producing high-quality food for the nation, helping to reduce greenhouse gas emissions, and delivering increased biodiversity and wider environmental benefits.

In 2021-22, the Scottish Government committed to bringing forward the Agriculture and Rural Communities (Scotland) Bill, which has since become an Act, to deliver that vision.

The National Test Programme was announced in October 2021 to provide funding for farmers and crofters to prepare their farms to meet the conditions of future agriculture policy and support.

Regulations came into force from 1 January 2022 to consolidate the Silage Surry and Agricultural Fuel Oil (Scotland) Regulations 2003 into The Water Environment (Controlled Activities) (Scotland) Regulations 2011. These included improved controls on the storage of slurry and digestate to reduce leakage, and a move to precision spreading methods to maximise the nutrient benefit and reduce emissions. This provides benefits to water quality, air quality, and climate change mitigation.

2.11.5.4 Welsh Government

Welsh emissions for the agriculture sector decreased to 5.6 (MTCO2e) in 2022, this is a -3.8% change since 2021 and -7.7% from the base year (1990).

[175] Northern Ireland: Soil Nutrient Health Scheme

The Agriculture (Wales) Act 2023 establishes Sustainable Land Management as the framework for future agriculture support.[176] The Welsh Government will introduce a new Sustainable Farming Scheme (SFS) in 2026.[177] It will provide support for farmers to respond to the climate and nature emergencies, and to produce food in a sustainable way.

In preparation for the SFS in 2026, the Welsh Government has introduced the Habitat Wales Scheme to increase the area of habitat land under management, along with support for Organic and Common land farmers and an extension of Farming Connect support. In addition, a new Integrated Natural Resources Scheme was launched to deliver nature-based solutions across landscapes, catchments and pan Wales. During this preparatory phase, the Welsh Government continues to support farmers and growers through a range of capital investment schemes that tackle climate change, lead to improvements in soil, air and water quality and reduce the decline in our native biodiversity.[178]

2.11.5.5 Jersey

The Economic Framework for the Rural Environment[179] was published in 2022 and set outs emissions reduction strategies for the industry. As part of this, the revised Rural Support Scheme (RSS) was launched in January 2023. This provides credits to industry per Integrated Farm Management Plan. Uptake of this component of the RSS has been ahead of forecast with 80 local businesses now signed up to the scheme.

During the next 12 months, Jersey will continue to investigate the feasibility of farm-scale Anaerobic Digestion plants. The installation of this technology would reduce emissions from slurry and feed energy into the grid to accommodate peak demand.

2.11.5.6 Guernsey

The States of Guernsey are currently reviewing their policy approach to dairy farming which is the predominant agricultural sector on the island. It is anticipated that the revised policy will be linked to payments for public goods which would include climate change mitigation and adaptation aspects.

As part of the development of the island's net zero plan, consideration is being given to the potential adoption of anaerobic digestion on island.

2.11.5.7 Isle of Man

In 2019, the Isle of Man Programme for Achievement of Climate Targets (IMPACT) Report[180] was produced. Appendices 18 and 28 relate to agriculture. The Phase 1

[176] Wales: Agriculture Act 2023
[177] Wales: Sustainable Farming Scheme
[178] Wales: Rural Grants Payments
[179] Jersey: Economic Framework for the Rural Environment
[180] Isle of Man: Programme for Achievement of Climate Targets (IMPACT) Report

Action Plan Progress Report[181] details progress made against the Council of Ministers' Climate Action Plan Phase 1[182] over the period 1 April 2021-31 March 2022, including actions relating to agriculture. Section 4 of the Isle of Man Climate Change Plan 2022-2027[183] sets out the Isle of Man's current, high level climate policies relating to the agricultural sector, including a commitment to prepare an Agricultural Strategy to deliver a 15% reduction in this sector's emissions by 2027. The Agriculture and Fisheries Grant Scheme[184] (through the Agri-Environment Scheme) provides financial incentive for several initiatives aiming to reduce greenhouse gas emissions from the sector.

2.11.5.8 Gibraltar

Gibraltar has no agricultural sector.

2.11.6 Land-use, Land-use Change and Forestry (LULUCF)

2.11.6.1 England

England addresses the LULUCF sector through the following strategies and policies:

- **The England Peat Action Plan**[185] **(2021):** set out the government's long-term vision for managing, protecting, and restoring peatlands so that they provide a wide range of benefits to wildlife, people and the planet.

- **Biomass Strategy**[186] **(2023):** set out the results of a review of the amount of sustainable biomass available to the UK (including domestically grown perennial energy crops and short-rotation forestry), and how this resource could be best utilised across the economy to help achieve net zero.

- **England Trees Action Plan**[187] **(2021):** set out the government's long-term, generational vision for the forestry sector to 2050. It introduced a programme of new measures to boost tree planting and establishment, improve woodland management in England and bring trees closer to people.

- **Nature for Climate Fund**[188] **(2021-present):** is the key public sector fund for tree planting and peatland restoration. The England Trees Action Plan committed the government to treble tree planting rates in England by the end of this Parliament. Its delivery is funded by the Nature for Climate Fund.

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[181] Isle of Man: Phase One Action Plan Progress Report
[182] Council of Ministers' Climate Action Plan Phase One
[183] Isle of Man: Climate Change Plan 2022-2027
[184] Isle of Man: Agriculture and Fisheries Grant Scheme
[185] England Peat Action Plan
[186] Biomass Strategy
[187] England Trees Action Plan
[188] Nature for Climate Fund

2.11.6.2 Northern Ireland Executive

Land-use, Land-use change and Forestry (LULUCF) sector accounts for 10.1% of greenhouse gas emissions according to the latest Northern Ireland Greenhouse Gas Inventory (1990-2022), with a reduction of 20.5% from the 1990 base year to 2022.

To continue to drive forward emission reductions in this sector, the Department of Agriculture, Environment and Rural Affairs (DAERA) has taken forward the development of a Northern Ireland Peatland Strategy[189] which they consulted on during 2021. The draft strategy sets out the strategic objectives and associated targets and actions to conserve and restore peatlands in Northern Ireland.

Separately in March 2020 DAERA announced a 'Forest for Our Future' programme which aimed to plant 9,000 hectares of new woodland by 2030 to contribute to the reduction of Northern Ireland's net greenhouse gas emissions. Since the programme commenced, to March 2022, 876 hectares of new woodland were planted.

2.11.6.3 Scottish Government

The Scottish Government committed £250 million over 10 years to restore 250,000 hectares of degraded peatlands by 2030.

Peatland restoration is delivered by Peatland ACTION - a flagship partnership established by the Scottish Government with five public sector Delivery Partners– NatureScot (NS), Loch Lomond and Trossachs National Park Authority (LLTNPA), Scottish Water (SW), Cairngorms National Park Authority (CNPA) and Forestry and Land Scotland (FLS).

In 2021-22 the total annual budget for peatland restoration was around £22 million and the Peatland ACTION partnership restored 5,370 hectares.

Scottish Forestry has taken measures to maximise woodland creation with the financial resources available. It will not be possible to meet the 18,000 hectares a year woodland creation target under the current budget settlement but, with additional finance generated through the Woodland Carbon Code, approximately 10,000 hectares of woodland creation may be possible in this financial year.

Approximately 75% of all new woodland across the UK in recent years have been in Scotland. In 2021-22, 10,480 hectares of new woodland were created out of a total of 13.890 for the UK. Scottish Forestry manages the Woodland Carbon Code on behalf of the four countries across the UK and is introducing greater flexibility in the Forestry Grant Scheme so that additional private finance from the carbon market can be attracted into woodland creation.

[189] Northern Ireland: Peatland Strategy

2.11.6.4 Welsh Government

The LULUCF sector in Wales provides a net sink (a removal of carbon dioxide from the atmosphere largely from the sequestration of carbon dioxide by trees) of 0.9 million tonnes of carbon dioxide (CO2) equivalent. The estimated size of this emissions removal has increased by 0.5% (0.005 MtCO2e) between 2021 and 2022.

The National Peatland Action Programme aims to restore 600-800 hectares of degraded peatland for each year of 2020-2025[190] with an ambition to increase delivery from 600ha to 1,800 per year by 2030/31[191]. 3,000ha has been restored over the first 4 years of the Programme since 2020. Its priority themes for action are:

1. Peatland erosion
2. Peatland drainage
3. Sustainable management of blanket peats
4. Sustainable management of lowland peats
5. The restoration of afforested peatlands
6. The gradual restoration of our highest carbon-peatlands

The Woodland Creation Grant[192] and Small Grants – Woodland Creation Scheme[193] provide financial support for the planting of trees and the installation of fencing and gates.

2.11.6.5 Jersey

The Carbon Neutral Roadmap[194] provides recognition that tackling the climate emergency by using nature-based solutions that also address the biodiversity crisis provides multiple benefits for our land, air and sea.

Jersey is supportive of regenerative land management practices and sequestration projects on-island whilst recognising our limited land area and high population density limit its potential. Support for local sinks in terrestrial or marine environment (blue carbon) will be prioritised before the purchase of off-island offsets. Any funded sequestration projects will be required to contribute to improvements in biodiversity.

2.11.6.6 Guernsey

Guernsey's Planning legislation, which comprises the Land Planning and Development (Guernsey) Law, 2005[195] and associated ordinances[196], and the 2016

[190] Wales: The National Peatland Action Programme
[191] Wales: Biodiversity Deep Dive: Recommendations
[192] Wales: Woodland Creation Grant
[193] Wales: Small Grants Woodland Creation Scheme
[194] Jersey: Carbon Neutral Roadmap
[195] Guernsey: Land Planning and Development (Guernsey) Law
[196] Available from - Guernsey: Legal Resources

Island Development Plan[197], along with associated planning briefs and subject plans, outlines the basis for how the island's land is used.

Land use change is largely driven by pressures from development. These pressures are managed through an integrated Island Development Plan, which is based on an agreed spatial strategy for the distribution of development. Guernsey's spatial strategy and planning policies protect the rural and natural environment from high levels of development, assist in achieving sustainable development and afford protection to important sites for biodiversity. New development is also subject to the Guernsey Building Regulations which specifically consider matters such as energy efficiency in the built environment.

There is no forestry industry on Guernsey.

2.11.6.7 Isle of Man

In 2019, the Isle of Man Programme for Achievement of Climate Targets (IMPACT) Report[198] was produced. Appendices 10A and B relate to LULUCF. The Phase 1 Action Plan Progress Report[199] details progress made against the Council of Ministers' Climate Action Plan Phase 1[200] over the period 1 April 2021-31 March 2022, including actions relating to LULUCF. The Peatland Restoration Project[201], commenced in 2021, aims to reduce greenhouse gas emissions from exposed or eroding peat, and aims to map all areas of peat on the Isle of Man and provide guidance and collaboration on the management and restoration of peatlands. The LULUCF project, completed in 2022, has led to a number of improvements in the methodology for calculating land based sources and sinks of GHG emissions. The Isle of Man Climate Change Plan 2022-2027[202] commits to the production of a Land Management Framework, to deliver a 10% increase in carbon sequestration by 2027.

2.11.6.8 Gibraltar

The Gibraltar Development Plan[203] was adopted in 2009 and is intended to guide land use planning in Gibraltar for the next 10 years. The plan takes into account the competing demands on Gibraltar's scarce land resources and provides a co-ordinated set of policies and proposals to manage future growth. A new development plan is currently being prepared.

Over 30% of Gibraltar's land area is a protected area in which development is not permitted.

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197 Guernsey: Island Development Plan
198 Isle of Man: Programme for Achievement of Climate Targets (IMPACT) Report
199 Isle of Man: Phase 1 Action Plan Progress Report
200 Isle of Man: Council of Ministers Climate Action Plan Phase One.
201 Isle of Man: Peatland Restoration Project
202 Isle of Man: Climate Change Plan 2022-2027.
203 Gibraltar: Development Plan

2.11.7 Waste & Wastewater

2.11.7.1 England

England addresses waste and wastewater through the following strategies:

- **Resources and Waste Strategy[204] (2018):** set out how to preserve our stock of material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. It also set out the plan to become a world leader in using resources efficiently and reducing the amount of waste created as a society, in addition to the ambition to prolong the lives of the materials and goods that we use, and move society away from the inefficient, 'linear' economic model of 'take, make, use, throw'.
- **Carbon Budget Delivery Plan[205] (2023)**: set out the plan to reduce wastewater treatment emissions through improved monitoring and subsequent optimisation of operations, as well as through further improvements in modelling and data collection to improve reporting and reduce uncertainty.

England tackles F-gas sector emission reductions through:

- The implementation of additional phasedown steps to meet the Kigali Amendment requirement This is achieved through Defra's public commitment in the Carbon Budget Delivery Plan to review Defra's domestic F-gas Regulation.
- A National Health Service (NHS) led initiative to increase incentives to prescribe inhalers not containing F-gases, as well as industry commitments to introduce propellants with lower global warming potentials in metered-dose inhalers that still do contain F-gases.

2.11.7.2 Northern Ireland Executive

The latest Northern Ireland Greenhouse Gas Inventory (1990-2022) reported that the sector represents 3.6% of all greenhouse gas emissions in Northern Ireland with waste-water handling making up 0.6% of the total emissions. From 1990 to 2022 the emissions in the sector have reduced by 61.9%. The reduction in emissions from the waste sector (1.2 MtCO2e) is primarily due to the continued process of methane capture and oxidation systems within landfill sites. Plans are being progressed for targeted policy and legislative interventions to help tackle the remaining emissions from the sector. DAERA is exploring the feasibility of diverting biodegradable wastes from landfill and is consulting on changes to recycling and waste management to improve the quality and quantity of what is collected and to bring business into scope of mandatory recycling.

[204] Resources Waste Strategy
[205] Carbon Budget Delivery Plan

Progress in this sector has been delivered though a number of plans and strategies over the past decade. The Northern Ireland Waste Management Strategy 'Delivering Resource Efficiency'[206] was published in 2013 and set the policy framework for the management of waste in Northern Ireland to 2020. Under this Strategy Northern Ireland increased its recycling rate to over 50%. To build upon this progress a new Waste Management Strategy[207] is currently being developed by the Department of Agriculture, Environment and Rural Affairs (DAERA) which will seek to deliver upon that at least 70% of waste being recycled target set in the Climate Change Act (Northern Ireland) 2022 and the various recycling and landfill targets set out in the Waste and Contaminated Land (Northern Ireland) Order 1997.

Northern Ireland 'Waste Prevention Programme -Stopping Waste in its tracks' [208]which was published in 2020 set out a range of policies and actions focused on waste prevention in line with the waste hierarchy with a focus on reducing waste and supporting the principles of a circular economy. One key outcome is the continuing benefit of the carrier bag levy[209] which was introduced in 2013, with the proceeds generated being used, in the delivery of local projects which both enhance and improve the environment.

2.11.7.3 Scottish Government

Scotland has made strong progress in reducing greenhouse gas emissions from the waste management sector. In 2022, sector emissions stood at 1.6 MTCO2e, 75% lower than 1990 levels. This has been driven by a reduction in the total amount of waste going to landfill in Scotland, which has dropped by nearly half over the past decade, while over 62% of waste was recycled in 2022. In the same year Scotland met its 2025 target to reduce all waste by 15% (against 2011 levels) for the second year in a row.

2.11.7.4 Welsh Government

The latest Wales Greenhouse Gas Inventory (1990-2022) reported that the sector represents 2.8% of all greenhouse gas emissions. From 1990 to 2022 the emissions in the sector have reduced by 72%. The reduction in emissions from the waste sector is primarily due to the significant reduction in the landfilling of biodegradable waste as well as the installation of methane capture on landfill sites. There has been a significant decrease in the proportion of Local Authority collected municipal waste disposed of via landfill, falling from 42.0% in 2012-13 to 0.9% in 2023-24.

Beyond Recycling, the Welsh Government's strategy for making the circular economy a reality, contains six core themes for keeping resources in use for as long as possible and avoiding waste:[210]

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[206] Northern Ireland: Waste Management Strategy 'Delivering Resource Efficiency
[207] Northern Ireland: Waste Management Strategy
[208] Northern Ireland: Waste Prevention Programme
[209] Northern Ireland: Carrier Bag Levy
[210] Wales: Beyond Recycling

- Driving innovation in materials use
- Upscaling prevention and re-use
- Building on Wales's recycling record
- Investing in infrastructure
- Enabling community and business action
- Aligning government levers

2.11.7.5 Jersey

In Jersey, the Solid Waste Strategy[211] commits to prioritising reuse and recycling as per the waste hierarchy. Residual municipal waste is sent to an Energy Recovery Facility which generates part of our electricity. In 2022, this contributed 8% of our greenhouse gas emissions. A recent engagement campaign 'It's not a load of Rubbish[212]', communicated the waste hierarchy of reduce, reuse recycle.

Since July 2022, the Single Use Plastics Law[213] came into force. This means Islanders no longer receive single use carrier bags with their purchases and are charged at least 70 pence per reusable bag.

The Construction industry generates a large proportion of waste in Jersey. Working collaboratively with the industry, we have been developing a plan to reduce inert construction waste on-island.

2.11.7.6 Guernsey

Guernsey's Waste Strategy[214] was approved in 2012 and is focused principally on waste reduction, with reuse and recycling prioritised over disposal. Waste has been diverted from landfill to processing as Refuse Derived Fuel – reducing emissions and increasing energy recovery.

Guernsey's household waste Pay-As-You-Throw scheme encourages waste reduction, and leads to increased reuse/recycling, and separation of organic waste – all of which reduce emissions in terms of processing waste/recycling. Guernsey's Waste Management Plan[215], approved in 2018, outlines the implementation plan for the Waste Strategy and also encourages home composting of organic food waste and garden waste, which aims to reduce emissions from transporting organic waste to the green waste site, and from associated processing. Zero organic waste is sent to landfill, collected household and commercial food waste is processed off-island to an Anaerobic Digestion plant for energy recovery and PAS110 compliant digestate. This reduces emissions that would otherwise be created through landfill.

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[211] Jersey: Solid Waste Strategy
[212] Jersey: 'It's not a load of Rubbish".
[213] Jersey: Single Use Plastics Law
[214] Guernsey: Waste Strategy – pp427
[215] Guernsey: Waste Management Plan

2.11.7.7 Isle of Man

In 2019, the Isle of Man Programme for Achievement of Climate Targets (IMPACT) Report[216] was produced. Appendices 13A, B and C relate to energy from waste. In 2004, the Island's Energy from Waste Plant facility was completed which now processes all domestic and commercial residual waste, generating 10% of the Island's electricity.[217] This diverts waste from landfill and has led to a significant reduction in emissions in this sector. The Phase 1 Action Plan Progress Report[218] details progress made against the Council of Ministers' Climate Action Plan Phase 1[219] over the period 1 April 2021-31 March 2022, including actions relating to waste. Section 6 of the Isle of Man Climate Change Plan 2022-2027[220] sets out the Isle of Man's current, high-level policies relating to reducing emissions from waste, including a commitment to produce Waste Management and Circular Economy Strategies to deliver 15% sectoral emissions reduction by 2027.

2.11.7.8 Gibraltar

Gibraltar's overall objective continues to be the reduction of waste wherever possible, followed by reuse and recycling, as per the principles of the waste hierarchy and the circular economy.

Gibraltar's overall objective continues to be the reduction of waste wherever possible, followed by reuse and recycling, as per the principles of the waste hierarchy and the circular economy. The current kerbside recycling programme was expanded in 2012 to include paper and plastic recycling as well as cooking oil and Waste from Electrical and Electronic Equipment (WEEE). All of Gibraltar's waste is exported to Spain for recovery or final disposal. Current plans are focusing on the development of a Waste Management Facility in Gibraltar to maximise recovery of recyclable material prior to export. A ban on single use plastic bags[221] was introduced in 2019 along with a more comprehensive ban on single use plastic items.[222]

2.11.8 Carbon Capture and Storage and Greenhouse Gas Removals

England has put in place the following strategies in regards to carbon capture and storage:

2.11.8.1 Carbon Capture, Utilisation and Storage

Carbon Capture, Utilisation and Storage (CCUS) is essential for industry to decarbonise. In the future net zero world, we will still need materials such as cement,

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[216] Isle of Man: Programme for Achievement of Climate Targets (IMPACT) Report
[217] Isle of Man: Suez Who we Are
[218] Isle of Man: Phase One Action Plan Progress Report
[219] Council of Ministers' Climate Action Plan Phase One
[220] Isle of Man: Climate Change Plan 2022-2027
[221] Gibraltar: Imports And Exports (Control) (Amendment No.3).
[222] Gibraltar: Imports And Exports (Control) (Amendment No.2)

steel, and chemicals. For many of these sectors, CCUS is currently the only viable route to decarbonise at the scale required for us to meet our targets.

- In November 2021, the government announced the selection of the HyNet and East Coast Cluster as the first two industrial CCUS clusters to be deployed in the UK.
- In August 2022, the government announced a shortlist of 20 projects representing a range of innovative CCUS technologies to be progressed to the due diligence stage for inclusion in those clusters. BEIS (now DESNZ) then launched Phase-2 of the Cluster Sequencing Process to determine the projects that would make up those clusters and enter negotiations.

2.11.8.2 Greenhouse Gas Removals

The Net Zero Strategy (2021) set out several commitments towards the ambition of deploying at least 5 MtCO2/yr of engineered removals by 2030, potentially rising to 23MtCO2/yr by 2035 and 75-81MtCO2/yr by 2050. As outlined in the Net Zero Growth Plan and other publications, the government has taken steps to deliver on this.

The UK:

- Commissioned research from Vivid Economics to explore policy support options for Greenhouse Gas Removal technology deployment in the UK (2019).
- Published a Call for Evidence based on the outputs of the Vivid Economics study, which invited views from stakeholders on whether there is a role of government in incentivising GGR development and deployment in the UK over the medium and longer-term through an effective policy and regulatory framework and, where needed, what type targeted support would be appropriate (2020).
- Convened a GGR monitoring, reporting and verification (MRV) Task and Finish Group to understand the current position on MRV for negative emissions, existing regulatory frameworks and standards, and the gaps that exist and work required to fill them (2021).
- Published a summary of responses to the Call for Evidence, which set out the government would take a portfolio approach to GGR deployment which enables the development and commercialisation of a mix a different technologies (2021).
- Commissioned a study from E4tech and Element Energy to explore policy mechanisms for First Of A Kind Direct Air Carbon Capture and Storage (DACCS) and other engineered Greenhouse Gas Removals (2022)
- Consulted on the preferred business models to incentivise early investment in GGRs, with consultations on both a technology neutral engineered GGR business model and a power BECCS specific model (2022).
- Delivered £100 million innovation funding, including through Phase 1 and Phase 2 of the Net Zero Innovation Portfolio Direct Air Capture (DAC) and GGR Programme. This programme was announced in 2020 and is due to complete in 2025.

2.11.9 Marine & Oceans

2.11.9.1 England

England has several legislation and policies in place to manage and protect the marine environment:

- **UK Marine and Coastal Access Act**[223] **(2009)**: makes provisions for the management of the marine environment, including providing for the designation of conservation zones.
- **Fisheries Act**[224] **(2020):** sets eight objectives, including a climate change objective, that provide the basis against which the UK Administrations will manage their fisheries.
- **Marine Policy Statement**[225] **(2011):** is the UK framework used to prepare marine plans and provides the basis for making decisions that affect the marine environment. The MPS's high-level objectives are to promote sustainable economic development, enable the UK's move towards a low-carbon economy, ensure a sustainable marine environment and to contribute to the societal benefits of the marine area.
- **UK Marine Strategy**[226] **(2019):** sets out a vision for UK waters to achieve clean, safe, healthy, biologically diverse and productive seas, which are used sustainably. The Strategy provides a legal framework, agreed with the Devolved Governments, for assessing and monitoring the status of UK seas and to put in place the measures needed to achieve Good Environmental Status (GES).

2.11.9.2 Northern Ireland Executive

The Department of Agriculture, Environment and Rural Affairs (DAERA) as the Marine Plan Authority (MPA) has a duty under the Marine and Coastal Access Act 2009 and the Marine Act Northern Ireland 2013, to prepare marine plans to cover the Northern Ireland inshore and offshore regions, which facilitate the sustainable development of Northern Ireland's marine area. The consultation on the draft Marine Plan[227] for Northern Ireland was launched April 2018. It set out the vision for a healthy marine area which is managed sustainably for the economic, environmental and social prosperity of present and future generations. The draft Marine Plan includes policies on climate change mitigation and will provide the framework for decision making for future use of the marine area, including for offshore renewable energy. With the public consultation responses published in April 2021, DAERA is now progressing towards adoption and publication of a Marine Plan for Northern Ireland.

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[223] UK Marine and Coastal Access Act
[224] Fisheries Act
[225] Marine Policy Statement
[226] UK Marine Strategy
[227] Northern Ireland: Marine Plan

In 2021, DAERA commenced the development of a blue carbon action plan that sets out how natural carbon stores in marine and coastal areas will be protected and restored.

2.11.9.3 Scottish Government

The Scottish Government has set out a new Blue Economy vision for the sustainable management of Scotland's seas, establishing long term outcomes to 2045 and including a dedicated climate outcome to support ecosystem health, improved livelihoods, economic prosperity, social inclusion and wellbeing. New actions to increase protection of the marine environment include; introducing fisheries management measures across the offshore Marine Protected Area (MPA) network by 2025, and to consult on the inshore MPA network during the current programme for Government. and introduction of a Scottish Wild Salmon Strategy. New evidence is also being delivered through the Scottish Blue Carbon Forum, building upon actions set out in the second Scottish Climate Change Adaptation Programme[228] to address Scotland's marine climate risks.

2.11.9.4 Welsh Government

The Welsh National Marine Plan[229] sets out the Welsh Government's long-term vision for Welsh seas that are clean, healthy, safe, productive and biologically diverse:

- Through an ecosystem approach, natural resources are sustainably managed and our seas are healthy and resilient, supporting a sustainable and thriving economy
- Through access to, understanding of and enjoyment of the marine environment and maritime cultural heritage, health and well-being are improving
- Through Blue Growth more jobs and wealth are being created and are helping coastal communities become more resilient, prosperous and equitable with a vibrant culture
- Through the responsible deployment of low carbon technologies, the Welsh marine area is making a strong contribution to energy security and climate change emissions targets

Welsh Government is taking a spatial approach to implementing the Marine Plan, developing planning guidance and tools to provide greater spatial direction and to balance supporting renewable energy with protecting the marine environment. Sector Locational Guidance for wave and tidal stream energy[230] were published in 2022 to help understand opportunities for future sector development. In 2024, Welsh Government consulted on potential Strategic Resource Areas[231] to identify and

[228] Scotland: Climate Ready Scotland: Climate Change Adaptation Programme 2019-24 (2019)
[229] Wales: National Marine Plan
[230] Wales: Locational Guidance for Wave and Tidal Stream Energy
[231] Wales: Strategic Resource Areas Consultation

safeguard key areas of resource for tidal stream energy. It is also working with stakeholders to develop planning guidance on opportunities for ecosystem enhancement and restoration.

2.11.9.5 Jersey

The Carbon Neutral Roadmap sets an ambition to promote Jersey as a centre of excellence for blue carbon sequestration. In 2022, research[232] into Jersey's resources was published that found that Jersey's seabed sequesters over 10,000 tonnes of carbon annually, the equivalent combined weight of the CO2 emissions produced by the Island's agriculture and waste management sectors. Further scientific studies are underway to better understand, protect and enhance blue carbon sequestration.

The Jersey Marine Spatial Plan[233] has been approved. This sets out how Jersey's territorial waters should be utilised and protected to ensure the correct balance of competing uses.

2.11.9.6 Guernsey

Guernsey is in the early stages of developing a marine spatial plan, with an aim for delivery by the end of 2025. It is intended that the plan will enable renewable energy developments and potential for nature, as well as managing other uses of the marine environment. As part of this work, a Blue Carbon report will be produced in the first half of 2025 which will establish the capacity of carbon storage and sequestration in Guernsey's waters. This will then be used to advise on the climate mitigation measures that can be undertaken within Guernsey's marine environment.

The Strategy for Nature[234], the islands national biodiversity strategy, sets out a framework to enable the long-term management of nature in Guernsey. The Strategy recognises the important role nature and nature-based solutions plays in mitigating the impacts of climate change and seeks to protect and restore habitats which play important roles in carbon sequestration and storage. It also seeks to maximise biodiversity and ensure its resilience to a changing climate.

2.11.9.7 Isle of Man

In 2019, the Isle of Man Programme for Achievement of Climate Targets (IMPACT) Report[235] was produced. Appendix 10C relates to blue carbon. The Phase 1 Action Plan Progress Report[236] details progress made against the Council of Ministers' Climate Action Plan Phase 1[237] over the period 1 April 2021-31 March 2022, including actions relating to blue carbon. As of 2022 10.8% of the Isle of Man's entire

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[232] Jersey: Blue Carbon Resources: An Assessment of Jersey's Territorial Seas
[233] Jersey: Marine Spatial Plan
[234] Guernsey: Strategy for Nature
[235] Isle of Man: Programme for Achievement of Climate Targets (IMPACT) Report
[236] Isle of Man: Phase One Action Plan Progress Report
[237] Isle of Man: Council of Ministers' Climate Change Action Plan Phase One

territorial sea and 51.8% of the inshore (0-3 nautical mile area) were protected.[238] Section 4 of the Isle of Man Climate Change Plan 2022-2027[239] sets out the Isle of Man's current, high level climate policies relating to the marine environment and fisheries sector, including a commitment to work with the fishing industry to continue to reduce the carbon footprint of trawling and dredging, increase the efficiency of fishing effort and cut fuel costs. The Manx Blue Carbon Project[240] began in 2022, working with Bangor and Swansea Universities, as well as with the UK National Oceanography Centre to research and map blue carbon stores in the Isle of Man territorial sea. The project aims to develop a comprehensive blue carbon management plan to maximise carbon sequestration and maintain and restore related biodiversity and wider ecosystem services.

2.11.9.8 Gibraltar

Under the Marine Strategy Framework Directive, Gibraltar updated the environmental assessment showing Good Environmental Status for British Gibraltar Territorial Waters (BGTW)[241]. In 2021 Gibraltar published an updated monitoring programme for BGTW. This programme is being implemented in collaboration with the University of Gibraltar. Gibraltar has legislated to increase the number of Marine Protected Areas and no-take zones, safeguarding the biodiversity and health of its waters. Gibraltar has also embarked on a project to increase biodiversity within the intertidal zone through the installation of vertipools on existing grey infrastructure.

2.11.10 Biodiversity and Adaptation

2.11.10.1 England

England has delivered the following strategies to support biodiversity and tackle adaptation:

- **Strategic Framework[242] (2023):** set the direction for the UK's integrated approach to international action on nature and climate through to 2030. Its three overarching priorities covered: keep 1.5C alive by halving global emissions; build resilience to current and future climate impacts and; halt and reverse biodiversity loss. The framework identifies six global challenges to the 2030 vision and the levers available to the UK to meet those challenges. It explains the UK's role and approach to international collaboration, drawing on our expertise, skills and leadership.

- **National Adaptation Plan (NAP)[243] (2023):** sets out plans to adapt to and mitigate the risks of a warming climate on the marine environment, including

[238] Isle of Man: Marine Nature Reserves
[239] Isle of Man: Climate Change Plan 2022-2027
[240] Isle of Man: Blue Carbon Project
[241] Gibraltar: Marine Strategy Framework Directive
[242] 2030 Strategic Framework for International Climate and Nature Action
[243] Third National Adaptation Plan

to protect, restore and create blue carbon habitats and manage the risks and opportunities to marine species, habitats, and fisheries.

- **Environmental Improvement Plan[244] (2023):** sets out the actions that must be taken to help restore nature, tackle environmental pollution, and increase prosperity. It states that Defra will lead a practical initiative to restore estuarine and coastal habitats (ReMeMaRe (Restoring Meadow, Marsh and Reef)), which will restore 15% of priority habitats along the English coast by 2043. Restored coastal wetlands such as saltmarsh and seagrass can sequester and store carbon.

2.11.10.2 Northern Ireland Executive

The Department of Agriculture, Environment and Rural Affairs (DAERA) has prepared the draft Northern Ireland Environmental Improvement Plan[245] (EIP). The EIP sets out Northern Ireland's environmental priorities for the decades ahead and will be the basis for a coherent and effective set of interventions that can deliver real improvements in the quality of the environment in Northern Ireland. The EIP will be published once it receives approval from the Northern Ireland Executive.

The draft EIP contains a commitment for DAERA to develop and publish a new Biodiversity Strategy[246] for Northern Ireland. In line with this commitment, DAERA, through a co-design process, has been leading on the development of a Nature Recovery Plan for Northern Ireland based on the 23 general targets revised and agreed at the UN's Convention on Biological Diversity (CBD) meeting in December 2022 (CoP15).

These targets cover the wide range of issues affecting biodiversity and, if adequately addressed, should go a long way to halt the loss of biodiversity or at least ensure many habitats and species are in a better ecological status. Target 3 of these is often viewed as the one that will have the biggest impact, if achieved. This seeks to ensure that by 2030 at least 30% of all terrestrial, inland water, and coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed.

The Nature Recovery Strategy will augment actions for promoting biodiversity in other major initiatives including the EIP and the Climate Action Plan. Once published the EIP and Nature Recovery Strategy will provide Northern Ireland commitments for environmental improvement to be included in the UK National Biodiversity Strategy and Action Plan.

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[244] Environmental Improvement Plan
[245] Northern Ireland: Environmental Improvement Plan
[246] Northern Ireland: Biodiversity Strategy

2.11.10.3 Scottish Government

The Scottish Government has committed to delivering improved and enduring benefits to the natural environment through the Environment Strategy for Scotland[247]. Sitting beneath this, the Scottish Biodiversity Strategy which has now been published[248] takes into account the new post-2020 global biodiversity framework and targets for the Convention on Biological Diversity's 2050 vision. The Scottish Biodiversity Programme[249] has been created to coordinate all activity on biodiversity including the development of a future strategic framework for biodiversity that compromises both terrestrial and marine aspects.

2.11.10.4 Welsh Government

The Nature Recovery Action Plan (2021-2022)[250] contains five themes for action:

- Maintaining and enhancing resilient ecological networks
- Increasing knowledge and knowledge transfer
- Realising new investment and funding
- Upskilling and capacity for delivery
- Mainstreaming, governance and reporting progress

Within the themes, five immediate priorities have been identified for further action:

- Aligning the responses to the climate emergency with the biodiversity crisis
- Addressing the post-EU exit funding gap for agri-environment measures
- Providing spatial direction for targeting action for biodiversity
- Improving the condition of the Protected Sites Network
- Exploring new and sustainable funding mechanisms for biodiversity action

2.11.10.5 Jersey

Priority is currently being given to protecting on-Island carbon sinks. This is being prioritised through the Island Plan[251] and our various natural area protection and enhancement programmes, such as the Jersey National Park, Ramsar sites, Biodiversity action plan, tree strategy and LEAF programme. The Climate Emergency Fund supports projects that directly address the biodiversity crisis, including those with a focus on species and habitat restoration and protection, biosecurity and the marine environment.

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247 Scotland: The Environment Strategy for Scotland: vision and outcomes
248 Scotland: Biodiversity Strategy
249 Scotland: Biodiversity Programme
250 Wales: Nature Recovery Action Plan
251 Jersey: Island Plan

2.11.10.6 Guernsey

In 2020, Guernsey's government published an updated Biodiversity Strategy, entitled the 'Strategy for Nature'. The Strategy for Nature sets a framework for Guernsey's government, the private sector and the community to strengthen Guernsey's response to the changes facing nature from climate change and other human made pressures. It encompasses mainstreaming biodiversity and horizon scanning for pressures on nature and increasing community awareness of nature including promoting its health and wellbeing benefits. In recognition of risks to biodiversity from climate change, the Strategy for Nature includes an objective to "Reduce pressures on nature and ensure the resilience of our natural capital and assets". This objective will be achieved by reducing threats and pressures on our natural environment and the introduction of targeted conservation action to support priority species and habitats.

Guernsey's government recognises the increased pressure of invasive non-native species (INNS) in light of changing climate, and also the detrimental impact of INNS on biodiversity and its resilience to the impacts of climate change. Guernsey's INNS Action Plan aims to reduce the introduction and establishment or invasive species through enhanced biosecurity and surveillance measures. The Action Plan also seeks to manage species already present, especially those which will become more invasive with the forecast changes in climate.

2.11.10.7 Isle of Man

Ratification of numerous international conventions relating to biodiversity has been extended to the Isle of Man.[252] The Biodiversity Strategy 2015 – 2025 is in effect[253]. The Isle of Man became the world's first entire island nation with Biosphere status in 2016.[254] In 2019, the Isle of Man Programme for Achievement of Climate Targets (IMPACT) Report[255] was produced. Appendix 10B relates to tree planting and habitat connectivity. The Phase 1 Action Plan Progress Report[256] details progress made against the Council of Ministers' Climate Action Plan Phase 1[257] over the period 1 April 2021-31 March 2022, including actions relating to biodiversity and adaptation. The Climate Change Act 2021[258] contains amendments to the Town and Country Planning Act 1999, setting out six policy areas – including "the maximisation of carbon sequestration, maintenance and restoration of ecosystems, and biodiversity net gain" to be incorporated into national planning policy by 1 January 2025.
Adaptation: See 'Chapter 3, section 3.11.2.7.

[252] Isle of Man: International Conventions
[253] Isle of Man: Biodiversity Strategy and Delivery Plan
[254] Isle of Man: Information sheet UNESCO Biosphere Isle of Man
[255] Isle of Man: Programme for Achievement of Climate Targets (IMPACT) Report
[256] Isle of Man: Phase One Action Plan Progress Report
[257] Isle of Man: Council of Ministers' Climate Change Action Plan Phase One
[258] Isle of Man: Climate Change Act 2021

2.11.10.8 Gibraltar

One of the main climate impacts that will be felt in Gibraltar is increased heat, with a forecast sharp increase in the number of hot days in a given year. Investing in the creation of new green areas within the city centre, such as the conversion of a concrete parking lot into Commonwealth Park[259] in 2014 is helping to combat the heat island effect whilst simultaneously providing new habitats and potential for increased biodiversity.

Gibraltar will also embark on an ambitious rewilding programme in the next 5 years. Notable species that will form part of the enhanced rewilding programme include, but are not limited to Lesser Kestrel *Falco naumanni* (recently extinct as a nesting bird), Little Owl *Athene noctua* and the Ocellated Lizard (*Timon Lepidus*). The programme to artificially propagate and re-populate the endemic Gibraltar Campion (*Silene tomentosa*) will be expanded with a new propagation facility created at Tovey Cottage Field Centre in addition to the Gibraltar Botanic Gardens. Other regionally important species will also be propagated and planted as part of a wider and ambitious habitat restoration programme within and outside the Gibraltar Nature Reserve.

2.11.11 Education & Skills

2.11.11.1 England

The education sector in the UK will play a critical role in positively responding to climate change and inspiring action on an international stage. The Department for Education is helping to create a sustainable future through education, developing the skills needed for a green economy, and supporting our sectors to reach net zero targets.

- **Strategy for Sustainability and Climate Change**[260] **(2022):** The Department's strategy for Sustainability and Climate Change was informed by stakeholders and young people and sets out action to 2030 on: 1) climate education; 2) green skills and careers; 3) the education estate and digital infrastructure; 4) operations and supply chains; and 5) international. The Strategy sets out initiatives including extra support for teaching about nature and climate change, a National Education Nature Park, Climate Action Award and support for education leaders to take a whole-setting approach to climate change.

- **Green apprenticeships**: Apprenticeships in England are a core part of the government's skills agenda, helping grow the economy by improving the skills pipeline. Apprenticeships give employees high-quality, hands-on training to start and progress in work. There are over 680 occupations with corresponding apprenticeships, from entry-level to expert. The Institute for

[259] Gibraltar: Commonwealth Park
[260] Sustainability and Climate Change Strategy

Apprenticeships and Technical Education (IfATE) has worked with employers to identify over 200 occupations which directly support the green economy.

- **Green Jobs delivery group**: The Green Jobs Delivery Group was the central forum for driving forwards action on green jobs and skills across government and industry. Led by ministers and business leaders, it worked to ensure workers were supported with the transition to a green economy. Through a series of deep dives, the Green Jobs Delivery Group was identifying occupations to target key skills programmes towards green sectors and occupations.

- **Climate literacy across government**: More generally, there now exists a training offer available to all civil servants, expanded training for Fast Streamers, and embedded climate and environment objectives within the cross-cutting policy objectives and responsibilities in the Civil Service policy profession standards.

2.11.11.2 Northern Ireland Executive

The Department for the Economy (DfE) published the Northern Ireland Executive's energy strategy 'The Path to Net Zero Energy[261]' December 2021, which set out the roadmap to 2030 aiming to deliver a 56% reduction in energy-related emissions, while on the pathway to net zero by 2050. To drive the strategy forward DfE will publish annual Energy Strategy Action Plans, the first of which was published January 2022[262] and set out a range of new initiatives such as a hydrogen centre of excellence and an energy skills audit leading to a Green Skills Action plan.

The Department of Agriculture, Environment and Rural Affairs (DAERA) have been leading on the development of the Northern Ireland Executive's Green Growth Strategy. The Strategy is the Northern Ireland Executive's multi-decade strategy, balancing climate, environment and the economy in Northern Ireland. After extensive engagement with organisations and individuals, the draft Green Growth strategy consultation opened in October 2021[263], with the department hosting online public consultation sessions. Responses to the consultation have been analysed and, alongside the Climate Change Act (Northern Ireland) 2022, will inform the update of the strategy.

Skill Up is a flexible skills programme that offers a range of free training opportunities to support upskilling and reskilling, which was launched in August 2021. Funding was initially announced by DfE and the Northern Ireland Office (NIO) for a 3-year period, to deliver up to 10,000 training places per year in accredited qualifications.

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[261] Northern Ireland: Energy Strategy Path to Net Zero Energy
[262] Northern Ireland: Energy Strategy Action Plan
[263] Northern Ireland: Consultation on Green Growth Strategy

2.11.11.3 Scottish Government

Scotland's National Strategy for Economic Transformation[264] sets out the priorities for Scotland's economy and shows that a skilled population is fundamental to business productivity and economic prosperity. In addition, Scotland's Purpose and Principles[265] sets out the framework for decision making for post-school education, skills and research to ensure that the system is fit for the future, delivering the best outcomes for learners, employers and public investment.

Significant work is progressing to reform the Scottish education and skills system so that it is more responsive to our economic, social, and environmental needs and ambitions, and the Scottish Government will continue to invest in that system and the infrastructure that supports it, including for example, schools, colleges, universities, apprenticeships and our Innovation Centres, to enable the transition to net zero.

The Scottish Government's Climate Emergency Skills Action Plan[266] (2020-2025) provided an initial framework and springboard for skills planning, development and investment across sectors of the economy known to be crucial to achieving net zero. Scotland continues to build on these strong foundations for example, through the Green Industrial Strategy[267] identifies areas of strength and opportunity for Scotland to grow globally competitive industries in the transition to net zero and outlines what government and partners will do to support stakeholders to create an enabling environment for investment and growth.In addition, Scotland's Curriculum for Excellence incorporates an emphasis on the cross-cutting theme of Learning for Sustainability – a term that brings together sustainable development education, global citizenship and outdoor learning. A refreshed and strengthened Learning for Sustainability Action Plan was published in 2023 setting a vision (Target 2030) that by the end of this decade all 3-18 education settings will be sustainable education settings.

2.11.11.4 Welsh Government

The Curriculum for Wales, which commenced roll-out in 2022, represents the biggest change to what and how learners learn in Wales since devolution. This transformational new approach has been built by teachers and experts to prepare our learners for a changing world. One of its four purposes is to develop our young people as ethical, informed citizens, ready to be active citizens of Wales and the world, with building understanding of climate change and sustainability mandatory.

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[264] Scotland: National Strategy for Economic Transformation
[265] Scotland: Purpose and Principles
[266] Scotland: Climate Emergency Skills Action Plan
[267] Scotland: Green Industrial Strategy

In Wales, 90% of schools across every local authority take part in the Eco-Schools programme.[268] This equates to more than 400,000 pupils – one of the highest participation rates in the world.

The Welsh Government funds 100% of training costs for apprentices of any age with businesses of any size. Recipients follow an approved Welsh Apprenticeship Framework such as Energy, Engineering or Construction and must be working in Wales for 51% or more of their time. There is an employer incentive to recruit disabled apprentices as well as Supported Shared Apprenticeships.

Green Personal Learning Accounts provide adults in employment in Wales with a fully funded option to study part-time at an Further Education (FE) college/with a training provider partner to up- and re-skill for the green economy including in energy, construction, engineering and manufacturing. Courses approved under this scheme are determined by an expert panel including employers to ensure a targeted approach to meeting industry demand for skills.

The Welsh Government has operated a Flexible Skills Programme (FSP) since 2016. The FSP is a training grant, available to all employers in Wales, that wish to purchase training courses to meet upskilling objectives and potentially create and fill more green jobs. The Welsh Government will contribute 50% towards the training costs. It includes specific programmes to support skills gaps in the Engineering and Manufacturing Sector as well as the development of skills to help address Net Zero challenges such as hydrogen, amongst other areas.

The Welsh Government's Net Zero Skills Action Plan (2021)[269] prioritises seven key areas of action for delivering the Welsh Government's vision for a fairer, greener and stronger Wales:

- Gain an understanding of the current skills position for each emission sector
- Build a shared understanding of net zero skills across Wales
- Grow a skilled workforce to meet our net zero commitments
- Strengthen the skills system
- Promote opportunities for early years and young people to realise their potential
- Cross-government and partnership approach to meet our skills commitment
- Just transition

2.11.11.5 Jersey

A Future Economy[270] work programme has set out actions to develop a more resilient supply chain and increase skills on island. This includes the green skills necessary to decarbonise and ensure a just transition.

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[268] Wales: Eco-Schools programme
[269] Wales: Net Zero Action Plan
[270] Jersey: Future Economy Work Programme

At COP26, the government pledged to put children first in our net zero transition. Improving climate education is vital to tackle the climate emergency. A full-time officer has been employed to improve climate education across the curriculum.

2.11.11.6 Guernsey

As part of the Key Stages 1, 2 and 3 of education in Guernsey, raising awareness and learning about climate change, energy efficiency and sustainability are included in the Bailiwick of Guernsey Curriculum, published in 2017, used in Guernsey and Alderney government-maintained schools. This is achieved through subjects such as Geography and Science. Coverage is broad, focusing on, for instance: teaching and understanding how the world's climate is changing, there being various ways to address climate change, and of the potential impacts of climate change; how sustainability is doing things in a way that ensures resources needed are not damaged or wasted and are used wisely; and about the production of carbon dioxide by human activity, the impact on the climate and greenhouse gases in the atmosphere; as well as renewable and non-renewable energy.

2.11.11.7 Isle of Man

In 2019, the Isle of Man Programme for Achievement of Climate Targets (IMPACT) Report[271] was produced. Appendix 9 relates to climate in the Manx curriculum. Legal requirements for new buildings to achieve a minimum SAP rating[272] commenced in 2020. Between 1 January 2021 and 31 December 2023 the minimum requirement was equivalent to a 'B' Energy Performance Certificate (EPC) rating in the UK, rising to the equivalent of an 'A' rating in January 2024. The Phase 1 Action Plan Progress Report[273] details progress made against the Council of Ministers' Climate Action Plan Phase 1[274] over the period 1 April 2021-31 March 2022, including actions relating to education and skills. The Isle of Man Retrofit and Low Carbon Skills Analysis[275] was produced in 2022. Section 2 of the Isle of Man Climate Change Plan 2022-2027[276] includes a commitment to upskill the construction industry in low carbon heating technologies. In schools, training with Eco Schools[277] has led to 5 schools achieving Green Flag status along with the continued roll-out of Global Teacher Training.[278]

2.11.11.8 Gibraltar

Gibraltar has long had an environmental education programme, carried out collaboratively between the Department of Education and the Department of the Environment & Climate Change. This has evolved to meet the changing priorities of

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[271] Isle of Man: Programme for Achievement of Climate Targets (IMPACT) Report
[272] Isle of Man: Building Control (Approved Documents) Order 2020
[273] Isle of Man: Phase One Action Plan Progress Report
[274] Isle of Man: Council of Ministers' Climate Change Action Plan Phase 1
[275] Isle of Man: Retrofit and Low Carbon Skills Analysis
[276] Isle of Man: Climate Change Plan 2022-2027
[277] Isle of Man: Eco Schools
[278] Isle of Man: Global Teacher Training

the education sector with a greater focus on outdoor and project based learning, with a strong environmental angle. In December 2022 Gibraltar published a Bill to amend its Education & Training Act[279] to ensure a commitment to making learning about the environment and climate justice is a fundamental principle of education policy. This revision will also bring to bear a number of commitments which will support the prioritisation of climate emergency related workstreams including a bespoke climate change curriculum framework for sustainable schools, developing climate change INSET training for educational staff and revised career advice which includes a focus on green jobs.

2.11.12 Sustainability and Behaviour Change

2.11.12.1 England

The UK is working to deliver the benefits of the net zero transition to our health, our homes and our overall prosperity. Our priority is making green choices easier, clearer and more affordable, and working with industry to remove barriers. There are numerous individual actions – some one-off and some frequent – that people can take to contribute to net zero. Choices and behaviours that impact on net zero broadly fall into three categories: adopting new low carbon technologies; using energy, technologies, or services more efficiently; and everyday business and consumer choices.

In England, there are the following strategies in place to tackle sustainability and behaviour change:

- **National Food Strategy[280] (2022**): The Strategy responded to Henry Dimbleby's independent review of the food system and set out a set of objectives to deliver "a prosperous agri-food sector". These led to, for example, the commissioning of a review into labour shortages, establishing the Food Data Transparency Partnership, and consulting on the government Buying Standards for Food and Catering Services.

- **Heat and Buildings Strategy (2021):** The Strategy set out government's overall approach to decarbonising heating, through increasing the roll out of clean heat technologies as well as the installation of energy efficiency measures. Heat pumps and heat networks were the major clean heat technologies, whilst also leaving flexibility for potential roll out of hydrogen. The strategy combined regulations to give industry certainty of technology transitions, as well as subsidies to support consumers to upgrade. These measures together built a credible path for the UK to meet its carbon budget sector effort shares for buildings.

[279] Gibraltar: Education & Training Act
[280] Government Food Strategy

2.11.12.2 Northern Ireland Executive

The Department for the Economy (DfE) have worked in collaboration across both the public and private sector, working with a cross-departmental steering group and a Circular Economy Coalition (an advisory panel established in 2021) to drive forward progress on the Circular Economy strategy. The Circularity Gap Report Northern Ireland, commissioned by DfE, was published in June 2022 and provided a snapshot of how circular Northern Ireland currently is. The report[281] informed much of the evidence base underpinning the development of the draft Circular Economy Strategy for Northern Ireland, which is due to be published in January 2023.

2.11.12.3 Scottish Government

In May 2022 we launched two linked consultations, on a Circular Economy Bill and on a Circular Economy & Waste Route Map. The Bill establishes the legislative framework to support Scotland's transition to a zero waste and circular economy, significantly increase reuse and recycling rates, and modernise and improve waste and recycling services. It is complemented by the Circular Economy & Waste Route Map, which sets out clear actions we need to take to progress a circular economy in Scotland by 2030. Together, they will help us achieve our sustainable resource and climate goals.

Scotland was also the first nation of the UK to implement a ban on many of the most problematic single-use plastics, with legislation coming into force in June 2022.

2.11.12.4 Welsh Government

Climate Action Wales[282] provides information and advice in relation to the following areas:

- **Green Home Energy Choices**: Reducing energy consumption, Home upgrade choices
- **Green Transport Choices**: Driving less; taking up active travel and public transport, Electric vehicle adoption
- **Green Food Choices**: Reducing food waste, Healthier eating and sustainable food choices.
- **Green Consumption Choices**: Shopping sustainably, using less, reusing, repairing and recycling.

The Welsh Government has updated building regulations to achieve a 37% reduction in carbon emissions for new dwellings.[283] It intends to make further changes in 2025, raising the bar to require new homes to achieve at least a 75% reduction in emissions.

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[281] Northern Ireland: Circularity Gap Report
[282] Wales: Climate Action Wales
[283] Wales: Building regulations guidance

The Welsh Housing Quality Standard exists to improve the quality of social homes.[284] Social landlords are legally obliged to meet the Standard's requirements, including those relating to energy performance and environmental impact.

2.11.12.5 Jersey

Jersey's Carbon Neutral Roadmap[285] makes a commitment to behavioural change campaigns to consider and reduce all emissions associated with Islanders' lives. Jersey-specific carbon literacy training has been developed. Officers have worked with internal colleagues, external stakeholder through the eco active business network and Ministers. As an organisation the government of Jersey has the responsibility to set an example on decarbonisation and has set itself ambitious decarbonisation targets with a focus on the government estate and fleet.

2.11.12.6 Guernsey

Guernsey's governmental strategy for transport has a focus on behavioural change with encouraging active travel as an alternative to vehicles forming a key part of the strategy. The island has a walking and cycling app to help navigate around the islands' quiet lanes and Guernsey's government has offered subsidies on electric bikes.

The island's energy policy outlines the importance of energy efficiency measures in reducing energy related emissions and the climate change policy reaffirmed the hierarchical approaches to waste management, energy use and transport. This requires behavioural change to preserve resources and reduce emissions.

2.11.12.7 Isle of Man

The Isle of Man became the world's first entire island nation with Biosphere status in 2016.[286] The Climate Change Act 2021[287] includes duties for Manx public bodies, which create a statutory requirement to support sustainable development and the UN Sustainable Development goals. Each of the actions in the Isle of Man Climate Change Plan 2022-2027[288] is linked to one or more UN Sustainable Development Goals, and the Act requires annual progress reports to include reporting on progress toward those goals.

Section C of the Isle of Man Climate Change Plan 2022-2027 sets out how the Isle of Man Government intends to 'lead by example' in relation to climate action, this includes commitments for climate change training across the public sector and a government-wide policy review to ensure that existing practices do not restrict our ability to meet our climate goals. Section 2 of the Isle of Man Climate Change Plan

[284] Wales: Housing Quality Standards
[285] Jersey: Carbon Neutral Roadmap
[286] Isle of Man: Information sheet UNESCO Biosphere Isle of Man
[287] Isle of Man: Climate Change Act 2021
[288] Isle of Man: Climate Change Plan 2022-2027

2022-2027 includes a commitment to a public engagement campaign promoting energy efficiency (completed in 2023[289]).

2.11.12.8 Gibraltar

Gibraltar has established a field centre in the Gibraltar Nature Reserve[290] which is serving to foster a better understanding and appreciation of local biodiversity among our young people. Tovey Cottage welcomes over 600 young people each year. Gibraltar has embarked on a process of developing Carbon Literacy training for the public sector, in collaboration with the UK Carbon Literacy Project which will help individuals to understand the carbon cost of their everyday actions and ways in which they can reduce their carbon footprint. This will result in a public sector that is engaged with the climate crisis and empowered to deliver the changes needed.

Gibraltar is also committed to organising citizen's assemblies on climate and nature to help raise further awareness and understanding and drive the behavioural changes needed at a societal level.

2.11.13 Health & Air

2.11.13.1 England

Air pollution is the biggest environmental threat to human health. Its impacts are disproportionately felt by low-income communities, exacerbating health and social inequalities. Sources that contribute to air pollution are varied; significant sources are transport, industrial processes, agriculture and home heating – specifically household burning of solid fuels. Some actions that reduce carbon also have benefits for air quality, but this is not the case for all measures, for example biomass combustion, which can have a negative impact on air quality. Government has taken action across a range of sectors.

- **The Environment Act (2021)**[291]: required two targets for fine particulate matter (PM2.5) to be set in regulation. The regulations[292] established targets for both a maximum annual mean concentration of 10 µg m-3 by 2040 and a population exposure reduction target of 35% by 2040 compared to 2018. The dual-target approach will improve public health by tackling the highest concentrations while ensuring all areas benefit from continuous improvement. It also introduced changes to the Local Air Quality Management framework[293] and improvements to the enforcement of smoke control areas[294] which limit emissions from the burning of solid fuels in homes on appliances such as stoves and fireplaces.

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289 Small Change Big Difference
290 Gibraltar: Tovey Cottage Natural History Field Centre
291 The Environment Act
292 The Environmental Targets (Fine Particulate Matter) Regulations
293 Local Air Quality Management framework
294 Smoke control area enforcement by local authorities in England

- **The UK plan for tackling roadside nitrogen dioxide (NO2) concentrations (2017)**[295]: legally obliged local authorities to reduce their NO_2 exceedances in the shortest possible time. Four cities, Bath, Birmingham, Bradford and Portsmouth implemented Clean Air Zones amongst other measures in accordance with local plans.
- **The Air Quality Information Systems Review (2021)**[296]**:** established to undertake a comprehensive review of how Government communicates air quality information to ensure members of the public, and vulnerable groups in particular, have what they need protect themselves and understand their impact on air quality.
- **Government's response to the consultation** on reducing ammonia emissions from solid urea fertilisers **(2022)**[297]: The response indicated support for an industry-led approach that was subsequently delivered through Red Tractor farm assurance standard[298] and farm advisors.

The UK Government, the Scottish Government, the Welsh Government, and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland put in place a new regime for the development of 'Best Available Techniques'[299] across the UK. The BAT approach ensures standards are enhanced over time by defining the techniques and technologies already in use which are the best for preventing or minimising emissions and impacts on the environment from industrial installations – this is then reflected in operator's permits.

2.11.13.2 Northern Ireland Executive

In November 2020, the Department of Agriculture, Environment and Rural Affairs (DAERA) launched a consultation on a Discussion Document on a Clean Air Strategy for Northern Ireland[300]'. In June 2022, the synopsis[301] of that consultation was published by DAERA. Work is now ongoing to develop Northern Ireland's first Clean Air Strategy taking into account the consultation responses.

2.11.13.3 Scottish Government

The Scottish Government published its Cleaner Air for Scotland strategy[302] in 2015 setting out a series of actions for improving air quality across a wide range of policy areas. Following an independent review of the strategy in 2019[303], which made recommendations for additional action on air pollution, a new strategy - Cleaner Air for Scotland 2: Towards a Better Place for Everyone - was published in July

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295 The UK plan for tackling roadside nitrogen dioxide (NO2) concentrations
296 The Air Quality Information Systems Review
297 Consultation on reducing ammonia emissions from solid urea fertilisers
298 Red Tractor farm assurance standard
299 Regime for the development of 'Best Available Techniques'
300 Northern Ireland: consultation on a Discussion Document on a Clean Air Strategy
301 Northern Ireland: Clean Air Strategy for Northern Ireland - A Public Discussion Document
302 Scotland: Cleaner air for Scotland: the road to a healthier future (2015)
303 Scotland: Cleaner Air for Scotland strategy: independent review (2019)

2021[304]. This sets out Scotland's air quality policy framework for the period 2021 to 2026 with a continued focus on delivery of co-benefits for air pollutant and greenhouse gas reductions.

2.11.13.4Welsh Government

The aim of the Clean Air Plan for Wales: Healthy Air, Healthy Wales (2020) is to improve air quality and reduce the impacts of air pollution on human health, biodiversity, the natural environment and the economy.[305] The Plan sets out a 10-year pathway to achieving cleaner air is structured around four core themes:

- **People**: Protecting the health and well-being of current and future generations
- **Environment**: Taking action to support our natural environment, ecosystems and biodiversity
- **Prosperity**: Working with industry to reduce emissions, supporting a cleaner and more prosperous Wales
- **Place**: Creating sustainable places through better planning, infrastructure and transport

2.11.13.5 Jersey

A long-term vision for Jersey was produced in 2017 through the 'Island Outcome Indicators'[306]. This vision includes clean air within its statement.

Jersey government are currently improving and relocating our air quality reference analysers (NOx, and Particulate Matter) to support our wider air quality monitoring programme and improve our ability to report data to Automatic Urban and Rural Network (AURN) standards. Jersey is developing sensor networks in partnership with external stakeholders with the aim of providing near real-time air quality data to inform the public, influence behaviour and support sustainability workstreams.

2.11.13.6 Guernsey

In 2019, the Environmental Pollution (Air Pollution) Ordinance[307] was enacted in Guernsey. This Ordinance sets local ambient air quality standards and allows greater environmental regulation of point source emitters including, but not limited to, through licensing prescribed operations, placing limits on the sulphur content of fuels and restricting burning in the open air. The limitations on burning in the open air has benefits form a climate perspective.

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[304] Scotland: Cleaner Air for Scotland 2 - Towards a Better Place for Everyone
[305] Wales: Clean Air Plan for Wales: Healthy Air, Healthy Wales
[306] Jersey: Island Outcome Indicators
[307] Guernsey: Environmental Pollution (Air Pollution) Ordinance

2.11.13.7 Isle of Man

Actions to reduce use of fossil fuels, such as the ban on fossil fuel heating systems in new buildings, created by the Climate Change Act 2021[308] and commencing 1 January 2025, will help to improve air quality. Other health concerns related to climate change are primarily linked with adaptation. Section A of the Isle of Man Climate Change Plan 2022-2027[309] sets out actions relating to adaptation and resilience, including commitment to a Climate Change Risks and Opportunities Report for the Island, which is currently being prepared and will include risks to health.

Air quality monitoring has been increased to include NO2 and SO2 at over 60 sites around the Island, with data published monthly.[310]

2.11.13.8 Gibraltar

Gibraltar has a well-established air quality monitoring network in place and results demonstrate a steady improvement in local air quality since the network started monitoring in 2005.[311]

The switch from diesel to natural gas for the generation of electricity marked a significant improvement in levels of nitrogen dioxide and particulate matter. Efforts are now focused on reducing emissions from transport and construction.

2.12 Information on how actions, policies and measures are modifying longer-term trends in GHG emissions and removals.

To avoid duplication, please refer to the information presented in the National Inventory Report, published on UNFCCC, under each sector for the estimated impact of actions, policies, and measures.

2.13 Information on the assessment of economic and social impacts of response measures

The government regularly assesses the impact of existing and planned policies against its emission targets, including the NDC and Carbon Budgets. The annual Energy and Emissions Projections (EEP) take account of any policies that, as of June that year, have either been implemented or those that are planned where the level of funding has been agreed and the policy design is near final.

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[308] Isle of Man: Climate Change Act 2021
[309] Isle of Man: Climate Change Plan 2022-2027
[310] Isle of Man: Air Quality Monitoring
[311] Gibraltar: Air Quality in Gibraltar

Under section 10 of the Climate Change Act 2008, the UK government must take account of economic and social circumstances when making decisions in relation to carbon budgets. In particular, section 10 of the Act requires an appraisal of the likely impact of policies on fuel poverty, the economy, and "the competitiveness of particular sectors of the economy."

This information is gathered by officials and presented to the DESNZ Secretary of State on a regular basis. A summary of the economic and social impact of the policy package is also published in reports following the setting of a carbon budgets. The most recent assessment was published in the previous UK government's 2023 Carbon Budget Delivery Plan.[312]

2.14 Summary of greenhouse gas emissions and removals

Please refer to the accompanying CTF tables submitted alongside the Biennial Transparency Report.

2.15 Projections of greenhouse gas emissions and removals as applicable

This section presents information from the most recent full update to the UK's GHG Energy and Emissions Projections (EEP) 2023 -2050, published in December 2024[313]. It includes estimates of future energy demand and GHGs in the UK up to 2050, and within this section we focus on projections up to 2040.

The UK's national projections are based on a "With Additional Measures" (WAM) scenario. This takes into account policies that, as of June 2024 have either been implemented or are planned and the level of funding has been agreed and the design of the policy is near final. These projections do not present the UK's full package of policies, as they do not include policies that have only been announced, or are in early development or being planned by the current government. They therefore are not an assessment of the UK's delivery position against carbon budgets or the NDC. The projections are the baseline against which new early-stage policies and proposals are assessed to monitor progress towards carbon budget targets.

For international reporting, the projections presented in this Biennial Transparency Report used the "With Existing Measures" (WEM) policy scenario, which excludes policies that were classed as planned at the cut-off date of June 2024. Projections in this section are for the "With Existing Measures" (WEM) scenario, unless otherwise stated.

The projection models incorporate information from the UK's 1990-2022 GHG Inventory publication (published in 2022), and the historic statistics presented earlier this chapter are on the same basis.

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[312] Carbon Budget Delivery Plan
[313] EEP 2023-2050

Key findings show that:

- Based on the WEM scenario, the projections show that by 2030, UK emissions of the basket of the 7 greenhouse gases (GHGs) covered by the Paris Agreement would be expected to be 335 $MtCO_2e$, approximately 479 $MtCO_2e$ below the 1990 level (59% lower); and by 2040, the projections show equivalent figures of 505 $MtCO_2e$ and 62% lower than 1990. These projections are not an assessment of the delivery position against carbon budgets: as policies and measures at an earlier stage of development are developed and implemented, the resulting emissions savings will be factored into future projections.

- The UK projects emissions of CO_2, CH_4 and N_2O of 61%, 66% and 60% respectively below 1990 levels by 2040.

- For the fluorinated GHGs, the UK projects that emissions of HFCs will be 74% lower than their 1990 levels by 2040. For PFCs, the UK projects emissions will be 90% lower, for SF6 95% lower; and for NF3 emissions will be 42% lower than their 1990 levels by 2040.

The UK is committed to meeting its 2030 NDC target and will publish more detailed plans on delivery in due course, outlining the policies and proposals it has in place to meet the 2030 and 2035 NDCs and carbon budgets up to 2037. The plan will include consideration of delivery risks and mitigations. The publication will also provide indicative implementation dates for policies and proposals; however these dates may change as proposals and policies develop over the coming years. When developing policies and proposals, the government considers alternative pathways and policy levers to meet its carbon targets.

2.15.1 “with measures” projection of all GHG emissions and removals and “with additional measures” projection and “without measures” projection

The “with existing measures” (WEM) scenario includes policies that had been implemented or adopted by June 2024 but excludes planned measures. In addition, the UK provides selected data from the "with additional measures" (WAM) scenario, which includes planned measures as at the same policy cut-off date. Both projection scenarios exclude the use of credits from flexible mechanisms such as the Joint Implementation and Clean Development Mechanism (CDM). The UK does not produce a without measures (WOM) scenario. Many mitigation measures were already in place when emissions projections were first produced by the UK, and there are certain policies and measures (PaMs), such as Emissions Trading Schemes (ETS), for which no past counterfactual scenario can be reliably modelled. Currently, it is not feasible to remove all these effects to produce a robust WOM projection. However, we are exploring options that might allow us to produce a scenario that removes those policies where we can model a suitable WOM counterfactual. We will implement this and incorporate it into future submissions as soon as we have identified a suitable methodology.

The figures within this National Communication include British Crown Dependencies and Overseas Territories. These territories are excluded from UK Carbon Budget’s

legislation and do not appear in the EEP report. According to the UK's 1990-2022 GHG Inventory, these regions were responsible for 0.4% of total emissions in 2022. Throughout this section, the geographical scope of the presented figures includes the UK and its Crown Dependencies and Overseas Territories as denoted by the label '(UNFCCC coverage)' unless otherwise specified.

Under the WEM scenario, the UK projects GHG emissions to be around 479 $MtCO_2e$ below the 1990 level (59% lower) by 2030, and roughly 505 $MtCO_2e$ lower by 2040. All projections include emissions from Land Use, Land Use Change and Forestry (LULUCF), for consistency with Inventory Convention reporting, although the percentages are very similar if it is excluded[314].

Tables 5 and 6 show overall projections for each gas under WEM and WAM scenarios respectively. This shows that additional planned policies as of June 2024 are expected to mainly affect CO_2 emissions, reducing them by 12 Mt more in the year 2040 than in the equivalent projection under the WEM scenario.

Table 5: GHG emissions by gas for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
Carbon dioxide	606	568	506	320	260	237
Methane	150	124	75	58	53	51
Nitrous oxide	44	26	20	19	18	18
Hydrofluorocarbons	12	6	11	8	4	3
Perfluorocarbons	1	1	0	0	0	0
Sulphur hexafluoride	1	2	1	0	0	0
Nitrogen trifluoride	0	0	0	0	0	0
Total	815	727	614	406	335	309
Memo Items						
Marine Bunkers	9	8	12	9	13	15
Aviation bunkers	16	30	32	15	35	35

Table 6: GHG emissions by gas for WAM scenario, MtCO2e

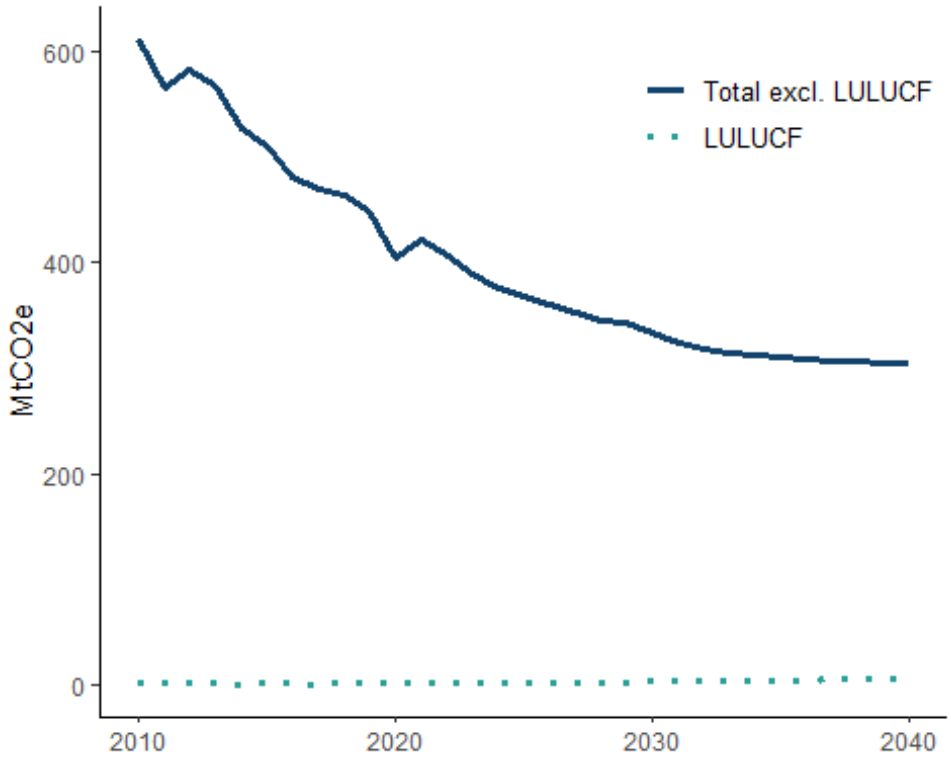
	1990	2000	2010	2020	2030	2040
Carbon dioxide	606	568	506	320	253	225
Methane	150	124	75	58	53	51
Nitrous oxide	44	26	20	19	18	18

[314] Reporting LULUCF emissions in full means the scope is wider than that under Articles 3.3 and 3.4 of the Kyoto Protocol and includes estimates for all anthropogenic sources minus sinks.

	1990	2000	2010	2020	2030	2040
Hydrofluorocarbons	12	6	11	8	4	3
Perfluorocarbons	1	1	0	0	0	0
Sulphur hexafluoride	1	2	1	0	0	0
Nitrogen trifluoride	0	0	0	0	0	0
Total	815	727	614	406	328	298
Memo Items						
Marine Bunkers	9	8	12	9	13	15
Aviation bunkers	16	30	32	15	35	35

2.15.2 Projected progress across territorial emissions

Figure 17: Projected UK territorial emissions for WEM scenario, MtCO2e



With the existing policies and measures in place, emissions from the energy sector are projected to decrease by 26% between 2022 and 2040 and total emissions (excluding LULUCF) are projected to fall by 25% between 2022 and 2040.

Tables 7 and 8 show the main impact of additional planned policies. There are some power sector interventions which are classed as Planned, and hence are included in the WAM scenario but not WEM.

2.15.3 Projected progress: showing WEM and WAM

Table 7: Projected progress total territorial emissions for WEM scenario, MtCO2e

	2010	2020	2030	2040
Total excl. LULUCF	613	405	333	304
LULUCF	1	1	2	5
Total	614	406	335	309

Table 8: Projected progress total territorial emissions for WAM scenario, MtCO2e

	2010	2020	2030	2040
Total excl. LULUCF	613	405	326	293
LULUCF	1	1	2	5
Total	614	406	328	298

2.15.4 Projections by sector

Table 9 shows the UK's projection of the distribution of GHG emissions across sectors of the UK economy.

Table 9: GHG emissions by sector for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
1. Energy	601	552	497	312	258	236
…Of which: A3. Transport	123	130	123	98	90	56
…Of which: Non-transport	478	422	374	214	169	179
2. Industrial Processes	80	53	40	31	17	12
3. Agriculture	50	48	43	42	40	40
4. LULUCF	11	6	1	1	2	5
5. Waste	72	68	32	19	17	17
Total	815	727	614	406	335	309

2.15.4.1 Energy

This sector includes all emissions which fall under IPCC code 1. Within tables, we break this down into transport (1A3) and energy excluding 1A3. This sector includes emissions from electricity and heat production, manufacturing industries and construction (such as chemicals, iron and steel, non-ferrous metals), commercial and

residential sectors. The UK projects energy emissions (excluding transport) of 65% lower than 1990 levels by 2030 and 62% lower by 2040 (see **Table 10**).

Table 10: Energy (excluding transport) emissions by gas for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
Carbon dioxide	436	400	362	207	162	174
Methane	40	20	11	7	5	5
Nitrous oxide	2	1	1	1	1	1
Total	478	422	374	214	169	179

2.15.4.2 Transport

Table 11 gives projections for transport emissions of around 27% lower than 1990 levels by 2030 and 54% lower by 2040. This is mainly driven by the implementation of the Vehicle Emissions Trading Schemes (VETS) Order 2023, commonly known as the ZEV Mandate, which came into force in Great Britain in January 2024.

Table 11: Transport emissions by gas for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
Carbon dioxide	121	128	122	97	89	56
Methane	1	1	0	0	0	0
Nitrous oxide	1	1	1	1	1	1
Total	123	130	123	98	90	56

2.15.4.3 Industrial processes

Table 12 indicates the emissions from industrial processes are projected to fall 79% below 1990 levels by 2030 and 85% below 1990 levels by 2040.

Table 12: Industrial processes emissions by gas for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
Carbon dioxide	43	39	27	21	11	8
Methane	0	0	0	0	0	0
Nitrous oxide	22	5	2	1	1	1
Hydrofluorocarbons	12	6	11	8	4	3

	1990	2000	2010	2020	2030	2040
Perfluorocarbons	1	1	0	0	0	0
Sulphur hexafluoride	1	2	1	0	0	0
Nitrogen trifluoride	0	0	0	0	0	0
Total	80	53	40	31	17	12

2.15.4.4 Agriculture

These projections show emissions from the agriculture sector remaining constant between 2030 and 2040. Table 5.1.9 illustrates this.

Table 13: Agriculture emissions by gas for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
Carbon dioxide	1	1	2	1	1	1
Methane	33	32	28	28	26	26
Nitrous oxide	16	15	14	13	13	13
Total	50	48	43	42	40	40

2.15.4.5 Land Use, Land Use Change and Forestry (LULUCF)

Table 14 indicates the emissions from industrial processes are projected to fall 79% below 1990 levels by 2030, 55% below by 2040.

Table 14: LULUCF emissions by gas for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
Carbon dioxide	3	-1	-6	-6	-5	-2
Methane	6	6	6	6	6	6
Nitrous oxide	2	2	1	1	1	1
Total	11	6	1	1	2	5

2.15.4.6 Waste

The UK's WEM projections show that by 2030 annual GHG emissions from waste management are projected to fall 76% below 1990 levels and by 2040 they are projected to fall 77% below 1990 levels (**Table 15**).

Table 15: Waste emissions by gas for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
Carbon dioxide	1	1	0	0	0	0
Methane	70	66	30	18	15	15
Nitrous oxide	1	1	1	2	2	1
Total	72	68	32	19	17	17

2.15.5 Projections by gas

This section focuses on overall trends in the emissions of each GHG. **Figures 18 and 19** show projections for overall emissions of GHG gases to 2050.

Figure 18: UK projected territorial emissions (excluding IAS), MtCO2e

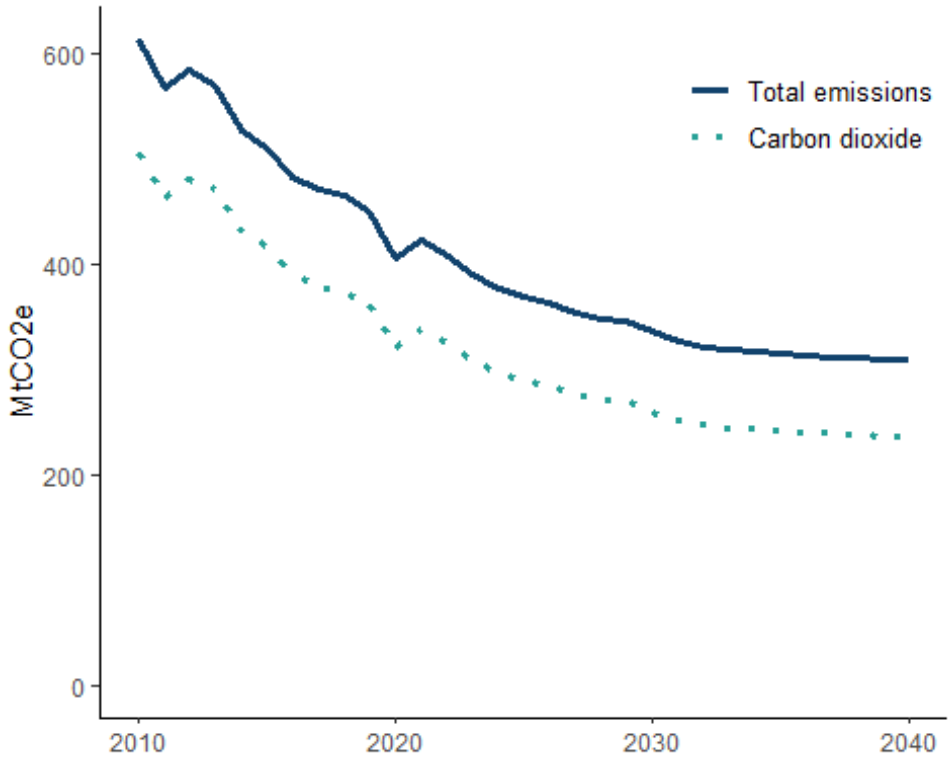
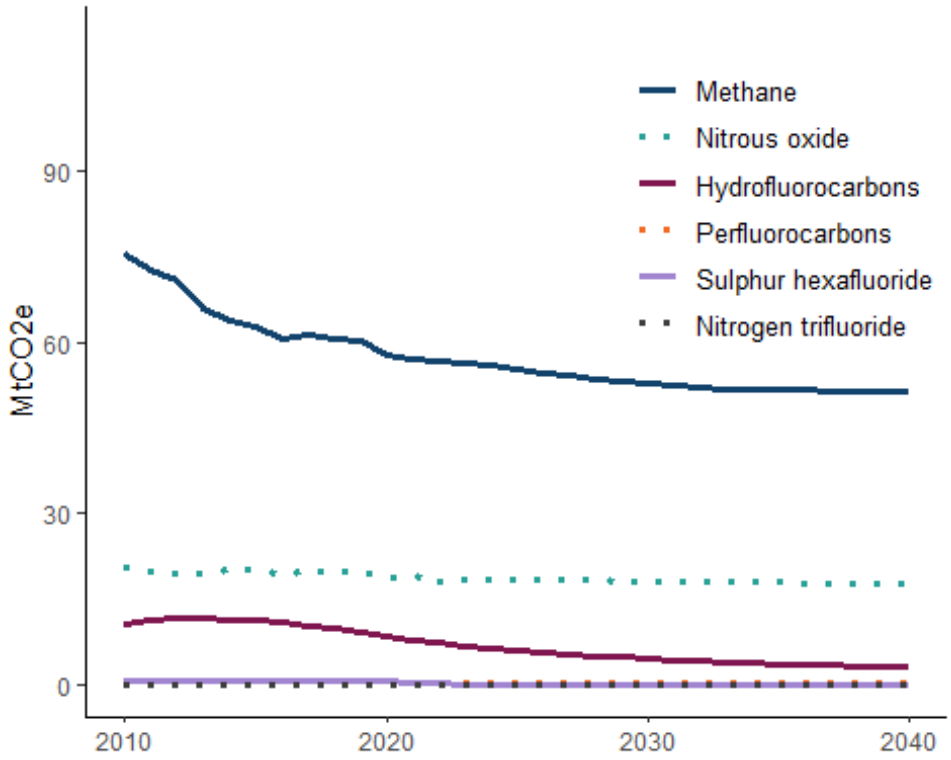


Figure 19: UK projected territorial emissions for all GHG except carbon dioxide (excluding IAS), MtCO2e



2.15.5.1 Carbon dioxide

Table 16 shows that energy related emissions were the largest source of CO_2 in 2020. By 2030, the UK projects CO_2 emissions are 57% lower than 1990 emissions. By 2040 the UK projects CO_2 emissions are 61% lower than 1990 emissions.

Table 16: Carbon dioxide emissions by sector for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
1. Energy	556	529	484	304	251	230
…Of which: A3. Transport	121	128	122	97	89	56
…Of which: Non-transport	436	400	362	207	162	174
2. Industrial Processes	43	39	27	21	11	8
3. Agriculture	1	1	2	1	1	1
4. LULUCF	3	-1	-6	-6	-5	-2
5. Waste	1	1	0	0	0	0
Total	606	568	506	320	260	237

2.15.5.2 Methane

The two biggest emitters of CH_4 in 2020 were agriculture and waste management. The UK projects a decline in CH_4 emissions between 2022 and 2030 of 4 $MtCO_2e$. This means that by 2030, emissions of CH_4 are projected to be 65% lower than 1990. By 2040, the WEM scenario projects that methane emissions will be 66% lower than 1990 (**Table 17**).

Table 17: Methane emissions by sector for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
1. Energy	42	20	11	7	5	5
…Of which: A3. Transport	1	1	0	0	0	0
…Of which: Non-transport	40	20	11	7	5	5
2. Industrial Processes	0	0	0	0	0	0
3. Agriculture	33	32	28	28	26	26
4. LULUCF	6	6	6	6	6	6
5. Waste	70	66	30	18	15	15
Total	150	124	75	58	53	51

2.15.5.3 Nitrous Oxide

Most nitrous oxide emissions come from agriculture. The UK projects a slight decline in N_2O emissions out to 2040, projecting emissions in 2030 that are 59% lower than in 1990, and 60% lower than 1990 in 2040.

Table 18: Nitrous Oxide emissions by sector for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
1. Energy	3	3	2	2	2	1
…Of which: A3. Transport	1	1	1	1	1	1
…Of which: Non-transport	2	1	1	1	1	1
2. Industrial Processes	22	5	2	1	1	1
3. Agriculture	16	15	14	13	13	13
4. LULUCF	2	2	1	1	1	1
5. Waste	1	1	1	2	2	1
Total	44	26	20	19	18	18

2.15.5.4 Hydrofluorocarbons

Almost all HFCs are emitted by the Industrial Processes sector. In 2030, the UK projects HFC emissions of 3 MtCO2e less than in 2022. By 2030, HFC emissions are projected to fall by 63% compared to 1990 levels. In 2040, the UK projects a reduction in HFC emissions of 74% compared to 1990 levels.

Table 19: Hydrofluorocarbons (HFCs) emissions by sector for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
2. Industrial Processes	12	6	11	8	4	3
Total	12	6	11	8	4	3

2.15.5.5 Polyfluorocarbons

PFC emissions remain at low levels over the projection period.

Table 20: Polyfluorocarbons (PFC) emissions by sector for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
2. Industrial Processes	1	1	0	0	0	0
Total	1	1	0	0	0	0

2.15.5.6 Sulphur hexafluoride

SF_6 emissions remain at low levels over the projection period.

Table 21: Sulphur hexafluoride (SF6) emissions by sector for WEM scenario, MtCO2e

	1990	2000	2010	2020	2030	2040
2. Industrial Processes	1	2	1	0	0	0
Total	1	2	1	0	0	0

2.16 Information describing the methodology used to develop projections

2.16.1 Projections methods by sector

The UK projections of emissions of CO_2 and combustion-related emissions of other GHGs (CH_4 and N_2O) are based on the UK's Energy and Emissions Projections modelling suite used for its annual publication and internal analysis.

We produce projections of energy demand and combustion-related GHG emissions outside the power sector by applying standard statistical techniques. These project forward energy demand and emissions based on trends and relationships in past data. We adjust these projections to take account of estimated reductions in energy consumption from policies which are modelled separately using more detailed sectoral models. We then project energy-related emissions by multiplying energy demand by the relevant emissions factors[315].

We produce projections of power sector generation and associated emissions by feeding our projections of electricity demand into a model of electricity supplier behaviour.

The following table outlines a summary of the models involved in the Energy and Emissions projections:

Table 22: Modelling approaches for the projections

Model	Purpose	Notes
Energy Demand Model (EDM)	Projecting energy demand and associated emissions	Uses bespoke econometric analysis of past energy demand by fuel and sector as published in the UK's annual energy statistics publication – DUKES (Digest of UK Energy Statistics). The resulting projection equations are combined with projections for drivers such as UK GDP growth and separately modelled policy impacts to project forward energy demand by fuel and sector. Energy demand projections are converted to emissions projections through emissions factors and calorific values.
Dynamic Dispatch Model	Projecting energy supply and associated emissions	This model is used to project emissions from the power sector. It takes projected electricity demand from the Energy Demand Model and provides a modelled generation mix that meets that level of demand under current power sector policies. It is a market-based model that simulates the operation of the electricity market and the investment decision of market participants. It is a profit-maximisation model incorporating the effect of UK policies which incentivise

[315] Emissions factors are available from: Government Conversion Factors for Company Reporting

Model	Purpose	Notes
		low-carbon generation through market mechanisms. Includes combined heat and power plants.
UK GHG Inventory Non-CO_2 emissions models	Projecting non-combustion, non-CO_2 emissions.	Use emissions from the 1990-2022 GHG Inventory (GHGI) as the baseline for these emissions projections. Sectoral models are used to project forward emissions from these sources.

The overall modelling approach has been consistent over time, although there have been incremental improvements to the projections which are described in the UK's domestic EEP publications[316].

The principal source of past energy statistics is the Digest of UK Energy Statistics (DUKES). The UK's model suite projects emissions using projections for fossil fuel prices, carbon prices, economic growth, temperature and demographics. Key assumptions for projections are given in **CTF Table 11**.

The UK's domestically published projections include variant scenarios for high and low fossil fuel price assumptions, high and low GDP growth rates. More detail on this is provided later in this section.

2.16.1.1 Transport

The CO_2 road transport model is an econometric response surface model integrated into the economy-wide Energy Demand Model (EDM) and calibrated against the Department for Transport's (DfT's) National Transport Model (NTM). The econometric model is multi-modal as it includes cars, light good vehicles (LGVs), heavy goods vehicles (HGVs), and public service vehicles (PSVs). Car demand has a link to population, and HGV demand is linked to projections for manufacturing Gross Value added (GVA). Other factors which affect transport demand are the oil price, motor spirit/diesel engine share, and fuel efficiency and biofuel substitution effects.

Most energy efficiency improvements are policy-driven, such as by new car emissions intensity targets and complementary measures such as lower rolling resistance tyres for HGVs. Unlike for other demand sectors, impacts of policies and measures on road transport fuel demand are modelled within the EEP modelling suite. Road vehicle efficiencies, motor spirit/diesel engine shares, and biofuel use under different policy scenarios are used to calculate mitigation impacts from differences in demand between scenarios.

Electricity demand from electric cars and LGVs is passed to the Dynamic Dispatch Model (DDM) which takes this additional demand into account when calculating power sector generation. The activity data (vehicle distances travelled) is projected using the latest DfT traffic forecasts.

[316] See https://www.gov.uk/government/collections/energy-and-emissions-projections

DfT's projected traffic growth, the planned electrification of existing track, and the construction of new lines such as Crossrail and High Speed 2 underpin the rail transport model.

Projections for UK commercial aviation involve estimates of future UK GDP, consumer expenditure, population, and oil prices. The Fleet Mix Model captures efficiency improvements, for example the model assumes increasing use of biofuels. DfT provides more detailed information about methodology and assumptions with its aviation forecast. The modelling has extrapolated trends in the GHG Inventory to extend aviation emissions projections to UNFCCC coverage.

The UK projects that national navigation will remain largely static.

2.16.1.2 Energy supply

The UK uses the DDM to project investment and generation in the electricity supply sector. The DDM is a market-based model that simulates the operation of the electricity market and the investment decision of the market participants in detail. It is a profit-maximisation model incorporating the effect of government policies such as Contracts for Difference which incentivise low-carbon generation through market mechanisms.

The DDM also models investment in the supply of heat and electricity from Combined Heat and Power plants, mostly in industry.

2.16.1.3 Industrial and Commercial sector emissions

For emissions projections, the UK breaks manufacturing down into sectors using the Standard Industrial Classification (SIC). The manufacturing sectors in the EDM are:

- Chemicals;
- Construction;
- Engineering and vehicles;
- Food, drink and tobacco;
- Iron and steel;
- Non-ferrous metals;
- Non-metallic mineral products;
- Pulp, paper and printing;
- Textile products; and
- Manufacturing not elsewhere classified.

The UK projects Gross Value Added (GVA) for each of these sectors using GDP, interest rates, and, in some cases, terms of trade (the relative prices of imports and exports). The UK projects total energy demand for each sector from GVA and energy prices. Except for iron and steel, the model splits total energy demand into different fuels using historical fuel demands and projections of relative fuel prices. In iron and steel, the UK estimates energy demand using sector GVA and the tonnages of steel produced using electricity or by the Basic Oxygen Steel (BOS) process.

Energy demand is projected by commercial services from sector GVA, and temperature based on econometric analysis of past consumption, GVA and temperature.

2.16.1.4 Residential

The UK projects the residential emissions from gas, oil and solid fuels use separately. The estimates depend on assumptions about the percentage of households using each fuel as their main heating source. The primary drivers of residential energy demand are household numbers, fuel prices, temperature and income.

Residential demand for electricity is projected using the same drivers and passed to the DDM.

2.16.1.5 Agriculture

UK agriculture uses a relatively small amount of energy. Therefore, projections of its combustion emissions come from simple trend models.

The UK uses Food and Agricultural Policy Research Institute (FAPRI) methodology[317] to provide projections of activity, such as livestock numbers, crop production, fertiliser nitrogen use, and non-CO_2 emissions to 2030. Projections for later years are held constant. The FAPRI projections come from an economic model that assumes a specific set of international prices for agricultural commodities and a path for the sterling exchange rate. Together, these factors are important determinants of the returns to farmers and hence of total agricultural production. The UK converts these FAPRI activity projections to emissions using the latest agriculture model in the UK's GHG Inventory.

2.16.1.6 Waste management

Projections of CH_4 from landfill depend on UK projections of tonnages of municipal waste going to landfill and on figures for commercial and industrial waste. Waste composition is projected from knowledge of changes to BWT processes and from projections of waste arising.

These projections of waste going to landfill are then run through MELMod, the landfill emissions calculation model. The MELMod model is based on the IPCC's first-order decay methodology, which the 2014 GHG Inventory report summarises. UK population projections underpin predictions of emissions of CH_4 and N_2O from domestic wastewater and sewage/sludge decomposition. Industrial wastewater emissions are predicted to stay constant. BWT emissions from multiple sources are combined. Some are projected to be constant, and some are extrapolated from the latest year of historical data using sector experts' estimates of future BWT capacity.

[317] FAPRI-UK Greenhouse Gas Emission Modelling System for England, Wales, Scotland and Northern Ireland

2.16.1.7 Industrial processes

Manufacturing sub-sector GVA projections or energy demand projections are used to project CO_2 emissions from industrial processes where there is evidence of correlation. Other CO_2 emissions are projected to remain constant at the last actual value from the UK's GHG Inventory (published 2022).

Many methods are used for projections of non-CO_2 emissions from industrial processes. Some sources use manufacturing sector GVAs while others use more detailed assumptions about future activity. Annex N of the UK's domestic EEP publication[318] provides more information on non-CO_2 emissions projection methods.

2.16.1.8 Public sector

Sector employment levels are used as the main driver in modelling non-electricity energy demand from public services. The projections assume that the historical trend of improving energy efficiency per employee will continue. Temperature also affects public sector demand. The models break non-electricity energy demand into fuels using the same proportions as in latest historical data.

2.16.1.9 Land Use, Land Use Change and Forestry (LULUCF)

The Centre for Ecology and Hydrology and Forest Research model LULUCF emissions using approaches that are consistent with the current inventory methodology. They produce four scenarios – Baseline, Central, High and Low – for future emissions. Each makes assumptions about afforestation, wildfires, peat extraction, land use change and deforestation. They developed these scenarios with a policy maker stakeholder group and updated them in 2016 following discussions with UK Devolved Governments. Broadly, their central scenario is a continuation of current policies and activity rates. This is the scenario used in generating emissions projections for this report.

2.16.2 Estimation of emissions in Crown Dependencies and Overseas Territories

The UK's Crown Dependencies and Overseas Territories are not included in the projections which the UK produces annually to monitor progress against its own carbon budgets. The projections in this report supplement the UK annual figures with forecasts for areas that are consistent with the UK's 1990-2022 GHG Inventory. Emissions in these territories are only a small proportion of UK emissions, making up 0.4% of the UK's UNFCCC coverage emissions in 2022. Two different approaches are used for projecting these territories:

- For most sectors (excluding 1. Energy and memo items), emissions for Crown Dependencies and Overseas Territories are projected based on

[318] Energy and Emissions Projections

simple linear trends of the emissions in each National Communication sector based on observations from the previous 9 years;

- However due to the significant impact of Covid-19 on transport sectors (particularly 1. Energy, and memo item rows), we used a different methodology. For these sectors, we projected emissions for Crown Dependencies and Overseas Territories with the same trajectory as the UK emissions for the equivalent sector.

2.16.3 Strengths of the projection methodology

The UK's modelling methodology has the following strengths:

- The initial starting point for the UK's Energy and Emissions Projections is the latest historical data from the GHG Inventory and DUKES. In the case of EEP 2023, this was based on the UK's GHG Inventory 1990-2022 and 2022 energy statistics (both of these with latest actuals 2022). These are well established sources of information;
- The main Energy Demand Model (EDM) uses econometric methods that capture long-run relationships between economic activity, energy consumption and emissions;
- The detailed model of electricity generation captures both short-run fuel switching and long-term investment strategies;
- The UK updates its projections regularly as part of the monitoring of UK national carbon budgets;
- Models use authoritative national and international sources for socio-economic projections;
- There is a rolling programme of review and update for the projection methodologies and econometric models, and modelling performance is tested by back-casting to see how well the model predicts what happened in the recent past;
- The projections distinguish between business as usual emissions and the emission reductions due to mitigating policies and measures; and
- The modelling estimates the mitigation impacts of policies using a common cross-government methodology.

2.16.4 Weaknesses of the projection methodology

The UK's modelling has the following weaknesses:

- The modelling generally assumes that historical relationships will continue in the future, which can fail to capture structural changes and new technologies where these fall outside the scope of included policies and measures;
- It hasn't been possible to update uncertainty analysis, so uncertainty ranges quoted are still based on analysis from 2019. Similarly, analysis assumed that the drivers of uncertainty were similar to previous years;
- There is considerable recognised uncertainty in economic and demographic projections from external sources;
- The UK cannot provide separate quantified impacts for some types of policy due to modelling limitations. Policies which operate fully or partly through a

price impact such as the Climate Change Levy (an environmental tax on the energy that businesses use) cannot be quantified due to limitations with our modelling approach. These are taken into account in the modelling (through their impact on energy demand), but we do not have estimates of the individual impacts; and

- As with all econometric modelling, this is subject to estimation errors.

2.16.5 Key assumptions

A set of key assumptions about UK economic growth, demographic changes and future fuel price trajectories underpin the UK's projections. The main sources of projected assumptions are the forecasts made by the UK's Office for Budget Responsibility (OBR) and Office for National Statistics (ONS), and supplemented by International Monetary Fund projections of world growth. Fuel prices are produced by the Department for Energy Security & Net Zero (DESNZ). CTF Table 11 documents key parameters and assumptions.

The UK released EEP 2023 -2050 in December 2024. UK GDP forecasts to 2023 were from the March 2024 Economic and Fiscal Outlook publication. Beyond 2023, GDP growth projections came from the March 2024 Long-term economic determinants forecast. The UK's Office for National Statistics (ONS) produced 2021-based population projections in January 2024. The household projections are also from ONS and are 2018-based (but including a projection update by the Welsh government in August 2020). **Table 23** shows updated socio-economic growth assumptions.

Table 23: UK growth projections, percentage per annum

	2025	2030	2035	2040
GDP	1.9	1.9	1.9	2.0
Households	0.6	0.6	0.5	0.5
Population	0.9	0.5	0.4	0.4

DESNZ updates the fossil fuel price and carbon prices projections annually, which are subject to peer review and are used widely across UK government. **Table 24** sets out the key fossil fuel and carbon price values for EEP modelling, and Table 5.2.3 details exchange rate assumptions.

Table 24: Fossil fuel and carbon price assu/verage)

	2025	2030	2035	2040
Crude oil	74	75	83	90
Gas	75	70	68	66
Coal	97	96	98	100

Table 25: Exchange rates against GBP sterling

	2025	2030	2035	2040
US dollars	1.27	1.27	1.27	1.27
Euros	1.16	1.16	1.16	1.16

2.16.6 Quality assurance and quality controls

Quality assurance of modelling is a high priority within UK government, and analysis for the EEP follows the DESNZ quality assurance guidelines.

A small group of DESNZ analysts produces the energy and emission projections, and owns, maintains and updates the Energy Demand Model (known as the EDM) which underpins the projections. The EEP team liaises with other modelling teams, both inside and outside DESNZ, to quality assure and compile the data which go into the overall projections.

Figures relating to electricity come from iteratively solving two specialised models with the EDM. These are the Dynamic Dispatch Model (DDM) and the Prices and Bills Model of retail electricity prices. This cycling ensures that electricity demand is in equilibrium with prices. The co-ordinators of these models also assure projections results. Projections for non-energy non-CO2 emissions are produced by the DESNZ Science division.

The Centre for Ecology and Hydrology produces the UK's LULUCF projections under contract; this is overseen by the DESNZ Science and Innovation for Climate and Energy Directorate.

DESNZ bases transport sector modelling on, and calibrates it against, the detailed models for road, rail and air used by the Department for Transport (DfT). These latter are in turn subject to DfT's quality assurance.

Analytical teams in the relevant areas prepare estimates of the emissions or energy savings due to UK government policies. Analysts prepare these policy savings estimates according to central guidance, which ensures that energy use and GHG emissions are valued consistently across UK government.

Analysts send the policy savings in a standard template and the EEP team checks them to look for any unaccounted overlaps and to ensure internal consistency between energy and emissions savings. The team confirms the model savings with the submitting analysts and departments. The UK updates its GHG projections to inform progress against national carbon budgets and publishes each set of projections. The EEP team improves and adapts the core Energy Demand Model incrementally, quality assuring each change to confirm validity and robustness. (The team responsible for the DDM quality assures any change relating to electricity generation). The EEP team presents interim and final results to a Steering Group which oversees the process, and stakeholders review draft EEP reports before publication. The UK's independent Climate Change Committee reviews the projections after their release.

2.16.7 Uncertainty

In December 2024 the UK published annexes of data to accompany its domestic projections. These included low and high fossil fuel prices and low and high UK GDP rates as variant scenarios and sensitivities.

Table 26: Prices in fossil fuel variant scenarios, 2023 prices (various scenarios, UK coverage)

	2025	2030	2035	2040
Low FFP - crude oil	53	46	49	51
Low FFP - Gas	50	41	37	33
Low FFP - Coal	77	76	77	78
High FFP - crude oil	104	110	114	117
High FFP - Gas	113	111	110	108
High FFP - Coal	118	114	114	113

The EEP team produced these scenarios using published low and high ranges[319].

2.16.8 Growth sensitivities

To investigate the impact of different economic growth rates, the EEP includes scenarios where the economy performs at 25 basis points per annum above or below the reference scenario value. **Table 27** shows this.

Table 27: Variant UK GDP growth sensitivities, percentage per annum (various scenarios, UK coverage)

	2025	2030	2035	2040
High UK GDP Growth	2.1	2.1	2.2	2.2
Low UK GDP Growth	1.6	1.6	1.7	1.7

Using these high and low fossil fuel and GDP variants gives four different emissions scenarios (**Table 28**). Although the scenario emissions projections shown in Table 5.2.6 show just UK territorial emissions (excluding CDOTs), they do indicate the scale of uncertainty in the projections reported within this section, as CDOT emissions were only 0.4% of the overall total in 2022.

For these projections, the effect of high/low fossil fuel prices was slightly larger than the impact of high/low GDP.

[319] Fossil Fuel Price Assumptions

Table 28: Total emissions in variant scenarios, MtCO2e (WAM policy accounting, UK coverage)

	2025	2030	2035	2040
WAM reference	368	327	304	296
Low FFP	371	335	313	307
High FFP	361	319	297	289
Low GDP	367	325	302	292
High GDP	368	329	307	301

2.16.9 Overall uncertainty

Future values of key variables such as fossil fuel prices, the impacts of policy and demographic/economic growth cannot be known with certainty. However, these variables underpin the UK projections. Understanding the impact of this uncertainty is important in the context of the UK's aim to reduce emissions through policy intervention, and so it is regularly investigated in EEP publications. Uncertainty analysis presented here is based on the most influential drivers of energy use and emissions, previously identified through sensitivity analysis. The EEP team carries out a Monte Carlo simulation to vary the values of these drivers, firstly obtaining historical distributions of input values then running the projections model on samples from these distributions.

The uncertainty ranges presented in this section are still derived from the uncertainty analysis from the estimates published in EEP 2018, due to time constraints at the time of analysis.

This method underpins the 95% confidence interval estimates presented in Figure 5.3 and **Table 29**. The upper and lower boundaries represent the projected emissions corresponding to the lower 2.5% and upper 97.5% percentiles of the Monte Carlo simulations respectively. Although the high/low emissions projections in **Figure 20** show UK coverage (excluding CDOTs), they do indicate the scale of uncertainty in the projections reported in this section, as CDOT emissions were only 0.4% of the overall total in 2022.

This analysis excludes the electricity supply industry and possible "structural breaks" in society or the economy which might significantly affect emissions. For example, societal and behavioural step changes or breakthrough technologies like improved storage could have profound impacts on the UK's energy mix and emissions but are hard to anticipate.

Figure 20: Uncertainty in UK projected emissions, MtCO2e (WAM scenario, UK coverage)

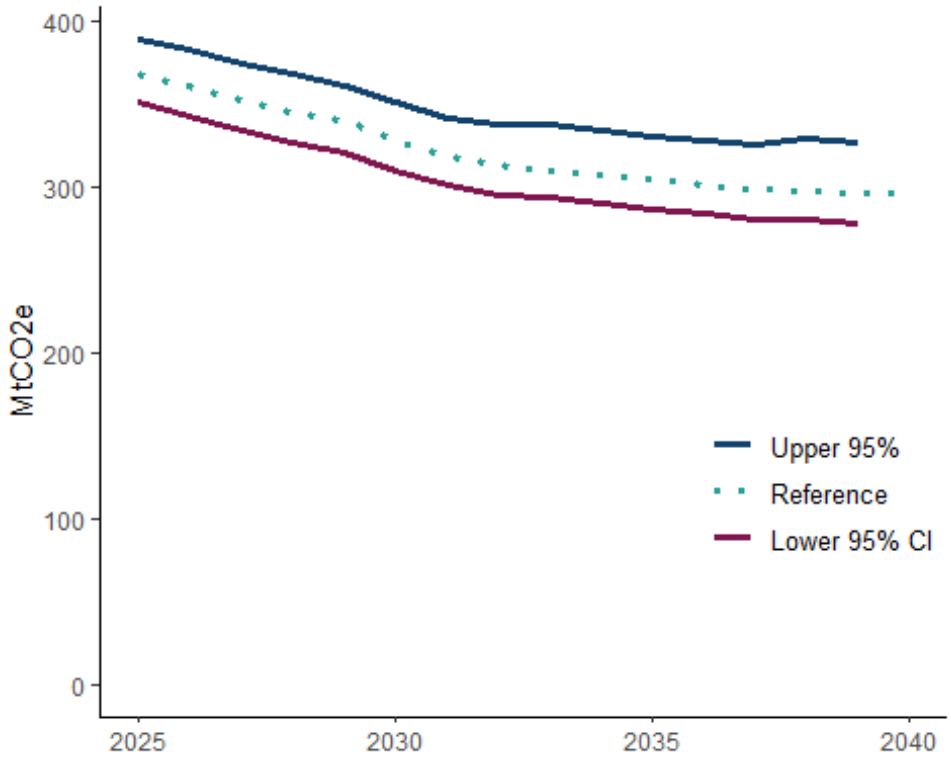


Table 29: Confidence interval for total emissions from Monte Carlo simulations, MtCO2e (WAM scenario, UK coverage)

	2025	2030	2035	2040
Upper 95% CI	389	351	330	NA
Reference: WAM Scenario	368	327	304	296
Lower 95% CI	351	310	286	NA

The methodology only looks at future uncertainty and does not examine uncertainty in historical inputs or emission estimates, such as those before 2022.

By 2030, the UK WAM scenario projects GHG emissions will be between 17% and 21% below 2022 levels. By 2039, the range is slightly wider with emissions projected between 23% and 29% below 2022 levels. The higher uncertainty for later years reflects the reduced confidence in modelled projections further into the future.

2.16.10 Projections for precursor gases

Projections for emissions from precursor gases in the UK are not included within this analysis but are produced by the National Atmospheric Emissions Inventory

(NAEI)[320]. The projections are produced at 5-year intervals out to 2050 and contains the pollutants regulated under the UN Gothenburg protocol.

2.17 Projections of key indicators to determine progress towards NDC

The WEM scenario projections in this section include the impact of the UK's implemented and adopted policies and measures at the policy cut-off point of June 2024. They are the baseline or counterfactual projection showing what the UK would expect to happen if no policies at an earlier stage of development were implemented.

The name, sector, GHG(s) and activity affected, and descriptions of these policies and measures can be found in CTF Table 5. The WEM scenario within this section does not include planned policies, but those are included within domestic reporting and are therefore shown in CTF Table 5.

The UK has continued to update its analysis of policies and measures expected to help meet both Nationally Determined Contributions and the targets for Carbon Budgets set under the UK Climate Change Act (2008). Over time, the UK's projections will include newer or more recently announced policies as they progress to the impact assessment stage. Within this section, we also include the total of territorial and international aviation and shipping (IAS) policy savings.

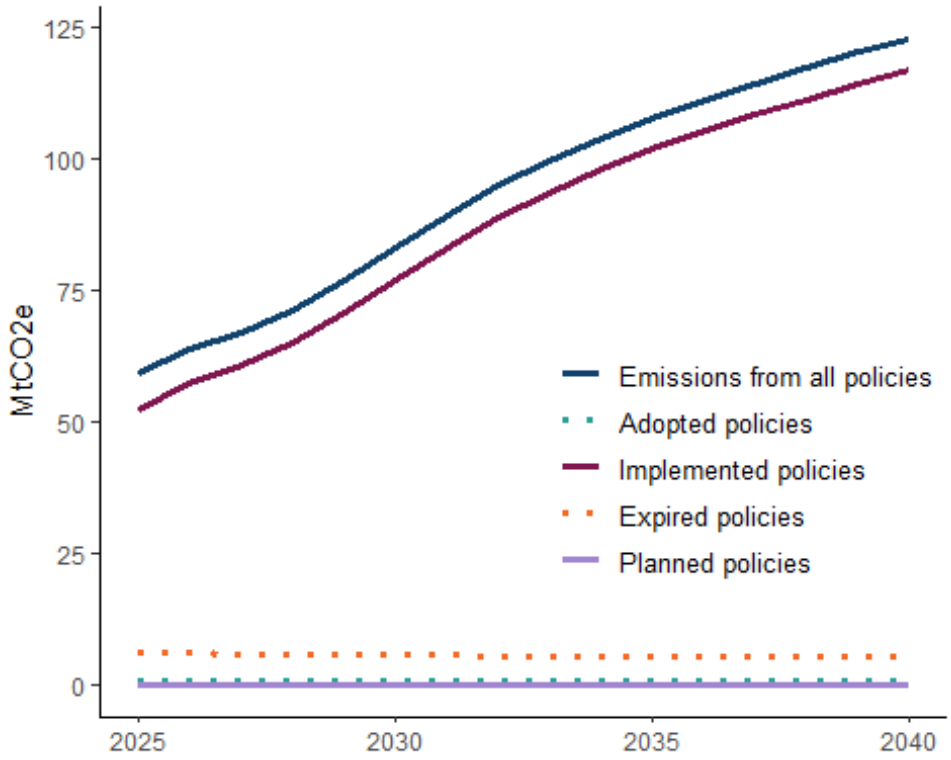
Table 5.3.1 and Figure 5.4 show the projected impact of demand-side policies only. Power supply markets are highly interconnected, meaning it is not possible to robustly disaggregate the impacts of individual supply-side policies. We are reviewing the method for calculating savings from overall power interventions, but for now the tables in this section and in CTF Table 5 exclude the aggregated emissions savings from power supply policies.

Table 30: Projected impact of policies (excluding power sector interventions) by status, MtCO2e

	2025	2030	2035	2040
Emissions from all policies	59	83	108	123
Adopted policies	1	1	0	0
Implemented policies	52	77	102	117
Expired policies	6	5	5	5
Planned policies	0	0	0	0

[320] Air Pollutant Emissions Data

Figure 21: Projected impact of policies (excluding power sector interventions) by status, MtCO2e



Chapter 3: Information related to climate change impacts and adaptation

3.1 National circumstances, institutional arrangements and legal frameworks

The devolved governments of Scotland, Wales and Northern Ireland contribute to the UK's overall climate objectives and have their own adaptation targets; unless stated otherwise, the information below outlines England's approach. The Devolved Government has provided information on their strategies in section 3.10.

3.2 Biogeophysical characteristics

We are already seeing climate impacts across the globe, with observed increases in the frequency and intensity of heatwaves, flooding, drought and wildfires. According to the World Meteorological Organization[321], long-term global warming is currently around 1.3°C compared to the 1850-1900 baseline, whilst in the UK, the 10 warmest years on record have all occurred since 2003[322]. Human-induced warming is increasing at around 0.25ºC[323] per decade, leading to further increases in global and UK climate hazards into the future.

The latest State of the UK Climate report,[324] highlighted a year of extremes. 2022 was shown to be the warmest year in the UK series from 1884, 0.9 °C above the 1991–2020 average, and for the first time 40 °C was recorded in the UK. The period January–August 2022 was also the driest across England and Wales since 1976, with drought status declared across parts of England and all of Wales. Rising sea levels have continued to be observed in the UK and have risen by 18.5cm since 1900's. The rate of sea level rise has also accelerated, with over 60% of the observed sea level rise (11.4cm) occurring over the past 30 years.

More recently, Met Office[325] observations show that 2023 was the second warmest year for the UK according to mean temperature. Both Wales and Northern Ireland experienced their warmest years on record in 2023. Changes in rainfall extremes has also begun to be observed in the UK. In 2023, the UK saw 11% more rain than average with a provisional figure of 1289.8mm falling.

3.3 Economy

The economic losses from flooding in England between November 2019 and March 2020 are estimated to be about £333 million and would have been significantly larger

[321] State of the Climate 2024
[322] 2023 was second warmest year on record for UK
[323] Independent Assessment of UK Climate Risk Advice to Govt for CCRA3 CCC
[324] State of the UK Climate 2022 - Kendon - 2023
[325] 2023 was second warmest year on record for UK

in the absence of flood defences[326]. The 'Monetary Valuation of Risks and Opportunities in the third Climate Change Risk Assessment(CCRA3)'[327] report found that around a quarter of the 61 climate risks and opportunities it identified each have the potential to result in economic impacts higher than £1 billion per year by 2050.

Disruption from climate change has the potential to reduce government revenues and increase government expenditure, reduce external performance (exports), damage infrastructure assets, increase social costs thereby increasing vulnerability for some population groups, and reduce economic growth (source: World Bank Group, 2020; Inclusive Futures, 2020). However, early adaptation action can help to reduce future costs and many adaptation actions represent good value for money. The 'Monetary Valuation of Risks and Opportunities in CCRA3'[328] report found that, for a range of early interventions, benefit-cost ratios typically range from 2:1 to 10:1. This means that every £1 invested in these adaptation actions could result in £2 to £10 in net economic benefit.

3.4 Infrastructure

Recent events such as Storm Arwen in 2021 and the heatwaves of 2022 demonstrate the kinds of impacts climate risks can lead to, from power outages to buckling train tracks. The evidence suggests these impacts will get more intense and frequent under any emissions scenario to 2050.

To help manage climate risks to infrastructure sectors:

- Ensuring that the regulatory framework is delivering adaptation outcomes
- Putting the necessary investment in place
- Engaging with infrastructure operators and regulators to improve understanding of and approaches to identifying and managing climate risk

The UK has a robust system to ensure that public investment in infrastructure appropriately considers climate risk, which the IMF's Public Investment Management Assessment[329] (PIMA) found to be relatively well-designed. The Green Book is guidance issued by HM Treasury on how to appraise policies, programmes and projects. It also provides guidance on the design and use of monitoring and evaluation before, during and after implementation.

The following levers are used to manage climate risks in infrastructure.

- National Infrastructure Strategy[330]
- UK government Resilience Framework[331],

[326] Environment Agency – National Flood and Coastal Erosion Risk Management Strategy for England
[327] Monetary Valuation of Risks and Opportunities in CCRA3
[328] Monetary Valuation of Risks and Opportunities in CCRA3
[329] United Kingdom: Technical Assistance Report-Public Investment Management Assessment
[330] National Infrastructure Strategy
[331] The UK government Resilience Framework

- Adaptation Reporting Power (ARP)[332]
- Critical National Infrastructure (CNI)[333] policy
- Planning policy[334]
- Institutional framework: strengthening our understanding of climate risk to infrastructure, through the National Infrastructure Commission (NIC)[335], the Infrastructure and Projects Authority's (IPA) [336] and the National Wealth Fund (formerly the UK Infrastructure Bank)

Major public investment in infrastructure is subject to an additional level of scrutiny through the UK government's Infrastructure and Projects Authority, which provides an assurance function to support the successful delivery of projects within the UK government's Major Projects Portfolio (GMPP).

The Infrastructure and Projects Authority's (IPA) Gate Review process is designed to provide a realistic view on a programme and project's ability to deliver agreed outcomes against time, cost, benefits and quality, and these Gate Reviews include tests to ensure infrastructure projects have considered climate risk and adaptation.

3.4.1 Global Goal on Adaptation (GGA) Thematic target 5 - Climate-resilient Infrastructure

Adaptation is embedded through the planning system for major infrastructure projects. National Policy Statements (NPSs) are a key part of the system for managing Nationally Significant Infrastructure Projects (NSIPs) and are important in ensuring that government policy is implemented effectively through the planning system. Infrastructure NPSs include requirements for planning applicants to demonstrate how they have considered the risks posed by the changing climate.

Plans for reforms to the NSIP[337] regime that will ensure the system can support our future infrastructure needs by making the system better, faster, greener, fairer and more resilient.

The UK government Resilience Framework[338], sets out how the government will work with industry and regulators to improve the security and resilience of UK CNI for example by using common but flexible resilience standards across CNI, and by reviewing existing regulatory regimes on resilience to ensure they are fit for purpose.

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[332] Consultation on the Fourth Round of the Climate Adaptation Reporting Power - Defra - Citizen Space
[333] Critical National Infrastructure (CNI)
[334] National Planning Policy Framework
[335] Infrastructure and Projects Authority
[336] UK Infrastructure Bank | UK Infrastructure Bank
[337] Nationally Significant Infrastructure Projects (NSIP) reforms: action plan
[338] The UK government Resilience Framework

3.4.2 Global Goal on Adaptation (GGA) Thematic target 1 - Water

Private investment in national infrastructure is often also subject to sector-specific regulation ensuring appropriate consideration of climate risk. This includes Water Resources Management Plans (WRMPs), through which water companies have a duty to set out how they will continue to supply water in their supply area over at least the next 25 years in the context of population growth and climate change. This long-term planning framework is supported by specific requirements and standards (e.g. water companies must demonstrate resilience to a 1-in-500-year drought), and by regular monitoring against company-level performance commitments on metrics like supply interruptions, leakage, and per capita consumption.

Most water companies have finalised their WRMPs with direction on how they plan to meet increasing water demands, which includes using £500 million investment to develop new infrastructure in the 2020-2025 period. The plans also include water efficiency measures such as providing water audits for businesses to consider how best to maximise their water efficiency. This will help in meeting targets to reduce leakage by 37% and non-household water use by 9% by 2038, safeguarding future water availability for businesses.

The Environment Agency's latest review of draft Regional Water Resource Plans found an additional 4,860 million litres of water a day (Ml/d) will be needed in England by 2050 to meet future supply pressures: this is around a third of the water currently supplied by water undertakers. Approximately half of the 4,860 Ml/d required will need to be delivered through demand management measures.

We are implementing a Water Demand Target under the Environment Act 2021 to reduce use of public water supply by 20% by 2037/38. The Water Demand target is based on a trajectory for achieving household water use of 110 litres per person per day, a 50% leakage reduction from 2017/18 levels and a 15% reduction in non-household water use by 2050.

Department for Environment Food and Rural Affairs (DEFRA) has also acknowledged recommendations made within the Baringa[339] report and will continue working with Ofwat to understand the implementation of these actions.

We recognise that smart metering can assist in reducing overall water consumption by enabling water companies to reduce leakage and incentivise more water efficient behaviours. Water companies have already committed to delivering a 50% reduction in leakage from 2017 to 2018 levels by 2050 and we expect Ofwat to challenge companies to deliver this and monitor progress.

Around 13% of households in England now have a smart water meter and this number is set to rise to 73% by 2040.

[339] Smart Metering Report

To help achieve our target of reducing the amount of water used per person in England per head by 20% by 2038, we have committed to working with regulators and industry on the rollout of smart meters, alongside mandatory water efficiency labelling, to enable consumers to make more water efficient choices.

The climate crisis is a water crisis. Despite this, the water crisis has largely gone unaddressed internationally. Through the Water Tracker for National Climate Planning[340], supported by the FCDO, the UK is providing partner countries with a clear pathway to design and implement coordinated and targeted climate action and meaningfully ensure the water-food-energy nexus is reflected in ambitious 1.5-aligned climate, resilience and nature plans.

3.5 Adaptive capacity

3.5.1 Adaptation challenges and gaps, and barriers to adaptation

As well as the barriers, gaps also exist in our ability to monitor our adaptation efforts. This is due to the complexity of adaptation and the associated challenges of identifying and developing appropriate indicators. Defra has held a series of sector-specific workshops focused on the monitoring and evaluation (M&E) of adaptation in each sector.

These challenges are consistent with the findings of the Climate Change Committee (CCC) in its 2021 progress report to Parliament[341]. Adaptation process indicators (such as the number of plans adopted, or buildings retrofitted) are relatively simple to measure and so more common. Indicators that measure adaptation outcomes (such as climate-sensitive sectors of the economy being better adapted) are rarer as they are harder to measure.

3.6 Institutional arrangements and governance, legal and policy frameworks and regulations

The UK was the first country in the world to enshrine government action on climate adaptation into law under the UK Climate Change Act (2008)[342]. The Act created a framework for strengthening UK preparedness to climate change risks. These include preparing, on a five yearly cycle, a UK Climate Change Risk Assessment (CCRA), followed by a National Adaptation Programme (NAP), setting out actions to address the risks identified in the CCRA. The Climate Change Act also provides Defra's Secretary of State with the power, known as 'Adaptation Reporting Power'[343] (ARP) to direct infrastructure providers and public bodies to report on their preparedness for climate change; it also required Defra to publish a strategy for each round of the process. The Act established an independent Climate Change

[340] Water Resilience Tracker for National Climate Planning — Alliance for Global Water Adaptation
[341] 2021 Progress Report to Parliament - Climate Change Committee
[342] Climate Change Act 2008
[343] Climate change adaptation reporting: third round reports

Committee (CCC) to advise government and assess adaptation progress on a biennial basis.

Responsibility for climate change adaptation is split between the four countries of the United Kingdom. National governments in Northern Ireland, Wales and Scotland are responsible for respective adaptation programmes. His Majesty's government (HMG) is responsible for climate change adaptation in England and for embedding adaptation within policy areas for which it has UK-wide competence such as energy security and foreign affairs. Climate policy (both mitigation and adaptation) is devolved to the Crown Dependencies and Overseas Territories, so they are responsible for setting their adaptation policies.

The third National Adaptation Programme (NAP3) made governance a priority over the five-year implementation period. This included establishing a senior official Climate Resilience Steering Board to oversee strategic, cross-cutting climate adaptation and resilience issues and drive further government action to increase UK resilience to climate change.

In addition to the Climate Resilience Steering Board driving further government action to increase UK resilience to climate change, the UK government will use its extensive network of overseas posts, researchers, and international relationships to identify emerging risks and escalating, where necessary, cascading risks through government's existing risk management governance structures.

Addressing climate risks, requires not only an improved understanding of those risks through government action to build capability and address evidence gaps, but also coordination across and between governments through strong governance structures.

3.7 Impacts, risks and vulnerabilities, as appropriate

3.7.1 Current and projected climate trends and hazards;

Observations from 2022 and 2023 have aligned with general climate change trends projected for the future in the UK Climate Projections (UKCP), produced by the Met Office. UKCP projections show an increased chance of warmer, wetter winters and hotter, drier summers, along with an increase in the frequency and intensity of extremes. These increases in extremes include increase in the frequency of and intensity of hot spells in summer.

Hot summers and heatwaves will become more intense and longer lasting, particularly in the south-east of England. Northern Ireland and Scotland will begin to experience summers like those currently felt in the rest of the country. Summer drought conditions will occur more often in the south of the UK, like that seen in 2022. Despite overall summer drying trends in the future, projections show increases in the intensity of heavy summer rainfall events in the future, as well as increased intensity of heavy rainfall events across all seasons.

Sea levels are projected to rise through the 21st century and beyond for all emissions scenarios. Sea levels will rise across the UK, with greater rises in the

south and east of the UK due to land movement. By end of the 21st century, sea levels in the UK may have risen by up to 1 meter.

3.8 Observed and potential impacts of climate change, including sectoral, economic, social and/or environmental vulnerabilities;

3.8.1 Global Goal on Adaptation (GGA) process target 1 - Impact, vulnerability and risk assessment

The UK's Third 'Climate Change Risk Assessment (CCRA3)'[344] published in 2022, has presented strong evidence that even under low warming scenarios the UK will be subject to a range of significant and costly impacts unless further action is taken. Informed by an independent assessment undertaken by the Climate Change Committee, CCRA3 identified 61 risks and opportunities to the UK from climate change, including risks to health and productivity, the built environment, businesses, the natural environment, and to public services.

Impacts range from a deterioration in soil health and agricultural productivity to impacts on water availability and energy generation. For example, unless we take further action, under a 2°C by 2100 warming scenario, annual damages from flooding for non-residential properties across the UK is expected to increase by 27% by 2050 and 40% by 2080. At 4°C this increases to 44% and 75% respectively.

Estimates represent impacts to the whole UK economy, but impacts are likely to vary significantly across localities, areas and groups.

3.8.2 Jersey

As an Island, sea level rise and associated flooding have been identified as a key risk from a changing climate.

There has also been a reduction is some local species, for example a 78% reduction in the brown crab since 2012 alongside an increase in some invasive species such as a 94% increase in the Asian Hornet.

3.8.3 Guernsey

In 2012, a report (Guernsey Coastal Defences – Flood Risk Assessment Studies[345]) was published looking at the flood risk around the coastline of Guernsey. This identified that ta number of locations around the coast, particularly to the low lying lands in the north and along the west coast, are at risk from increased sea levels leading to overtopping and flooding. The States of Guernsey agreed to a prioritisation for addressing these defences, as well as additional defences to the

[344] UK Climate Change Risk Assessment 2022
[345] Guernsey: Coastal Defences – Flood Risk Assessment Studies

island's capital – St Peter Port. Further recent work as part of the development of planning policies has updated the risk levels in line with UKCP18 climate change predictions.

The island is susceptible to invasive species, with the Asian hornet having arrived over the past decade. Despite a proactive response there is an annual search for and destruction of nests

3.8.4 Isle of Man

The Isle of Man commissioned a report in 2005 to identify the potential impacts of climate change for the Isle of Man – Climate Change Scoping Study – Executive Summary[346]. This identified problems and objectives, key receptors, vulnerability thresholds and decisions making criteria, as well as carrying out a risk assessment and presenting adaptation options. It covered a wide range of sectors and identified a range of potential impacts in all areas. This will be updated with another Climate Risks and Opportunities Assessment, as required by the Climate Change Plan 2022-2027, to ensure our understanding of climate risks and vulnerabilities remains current and able to inform effective policies.

3.8.5 Gibraltar

Gibraltar conducted its first Climate Change Vulnerability & Risk Assessment[347] in 2022.This identified a number of key risks and vulnerabilities including energy and water supply, food importation and impacts on public health as a result of extreme heat and increase in vector borne diseases.

3.9 Approaches, methodologies and tools, and associated uncertainties and challenges

A range of tools have been developed to help our partners assess climate risk and develop and deliver a policy response that affects real change.

These include:

- The UK Climate Projections[348], which provide up-to-date assessment of how the UK climate may change in the future, which are available at 2.2km resolution (UKCP18) for local risk assessment.
- 'The UK Climate Resilience Programme'[349] which uses UKCP18 to build the evidence on climate risks, adaptation and services in the UK. It has delivered several high impact outputs to date, including climate risk indicators to support

[346] Climate Change Scoping Study – Executive Summary
[347] Climate Change Vulnerability & Risk Assessment
[348] About UKCP - Met Office
[349] The UK Climate Resilience Programme

climate risk assessments and future-drainage[350], providing estimates of changes in rainfall for use in drainage design.

- The 'Green Book supplementary guidance on Accounting for the Effects of Climate Change'[351] provides guidance on how to account for climate impacts and environmental factors in policy appraisal.
- Ten Principles for good Adaptation' as set out in the Climate Change Committee's advice. These overarching principles relate to having a clear vision for a well-adapted UK and can be found in the Climate Change Committee's third independent assessment of the UK's climate risks[352] [353].
- An ambitious Fourth Climate Change Risk Assessment (CCRA4) Independent Assessment for 2027. Our aims for this include:
    - Spatial considerations which distinguish risk by area, including regional and localised mapping to understand how risk varies by location.
    - Systematic assessment of risk through sector-based, outcome-focussed groupings to better consider interdependencies.
    - More and integrated economic analysis woven through the risk assessment.
    - Stronger focus on adaptation action, with research driving towards resolving evidence gaps across societal and behavioural sciences.

Since the publication of the Climate Change Committee's Independent Assessment in 2021 we have been working at pace to mainstream adaptation to climate change in policy planning across UK government.

3.9.1 Jersey

As a small island, sea level rise and associated coastal flooding has been assessed as a high risk. Future temperature changes and fallouts from increased instances of extreme weather including flooding are also highly likely to have an impact on Jersey's infrastructure.

The Shoreline Management Plan[354] sets out how we'll maintain and enhance our coastal defences to protect our Island over the next 100 years. The plan is updated every 10 years. The next update is due in 2030.

A Strategic Flood Risk Assessment[355] was commissioned as part of the evidence base to inform the preparation of the bridging Island Plan. The new Island Plan now provides an appropriate planning framework to deal with both inland and coastal flood risk.

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[350] Future Drainage - Guidance for Applying Rainfall Uplifts
[351] Green Book Supplementary Guidance: Climate Change and Environmental Valuation
[352] independent assessment of the UK's climate risks
[353] Independent Assessment of UK Climate Risk Advice to Govt for CCRA3
[354] Jersey: Shoreline Management Plan
[355] Strategic Flood Risk Assessment

3.9.2 Guernsey

Guernsey government's recently consulted on a draft "Local Planning Brief"[356] for the harbour areas which updated the flood projections from 2012 for the east coast using the latest UKPC18 climate change predictions. This highlighted that over the course of the next 100 year the existing harbours are likely to be inoperable due to sea levels for certain periods. This highlights the challenge facing the island as a result of climate change.

3.9.3 Isle of Man

In 2024 the Isle of Man government commissioned a technical climate change risk and opportunity assessment to provide evidence for the development of an Adaptation Strategy. The climate change risk and opportunity assessment followed the principals of International Organisation of Standardisation (ISO) 14091:2021, the international standard for adaptation to climate change. An Isle of Man risk register, identifying 119 risks and 14 opportunities, has been established across five sectors: natural environment, health and communities, infrastructure, economy, and international dimensions. For each risk likelihood and magnitude scoring was undertaken, the risks were prioritised by their risk rating for each of the five sectors. Urgency scores were assigned to each of the 119 risks to indicate the need for adaptation action in two, five, and 10-year intervals, as well as beyond 10 years.

3.9.4 Gibraltar

Gibraltar's Vulnerability and Risk Assessment (VRA) was conducted using a combination of desk research and stakeholder consultations to extract key information. The desk research involved analysing over 40 sources of information, including targeted studies in Gibraltar, IPCC reports and studies undertaken in geographies that have a similar geographical and biophysical profile as Gibraltar (Mediterranean, urban and coastal). The consultations involved interviews and questionnaires with over 70 key stakeholders. The VRA is aligned with the latest definitions of terms from the IPCC's Fifth and Sixth Assessment reports which enable the assessment of climate vulnerabilities independently from hazards, focusing on sectors' 'propensity or predisposition to be adversely affected'. This ensures that the assessment does not incorporate uncertainties associated with climate projections.

3.10 Adaptation priorities and barriers

3.10.1 Domestic priorities and progress towards those priorities

In 2021, Climate Change Committee published an Independent Assessment[357] of UK Climate Risk in which they identified eight priority climate risk areas needing immediate attention over the following two years. These were based on the urgency

[356] Guernsey: Local Planning Brief
[357] Independent Assessment of UK Climate Risk Advice to Govt for CCRA3

of additional action, the gap in UK adaptation planning, the opportunity to integrate adaptation into forthcoming policy commitments and the need to avoid locking in poor planning.

The priority areas were identified as:

1. Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards
2. Risks to soil health from increased flooding and drought
3. Risks to natural carbon stores and sequestration from multiple hazards, leading to increased emissions
4. Risks to crops, livestock and commercial trees from multiple climate hazards
5. Risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks
6. Risks to people and the economy from climate-related failure of the power system
7. Risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings
8. Multiple risks to the UK from climate change impacts overseas

The UK Climate Change Risk Assessment 2022[358] highlights the government's approach to the eight priority risk areas and outlines recent actions taken to limit these risks as well as priorities going forward.

For NAP3 and the upcoming CCRA4 Independent Assessment, research and development of methods to monitor and evaluate adaptation actions have been prioritised. Defra is providing support to risk owning departments for monitoring and evaluating their NAP3 actions to better understand to what extent they are achieving their objectives and what could be done differently to inform the next NAP, NAP4.

3.11 Adaptation strategies, policies, plans, goals and actions to integrate adaptation into national policies and strategies

3.11.1 Global Goal on Adaptation (GGA) process target 2 – Planning

The National Planning Policy Framework (NPPF)[359] sets out the Government's planning policies for England and how these should be applied, guiding locally prepared plans for housing and other development. The National Planning Policy Framework was revised in response to the Levelling-up and Regeneration Bill: reforms to national planning policy consultation[360] on 19 December 2023 and sets

[358] UK Climate Change Risk Assessment 2022
[359] National Planning Policy Framework
[360] Levelling-up and Regeneration Bill: Reforms to National Planning Policy Consultation

out the government's planning policies for England and how these are expected to be applied.

3.11.2 Adaptation goals, actions, objectives, undertakings, efforts, plans, strategies, policies, priorities, programmes and efforts to build resilience;

3.11.2.1 England

The government's vision for adaptation is for a country that effectively plans for and is fully adapted to the changing climate, with resilience against each of the identified climate risks. The UK Climate Change Act provides a strong foundation to enhance resilience to climate impacts, with research and evidence informing policy and organisations publishing reports on their adaptation progress through the ARP.

Overseas, UK government provides official development assistance funding to support communities in climate vulnerable and fragile countries to adapt and build resilience to the current and future impacts of climate change to reduce the risk of conflict. As part of the COP28 outcome on the global goal on adaptation, we adopted the UAE Framework for Global Climate Resilience[361], which has 7 thematic and 4 process-based targets and agreed to launch a two-year work programme on indicators related to those targets.

3.11.2.2 Northern Ireland Executive

Northern Ireland's legal framework for climate adaptation is set out in section 60 of the Climate Change Act 2008. In line with this legal requirement the Department of Agriculture, Environment and Rural Affairs (DAERA) leads on the development of the Northern Ireland Climate Change Adaptation Programme (NICCAP) which sets out all departments policies and proposals in response to the latest UK Climate Change Risk assessment (CCRA).

The second Northern Ireland Climate Change Adaptation Programme (NICCAP2)[362] was published by DAERA in September 2019 and covers the 5-year period to September 2024. The NICCAP2 is the cross-departmental response to the risks identified in the second CCRA which was laid in Parliament in January 2017. Work is continuing to implement the actions contained in NICCAP2.

The UK Climate Change Committees 'The UK Climate Change Risk Assessment 2017 Evidence Report – summary for Northern Ireland'[363] which helped to inform the Second Climate Change Risk Assessment (CCRA2) highlighted risk areas which

[361] Glasgow–Sharm El-Sheikh Work Programme on The Global Goal On Adaptation Referred To In Decision 7/CMA.3
[362] Northern Ireland: Climate Change Adaptation Programme
[363] Northern Ireland: The UK Climate Change Risk Assessment 2017 Evidence Report

required more action to be taken including those associated with flood risk management.

In 2022, the Department for Infrastructure (DfI) commenced construction of the Belfast Tidal Flood Alleviation Scheme[364] which aims to provide a long-term approach to tidal flood risk management over the tidal reach of the River Lagan in Belfast. The scheme, through the construction of approximately 8.5 kms of flood defences over a 2-year period, will reduce the tidal flood risk to over 1500 properties identified as being at risk from a 1 in 200-year tidal event once completed. Under climate change projections, causing sea level rise, this number would be predicted to increase to over 3900 properties by 2080. As such the scheme has been designed to take account of the future impact of climate change as set out in the Department's "Technical Flood Risk Guidance in Relation to Allowances for Climate Change in Northern Ireland"[365]. The scheme design has factored the projected sea level risk to 2080 as well as allowing for future adaptability of the structures.

In response to risk to the coastal environment and communities DAERA, to support the work of the NI Coastal Forum, commissioned a 3-Dimensional Coastal Survey[366] of the Northern Ireland coastline in 2020 to acquire high resolution data through the use of topographic LiDAR, high resolution satellite-derived bathymetry data and pilot bathymetric LiDAR survey.

In 2021 a complete airborne LiDAR and orthophotography survey of the Northern Ireland coastline was undertaken. This data provides a precise representation of the morphology of the coastal environment of Northern Ireland and it is intended that the surveys will be repeated to provide a robust dataset to help monitor for coastal change to be used as the evidence base to inform the future coastal policy management decisions.

3.11.2.3 Scottish Government

The Climate Change (Scotland) Act 2009 sets the statutory framework for Scotland to adapt to climate change. The legislation requires Scottish Ministers to set out a programme of policies and proposals (a plan) for climate change adaptation every five years. These plans must address risks identified in the statutory UK Climate Change Risk Assessment (CCRA), which is also updated every five years, based on independent expert advice around the evidence on current and expected future climate impacts.

In 2024, the Scottish Government published its third statutory adaptation plan: Scottish National Adaptation Plan 2024-2029 (SNAP3). SNAP3 describes how we will support Scots to adapt and continue to live well in Scotland's changing climate. SNAP3 sets out a long term vision and defines Scotland's priorities for action over

[364] Northern Ireland: Belfast Tidal Flood Alleviation Scheme
[365] Northern Ireland: Technical Flood Risk Guidance in Relation to Allowances for Climate Change
[366] Northern Ireland: 3-Dimensional Coastal Survey

the next five years via its 23 objectives – all of which were informed by public engagement and consultation.

To deliver on Scotland's adaptation objectives, the Climate Change (Scotland) Act 2009 creates a legal duty across the Scottish public sector (including local authorities) to help deliver the national adaptation plan. SNAP3 includes over 200 policies focused on actions that are effective and inclusive, as part of Scotland's just transition to net zero and climate resilience. Climate change impacts people and places in multiple ways, and communities with less capacity to adapt because of existing inequalities will need support. Scotland's inclusive and place-based approach to adaptation is supported by the national capacity-building Adaptation Scotland programme.

To monitor success, SNAP3 includes a monitoring framework. This framework includes 38 data-ready indicators to track progress of the five-year objectives and be reported to the Scottish Parliament annually; and 16 data-ready indicators to track higher level trends in resilience and longer term adaptation outcomes. The existing UK CCRA process provides a full and independent measure of Scotland's overall climate resilience every five years; and progress of Scotland's adaptation plans and the actions within them will continue to be independently evaluated twice within every five-year period by the CCC.

3.11.2.4 Welsh Government

The UK Climate Change Act 2008 requires Welsh Ministers to lay reports before the Senedd Cymru / Welsh Parliament on the objectives, actions and future priorities of Welsh Ministers around the impacts of climate change.[367] This requirement is further strengthened by the Well-being of Future Generations (Wales) Act 2015, which sets out a number of overarching Well-being Goals that apply to public sector organisations in Wales.[368] Climate change is integral to all the Well-being Goals and there is specific reference to a 'resilient Wales', which includes resilience to the effects of climate change. Climate change is also a key element of the role of the Future Generations Commissioner for Wales and Public Service Boards (PSBs) created under the Act. PSBs are required to produce collaborative local well-being assessments, which must take into account the latest UK Climate Change Risk Assessment evidence. The Environment (Wales) Act 2016 also sets out further provisions in relation to climate change, including requirements for the sustainable management of natural resources as well as setting out governance arrangements for coastal and flood management.

Several strategic, interlinked policy developments have taken place in Wales that are helping to establish a robust strategic framework for climate change adaptation. These include publication of an updated National Development Framework, Flood and Coastal Erosion Risk Management Strategy, Water Resource Management Plans, National Peatland Action Programme, Area Statements for the management

[367] Wales: Climate Change Act 2008
[368] Wales: Well-being of Future Generations (Wales) Act 2015

of natural resources, and development of a new Sustainable Farming Scheme which will include measures for delivering climate adaptation.

3.11.2.5 Jersey

The Shoreline Management Plan was agreed in January 2020. The plan aims to ensure that coastal defences continue to protect the island over the next 100 years. Sea level rise and rainfall patterns resulting from climate change were modelled to access their impacts on coastal flooding and erosion. The plan considers risks to the community, environment, and economy of Jersey. It considers the coastal defences that are in place around the Island. Policies were developed to manage the risk these present and the appropriate management policy for each unit of the coastline was agreed.

Climate change will increase the threat of Invasive Non-Native Species (INNS). The Jersey Biological Security Framework has been set up to ensure international obligations are met and Jersey is protected from negative impacts. Components of this project include a review of current measures, establishing funding to deal with Asian Hornet threat and development of long-term management plans for Japanese Knotweed.

Government is working towards pulling together an overarching Adaptation Plan for the Island in the government Plan period 2025-2028. The Bridging Island Plan (2022) has been informed by the Shoreline Management Plan and, as a consequence has a policy regime that seeks to direct growth to areas which are least vulnerable to the long-term impacts of climate change, including flood risk; and to ensure that new development is more resilient to the potential impacts of flooding.

3.11.2.6 Guernsey

Guernsey's Climate Change Policy outlines the importance of adaptation for the island and the need for an overarching adaptation plan. The development of the adaptation plan is due to commence in the near future. Ahead of the development of the island adaptation plan, some decisions are already being taken with the threats of climate change in mind, including:

- In 2013, Guernsey's government agreed an approach to enhancing the coastal defences to adapt to the effect of climate change. With Guernsey being a small island, with around half the island being relatively low lying, the impacts of increased sea levels are potentially significant. The regions most at risk to climate-related flooding were identified and initial options for addressing at risk areas have been provided. Implementation has started on improving the defences.
- From a water security perspective, Guernsey is relatively well supplied from several reservoirs, which were created by historic quarrying. There is an ongoing review of whether to continue to allocate disused quarry sites for water reserves. That review is taking into account the predicted future impacts of climate change.

3.11.2.7 Isle of Man

The Isle of Man identified three priority issues for adaptation actions in 2015: awareness raising; public, animal and plant health; and storms and flooding. In 2020, the Department of Infrastructure formed the Flood Management Division to be responsible for all matters relating to flood risk management. National strategy documents include the National Strategy on Sea Defences, Flood and Coastal Erosion[369]. An independent review following severe flooding in the east of the Island in 2019 has also informed major works: Independent Review Final Report[370]. More information on specific projects can be found on the IOM Flood Hub website[371].

The Isle of Man Climate Change Plan 2022-2027[372] commits to the delivery of an Adaptation Strategy taking account of climate impacts across all areas of society, economy and the natural environment. This will be based on an independent Climate Risks and Opportunities Assessment (currently underway).

In addition, the Isle of Man Climate Change Plan 2022-2027[373] contains a commitment to add adaptation to the climate change duties for public bodies, the outcomes of which will be that adaptation becomes a statutory duty for all Manx public bodies and annual reporting on adaptation will be required.

3.11.2.8 Gibraltar

Gibraltar conducted its first Climate Change Vulnerability & Risk Assessment[374] in 2022 and is now working on developing a comprehensive Adaptation Strategy. This will focus on the priorities identified below:

- **Energy:** Gibraltar will increase energy diversification by accelerating investment in renewable energy and seek to identify alternative sources of energy imports. Government will also invest in energy efficiency programmes to reduce demand and promote passive approaches to cooling wherever possible.
- **Water**: Gibraltar will work with its main water provider to ensure redundancy in back-up energy systems for desalination and investigate the use of non-brackish (but non-potable) water sources for street cleaning and irrigation.
- **Food:** Continue diversification of food import routes and assess the impact of volatility and higher food prices on vulnerable groups.
- **Public Health**: Assess impact of increases in extreme heat on vulnerable populations and determine ways in which these impacts could be addressed. Increase monitoring of vector borne diseases.

[369] National Strategy on Sea Defences, Flood and Coastal Erosion
[370] Independent Review Final Report
[371] IOM Flood Hub website
[372] Isle of Man Climate Change Plan 2022-2027
[373] Isle of Man Climate Change Plan 2022-2027
[374] Climate Change Vulnerability & Risk Assessment

3.12 How best available science, gender perspectives and indigenous, traditional and local knowledge are integrated into adaptation;

The UK Climate Projections (UKCP), produced by the Met Office on behalf of government, is a set of tools and data that show how the UK climate may change in the future. UKCP underpins the independent assessment to support the UK Climate Change Risk Assessment. The CCRA then informs the relevant policies and plans set out in the National Adaptation Programme (NAP).

The UK is also committed to promoting equality and inclusion, including women's empowerment and gender equality. Public authorities must fulfil responsibilities set out under the UK's Equality Act (2010)[375] in the exercise of their functions. Through programmes such as the Protection Fund[376], the UK supports projects that use traditional knowledge, adaptation, and historical practices to address international heritage at risk from climate change and natural disasters.

3.12.1 Global Goal on Adaptation (GGA) Thematic target 7 - Cultural heritage

Climate change impacts our cultural heritage including historic buildings, museums, heritage sites, and archives. Climate change will increase the risk of flooding to more properties and areas. Areas already prone to flooding may experience an increase in frequency and severity. Heritage assets on the coast are particularly vulnerable where severe weather and sea level rise can combine to exacerbate the impacts on already vulnerable coastlines.

Likewise, intangible cultural heritage, such as knowledge, traditions, and folklore will also be affected by climate change. This derives from the risk of communities and groups of people being displaced and the associated impact on their traditions and customs. Resilience to climate change can therefore protect both UK's tangible and intangible cultural heritage, which in turn has associated benefits, including benefits to the UK's economy through heritage-related tourism, and wider heritage-related socioeconomic benefits including contributing to wellbeing and enhancing communities' pride in place.

To address climate risks to communities and the UK's cultural heritage, the government is:

- Investing billions in projects to improve the UK's climate resilience, including, £2.4 billion until March 2026 to improve flood resilience and better protect communities across England, including from coastal erosion, safeguarding future water supplies.

[375] Equality Act 2010
[376] British Council | Cultural Protection Fund

- Providing support through the £200 million Flood and Coastal Resilience Innovation Programme (FCRIP)[377], including helping 25 local areas between 2021 and 2027 to take forward wider innovative actions that improve their resilience to flooding and coastal erosion.
- Refreshing Shoreline Management Plans[378] by the end of 2024 so that they remain current and relevant, using the most up to date available information.
- Helping UK households that are at risk of flooding to access affordable insurance through the Flood Re[379] scheme.

- The Department for Culture, Media and Sport and its Arm Length Bodies are working with partners to complete the actions as laid out in NAP 3 to understand the threats, impacts and adaptation actions needed to respond to the impact of climate change on cultural heritage.

3.13 Adaptation actions and/or economic diversification plans leading to mitigation co-benefits;

Climate adaptation is essential in achieving other climate goals, including all sectors of the UK economy reaching net zero emissions by 2050. Climate change adaptation is considered a priority for the Farming and Countryside Programme, which will support the implementation of adaptation measures through Environmental Land Management Schemes (ELMs), as referenced in section 2.15.1. ELMs will support farmers to deliver 'public goods' such as healthy soils, clean water and biodiversity-rich habitats. These in turn support the foundations of sustainable and resilient food production in the long term. We have worked closely with farmers, food producers and environmental experts to develop new and improved agri-environmental schemes for farmers and land managers, which encourage greater participation and incentivise collaboration and landscape scale working. We will continue to work closely with key sectors to learn from and improve these schemes over time.

3.13.1 Global Goal on Adaptation (GGA) Thematic target 2 – climate-resilient food

The government is building the UK's resilience to overseas climate impacts on food, as well as helping capitalise on opportunities for the UK food industry to export new products and to new markets.

To ensure climate-resilient food and agricultural production and supply, DEFRA is:

- Delivering a range of measures to improve resilience and adaptation to climate change across the food supply and farming sector as set out in NAP 3. These measures include land management practices, such as action to

[377] Flood and Coastal Resilience Innovation Programme (FCRIP)
[378] Shoreline Management Plans
[379] Flood Re - A flood re-insurance scheme

improve soil health and water resources and to increase tree planting on farms, along with greater investment in innovation.

- Developing future publicly funded research and innovation, including investments under the Farming Innovation Programme[380], a £270m innovation programme which aims to drive up productivity and enhance environmental sustainability, enabling us to adapt to climate change more effectively, while improving levels of food security.
  Continuing to support research on food supply resilience in relation to climate change and adaptation measures through the work of the Met Office's Climate Service and Hadley Centre, and the Group on Earth Observations Global Agricultural Monitoring Initiative (GEOGLAM) until 2025.
- Our supply chains are built on supply from diverse sources, domestic production (producing 62% of the food we need, by value) and imports through stable trade routes. Increasing the long-term resilience of global supply chains will help to maintain the current resilience and security of supply.

3.14 Nature-based solutions to climate change adaptation;

The UK Prime Minister signed the Leaders' Pledge for Nature[381] at the UN General Assembly in 2020. This Pledge has been endorsed by over 75 countries. The UK works with other countries to take forward this agenda, strengthen resilience in national economies and ecosystems, taking an integrated approach to environmental challenges and scale up nature-based solutions.

The National Highways Natural Flood Management Fund was established in 2020/21 to explore the benefits of using nature-based solutions to reduce flood risk as an alternative to conventional hard engineered solutions on motorway and trunk roads. Through the fund, National Highways identified a pilot project seeking to use nature-based solutions as a tool to reduce surface water flooding on motorways and trunk roads associated with the Little Don and Irwell catchments. The pilot was unique as it was a catchment partnership between National Highways, the local Rivers Trusts, and the owners of the land where the natural flood management measures would be implemented. In addition, the fund used a novel bidding platform and a natural flood management modelling tool to rank bids from landowners with proposed measures during a live auction, supported by the Rivers Trust.

In January 2023, Natural England launched the Green Infrastructure Framework[382] which provides voluntary principles and standards for England to help local planning authorities and developers to create or improve green and blue infrastructure at a local level, particularly where provision is poorest. The national standards in the Framework provide a consistent way to set out what good green infrastructure provision looks like. The standards are supported by evidence based practical guidance on how to plan and design good green infrastructure, as well as England-

[380] Boost For Farming Innovation
[381] Home - Leaders Pledge for Nature
[382] Green Infrastructure Framework

wide maps of green infrastructure overlain with socio-economic data. Well-managed green infrastructure has many advantages such as its contribution to biodiversity recovery, cleansing pollutants, absorbing noise and moderating temperatures.

3.14.1 Global Goal on Adaptation (GGA) Thematic target 4 - Ecosystems

Using nature-based solutions will reduce society's vulnerability to climate risk and contribute to species recovery by providing more high-quality habitat for wildlife.

Measures being taken to support the adaptability and resilience of species, habitats and ecosystems to climate change impacts include:

- Setting out plans to increase adaptive woodland management in the updated Tree Health Resilience Strategy[383] and using use climate risk forecasts to inform net zero woodland creation policies, so that tree planting is spatially targeted to account for climate risk. This will be implemented in the post-Nature for Climate Fund forestry policies, including urban tree cover, by 2026.
- Developing 'adaptation of land management to wildfire risk' guidance by 2026 and continue to support public and private sector land managers to develop wildfire management plans.
- Restoring natural function and iconic water landscapes, through updated River Basin Management Plans up to 2027, to allow natural processes to re-establish and to produce the highest-quality habitats naturally, contributing to the achievement of Good Ecological Status at 75% of water bodies by 2027. Working with stakeholders to create and restore habitats and ecosystem functions, including those most at risk from climate change. This includes restoring and creating over 500,000 hectares of wildlife-rich habitat outside of Protected Sites by 2042, and restoring 75% of Protected Sites to favourable condition by 2042 – all in a manner that is suitable in the context of climate change
- Supporting stakeholders to use spatial prioritisation for habitat restoration and creation, informed by climate projections, such as projected hazard and land suitability mapping.
- Maintaining an adaptative management approach to reducing anthropogenic non-climate pressures on marine species and habitats. On Marine Protected Areas this includes delivering our new statutory target for 70% of the designated features to be in favourable condition by 2042, with the remainder in recovering condition.
- Restoring and creating new habitats, including through the Restoring Meadows Marsh and Reef initiative, which aims to restore at least 15% of 2 priority habitats – seagrass meadows, saltmarsh and native oyster reefs – by 2043.
- Improving data gathering and monitoring to support the restoration, recovery and creation of marine habitats, where relevant using effective spatial

[383] Tree health resilience strategy 2018

targeting, including through the marine Natural Capital and Ecosystem Assessment programme (2022-25).

3.15 Stakeholder involvement, including subnational, community-level and private sector plans, priorities, actions and programmes.

3.15.1 Public Participation

Defra, working with UKRI's Sciencewise Programme and Ipsos, ran a Public Dialogue for Climate Adaptation to understand public perceptions and attitudes towards climate adaptation in England. The dialogue explored the public's perspectives of climate adaptation and how they think the government businesses and civil society will address the challenges of climate change.

3.15.2 Private sector

Additional investment from the private sector will be required to support adaptation action over the coming decades. Indicative analysis estimates that, across all 61 risks and opportunities identified in the CCRA3, this could be as much as £10 billion per year.

The government has committed to support the flow of private finance into adaptation through the 2023 Green Finance Strategy[384], it will:

- Work with industry partners to improve the approach to climate resilience assessment and disclosure though developing adaptation metrics and guidance.
- Support private and public collaboration over the next 5 years to address barriers to investment
- Work with the Climate Change Committee to scope research requirements and identify adaptation investment needs and opportunities to inform the CCRA4 Independent Assessment in 2027.

3.15.3 Ownership, stakeholder engagement, alignment of adaptation actions and replicability

The UK government has coordinated and facilitated the mainstreaming of adaptation activity through NAP3. This has included establishing ownership within government for each of the 61 CCRA3 risks and opportunities.

Defra is responsible under the Climate Change Act 2008 for coordinating the UK government's action on climate adaptation. Defra works closely with the Cabinet Office Resilience Directorate on the strategic cross-government coordination of

[384] Mobilising Green Investment - 2023 Green Finance Strategy

climate adaptation, and with the Treasury to build climate resilience into cross-government spending decisions including through the Spending Review.

3.16 Progress on implementation of adaptation

3.16.1 Steps taken to formulate, implement, publish and update national and regional programmes, strategies and measures, policy frameworks (e.g. national adaptation plans) and other relevant information;

The United Kingdom of Great Britain and Northern Ireland submitted its first Adaptation Communication to the UNFCCC in December 2020, setting out its plans to prepare for the impacts of climate change in the UK and to support climate change adaptation overseas. The 2020 UK Adaptation Communication covers the following:

- National adaptation goals including details of NAP2 and the government's Third Strategy for the Adaptation Reporting Power (ARP).
- Examples of implementation of adaptation actions and implementation progress.
- The importance of nature-based solutions, the Adaptation Communication stresses that adaptation actions will take place across a wide range of terrestrial, freshwater and marine ecosystems, and there is an emphasis on projects that provide multiple benefits simultaneously.

An update to the UK's Adaptation Communication in October 2021 also offered updates on progress, including:

- The Climate Adaptation Summit in January 2021; under the UK G7 Presidency, the UK launched the 'Adaptation Action Coalition (AAC)'[385] with the aim of accelerating global action on adaptation.
- The Foreign and Development Ministers' welcoming of the Principles for Locally Led Adaptation; the principles aim to shift the dynamic so that adaptation interventions are informed by local priorities, knowledge, and expertise.
- In July 2023, NAP3 was published by the UK government, setting out a vision for a country that effectively plans for, and is fully adapted to, the changing climate.

NAP3 contains actions to address the risks of climate change to the natural environment, infrastructure, people and the built environment, business and industry, and international risks to the UK, as well as a chapter outlining work with local government on climate change adaptation. The NAP sets out policies and measures to be implemented at several levels and identifies the actors responsible for their

[385] Adaptation Action Coalition: an overview

implementation. NAP3 is underpinned by a monitoring tool to track progress on adaptation actions, on a periodic basis.

3.16.2 Implementation of adaptation actions identified in current and past adaptation communications, including efforts towards meeting adaptation needs, as appropriate;

Since publication of the 2020 Adaptation Communication, Defra has continued to progress domestic action on adaptation.

As identified in our adaptation communications, the following actions have been Implemented:

- Updating the government's Green Book Supplementary Guidance on Accounting for the Effects of Climate Change to encourage climate change risks to be embedded in policy and programme decisions, drawing on climate evidence and assessments.
- Establishing new government-wide adaptation governance to provide senior-level oversight and strategic direction on the delivery of statutory duties on adaptation and resilience policy across the government.
- Under the UK G7 Presidency, the Foreign and Development Ministers welcomed the Principles for Locally Led Adaptation, following the UK's endorsement of the Principles at the Climate Adaptation Summit in January 2021. The Principles for Locally Led Adaptation aim to shift the dynamic so that adaptation interventions are developed and implemented in a way that is equitable and informed by local priorities, knowledge and expertise.
- Investing in international disaster risk reduction: The UK contributed of £120 million to regional risk pools during the G7 Leaders' Summit, to support an improved response to extreme weather and climate-linked disasters.
- Making businesses more resilient, including implementing economy-wide, climate-related financial disclosures for businesses and investments products, which will support investment decisions to be aligned with our transition to a lower-carbon, climate resilient economy, globally.

3.17 How effective are implemented adaptation measures

3.17.1 Implementation

As set out in the UK Climate Change Act 2008, the Climate Change Committee has a duty to assess the progress in implementing the NAP, reporting to Parliament every two years. The government is working closely with the Climate Change Committee to identify how best to monitor adaptation activity and assign sectoral metrics and indicators for exposure and vulnerability to risk.

England and Devolved Governments fully recognise the scale of the challenge of adapting to climate change, as set out in the CCRA3 and its underlying reports.

3.17.2 Global Goal on Adaptation (GGA) process target 3 – Implementation

Examples of recent achievements include:

- Defra has set up new governance and an approach to actively manage the NAP programme through regular commissions to monitor delivery against NAP3 commitments. Risk owning departments are responsible for developing adaptation plans and policies and evaluating the effectiveness of these throughout the NAP3 implementation period (2023 to 2028).
- Passing the landmark Environment Act 2021, which enshrines the 25 Year Environment Plan in law and includes an historic legally binding target for species abundance for 2030.
- Working with over 120 businesses and public bodies to support them to report on activities to strengthen their resilience to climate change. Adaptation reporting focuses on a range of critical sectors, such as rail, road, energy, water, heritage, the natural environment, and finance, as well as a pilot of reporting by local authorities.
- Ensuring homes are fit for the future. This includes introducing a new requirement through the Building Regulations[386] to ensure that new residential buildings are built for a warmer climate. The new requirement includes prioritisation of passive measures to address overheating, including solar gains.
- The UK has implemented mandatory reporting in line with recommendations of the Taskforce on Climate-related Financial Disclosures (TCFD) across the economy as the core basis of Sustainability Disclosure Requirements (SDR). TCFD-aligned reporting requires disclosure of climate related financial risk information structured around four thematic areas: governance, strategy, risk management, and metrics and targets.

3.17.3 Coordination activities and changes in regulations, policies and planning

Over the 5-year NAP3 programme, UK government has committed to drive coordinated action on climate adaptation, including:

- As part of the 'UK government Resilience Framework'[387] outlined in section 1.4, the UK government will deliver on a new strategic approach to resilience.
- Work to strengthen governance arrangements overseeing the implementation of NAP3 which better take infrastructure sector interdependencies into account, ensuring these arrangements work alongside existing governance and collaboration forums on resilience.
- Work with external stakeholders and member organisations to strengthen the role of the Infrastructure Operators Adaptation Forum in driving forward best

[386] Approved Document O: Overheating
[387] The UK government Resilience Framework

practice on managing sector interdependencies including the risk of cascading failures.

- The government and its agencies will provide the governance structures, guidance, and plans to coordinate and align actions for nature recovery. It will explore options to establish appropriate governance arrangements so that the UK Environment Act 2021 biodiversity targets are delivered in a way that considers a changing climate
- 'Local Nature Recovery Strategies'[388] (LNRS) are measures set out in the Environment Act (2021) and will support public, private and voluntary sector organisations to work together on identifying collective priorities for restoring nature and improving climate resilience
- The government and external partners will integrate water management by delivering catchment action plans backed up with new funding to improve all water bodies in England. This will target actions where they will deliver the greatest impact for water quality, drought and flood management, and nature recovery.

3.18 Monitoring and evaluation of adaptation actions and processes

3.18.1 Achievements, impacts, resilience, review, effectiveness and results;

Effective monitoring and evaluation (M&E) is important for informing future decision making on adaptation. The Climate Change Committee's Technical Report for the CCRA3 Independent Assessment outlines that for many of the risks and opportunities, adaptation actions can often take a long time to take effect. In particular, the complexity of how systems respond to adaptation measures while also responding to other environmental and socio-economic pressures is not easily untangled.

M&E can help assess the effectiveness of actions taken, inform resource allocation decisions and reassess goals based on their feasibility or relative importance. When developing policy responses for climate risks, policy officials will also identify accompanying process and outcome indicators. Such indicators will help us assess whether: a) actions are being delivered b) actions are efficient 8 c) progress is being made on the declared outcomes.

At present, gaps exist in our ability to monitor our adaptation efforts. This is due to the complexity of adaptation and the associated challenges of identifying and developing appropriate indicators. As outlined in the M&E annex[389] to NAP3, some of the common challenges included:

[388] Local Nature Recovery Strategies
[389] NAP3: Annexes 2 to 5: Further supporting information

- Proving cause and effect for adaptation actions in a complex system with multiple drivers of change.
- Tracking progress to a moving target in a system with interacting and cascading climate and socioeconomic risks.
- The mismatch between short evaluation cycles and the time needed to effect change, especially for the natural environment.
- Access to high quality, affordable and trustworthy data.

These challenges are consistent with the findings of the Climate Change Committee in its 2021 progress report to Parliament. Adaptation process indicators (such as the number of plans adopted, or buildings retrofitted) are relatively simple to measure. Indicators that measure adaptation outcomes (such as climate-sensitive sectors of the economy being better adapted) are rarer as they are harder to measure. Work is ongoing to identify a suite of existing and potential indicators to evaluate the success of the NAP3 programme. In many cases, indicators will be researched or developed as part of an action.

As committed to in NAP3, the UK government is developing an Monitoring Evaluation and Learning framework, expected in 2025.

3.18.2 Global Goal on Adaptation (GGA) process target 4 - Monitoring, evaluation and learning (MEL)

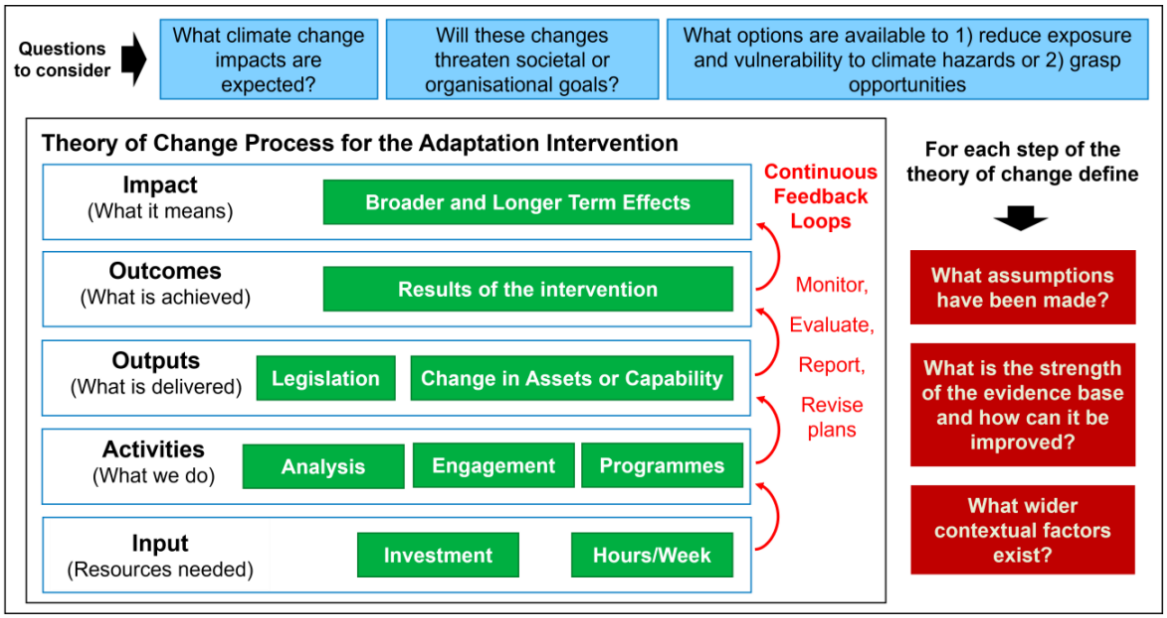
Adapting to a changing climate is a dynamic problem involving complex environmental and socioeconomic systems, such as our food or energy systems.

Due to the complexity of this challenge, DEFRA is using a theory of change approach applying the logic of interventions from action to impact to developing adaptation policy. As described in the 'Magenta Book',[390] which sets out guidance on evaluation in government, a theory of change captures the reasoning behind how an intervention is expected to work. The main steps involved in achieving the desired outcomes will be explicitly outlined (see **Figure 22**). Equally importantly, policymakers will clearly define any assumptions made, the quality and strength of the evidence supporting those assumptions, and wider contextual factors. Monitoring, evaluation and learning are fundamental components of this approach and will be used to challenge the assumptions made and support continuous improvement.

Please see below schematic for the recommended process for developing plans to adapt to climate change. Initially, the impacts of climate change and the adaptation options available will be considered. The logical steps of the theory of change approach will then be followed to design an intervention. First, the impact desired will be clearly stated and then the necessary outcomes, outputs, activities and resources required to achieve it. Continuous feedback loops to monitor, evaluate, report and finally revise plans are needed throughout each stage.

[390] The Magenta Book

Figure 22: Schematic of the recommended process for developing plans to adapt to climate change through a theory of change approach



Monitoring, evaluation and learning fosters a culture of sharing and learning from experiences and bringing risk owning teams from across departments together into outcome-based groupings, to more easily identify synergies and interdependencies and ensure we are working together efficiently.

3.18.3 Approaches and systems used, and their outputs;

Throughout the NAP3 period, Defra will continue to support risk owning departments across UK Government to further develop and implement their adaptation plans.

The Climate Change Committee's latest progress report in 2023 introduced a new framework which assesses 13 sectors structured around social outcomes or systems impacted by climate change, known as 'monitoring maps'. These most notably increase the focus on tangible changes in the economy, society and the environment by identifying a set of outcomes and actions necessary to deliver climate resilience within each sector (Climate Change Committee, 2023). It also expands on the enabling conditions required to achieve the outcomes, and the role of public policy in bringing them about.

The Climate Change Committee (CCC) is looking to share learnings from the UK experience and to learn from others[391] about theirs. The CCC developed a set of briefings detailing the approaches, reflections and lessons learned by the CCC in 12

[391] Sharing the UK's approach - CCC

years of advising the UK on emissions reductions and adapting[392] to climate change.

England will continue to champion action to advance adaptation alongside mitigation internationally, helping to build global resilience, drive action to protect those who are most vulnerable to climate change, and learn from others as per the CCCs advice. 'The 2030 Strategic Framework for International Climate and Nature Action[393]' was the first strategy to integrate our approach to climate mitigation, adaptation, and other environmental policies, to maximise co-benefits and minimise trade-offs, seeking to advance global adaptation and resilience as an international priority, including through co-beneficial mitigation and nature actions

3.18.4 How support programmes meet specific vulnerabilities and adaptation needs

Climate risks to the UK resulting from high temperatures, changes to air quality, and flooding can impact people's health and wellbeing as well as on the delivery of health and social care services. These risks also impact on food safety, water quality and water supplies, and an increased likelihood of vector-borne disease in the UK. Such risks are more likely to negatively impact on some members of the population, including people with disabilities and older people. Of the UK population, 38% of disabled people are 65 and older (source: UK Disability Survey research report, June 2021). In addition, overseas climate change impacts can increase the presence of diseases within the UK.

3.19 How adaptation actions influence other development goals;

Sustainable development has been considered and integrated into actions across all critical sectors identified in CCRA3, including education, health, the natural environment, and infrastructure. In addition to the actions, we are taking domestically, sustainable development is at the core of the UK's Official Development Assistance, enabling adaptation and resilience overseas. This not only enhances the resilience of the UK to climate risk but helps support the sustainable development needs of other countries.

The UK's International Climate Finance considers gender equality, disability inclusion and other sustainable development goals, with key performance indicators evaluating the success of UK International Climate Finance, including measurements of sustainable development objectives. More on this in chapter 4.

Adaptation and resilience of people and our natural environment contributes to many of the Sustainable Development Goals (SDGs). For marine ecosystems, SDG13 and SGD14 on Climate Action and Life Below Water are the most relevant for ocean-climate policy, and adaptation actions contribute to the UK's progress against the

[392] CCC Insights Briefing 7 Assessing Progress Preparing for Climate Change
[393] 2030 Strategic Framework For International Climate And Nature Action

targets. The UK's Voluntary National Review of Progress against the SDGs[394] highlights strong progress against SDG14 targets. The North East Atlantic Ocean Acidification Hub has been established in the UK. The Hub will act as the European regional centre for conducting monitoring and research into ocean acidification, primarily within the Northeast Atlantic region, including the submission of data to the UN for SGD 14.3 on ocean acidity.

3.19.1Global Goal on Adaptation (GGA) Thematic target 3 – Health

Since 2022, the climate-heath nexus has gained increasing attention, as countries recognise the importance of strengthening comprehensive policies to prevent the health impacts of climate change, building resilient and sustainable health systems, improving their ability to anticipate and implement adaptation interventions against climate-sensitive disease and health risks, bolstering climate-health information services, surveillance, early warning and response systems and a climate-ready health workforce. Subsequently, at COP28 the UK announced the UK's flagship Climate Resilient and Sustainable Health Systems Programme.

The government set out its plans to support vulnerable communities through:

- FCERM research and development projects[395], providing a critical assessment of the links between flooding and social vulnerability, social deprivation and inequalities and in the UK.
- Implementing the Approved document O[396] of the Building Regulations, in June 2022, to limit excess heat and solar gains across all new residential buildings. It will use recommendations from the Housing Health and Safety Rating System review to support the effective enforcement of quality and safety standards in all tenures of residential accommodation, including standards related to excess heat by 2030.
- Monitoring the occurrence of vector-borne diseases (VBDs); with the assistance of its specialised agencies, it will enhance surveillance and monitoring of overseas health risks as well as update the risk assessments of the Human Animal Infections Risk Surveillance (HAIRS) group, to provide a cross-government risk assessment defining the risk of VBDs in the UK.
- Building the capacity and capability of those working in the sector and those travelling overseas to recognise cases of suspected VBDs to increase detection of cases, limit spread and improve patient outcomes.
- In collaboration with its specialised agencies, making access to the Air Quality and Health Information and government Web Services available to the public and vulnerable groups.

[394] Voluntary National Review 2019
[395] FCERM Research and Development Projects
[396] Approved Document O: Overheating

3.20 Cooperation, good practices, experience and lessons learned

3.20.1 Efforts to share information, good practices, experience and lessons learned, including as they relate to:

3.20.1.1Science, planning and policies relevant to adaptation

Defra is supporting teams to learn from each other by facilitating communities of practice, working groups and expert panels. These range across areas such as specific sector-based risks, monitoring and evaluation and economic appraisal.

As part of the 2024-27 Met Office Hadley Centre Climate Programme (MOHCCP), government is working with the Met Office, academic partners and users of UKCP to develop further climate science capability to support adaptation.

A Climate Adaptation Research and Innovation Board (CARIB) has been convened to ensure that adaptation research and innovation efforts are targeted to support NAP3 delivery over the plan period (2023-28). CARIB brings together senior representatives from government departments, non-departmental public bodies and non-ministerial departments with major climate adaptation research and innovation (R&I) budgets or responsibilities under NAP3. This will be achieved through the development of a Climate Adaptation Research and Innovation Framework (CARIF) to provide strategic direction and influence spending decisions on climate adaptation across departments and UK Research and Innovation (UKRI) programmes.

3.20.1.2 Integration of adaptation actions into planning at different levels;

The government is improving its understanding of the distributional impacts of climate change and adaptation action through research programmes for the Independent Assessment of the fourth Climate Change Risk Assessment (CCRA4) and the UKRI-Defra funded 'Maximising UK Adaptation to Climate Change'[397] (MACC) Programme.

3.21 Helping developing countries to identify effective adaptation practices, needs, priorities, and challenges and gaps in a way that is consistent with encouraging good practices

Since 2011, the UK has supported over 110 million people adapt to the effects of climate change. To achieve this, the UK funds a range of bilateral, regional multilateral programmes to increase adaptation action in priority sectors and assist countries with their national adaptation plans and processes.

[397] Maximising UK Adaptation to Climate Change Research Projects

This includes helping improve accessible early warning systems and preparations as well as developing the capacity to act on the risks identified and strengthening the delivery mechanisms that enable effective early action to reach those who need it most. The UK is the sole funder of the Risk-informed Early Action Partnership (REAP)[398], an initiative launched in 2019 that brings together relevant actors from the development, humanitarian and climate communities on the Early Warning Early Action (EWEA) agenda. REAP provides international analysis, evidence, learning, coordination, and debate, to integrate and expand a systemic shift towards acting earlier to reduce the impacts of disasters, with the target of making 1 billion people safer from disasters by 2025.

The UK recognises that SIDS are on the frontline of climate change and are uniquely climate and economically vulnerable. The UK's Small Island Developing State Capacity and Resilience (SIDAR) programme, and the Sustainable Blue Economies programme, both launched in 2022, will support access to climate finance and the development of prosperous ocean-based economies.

The UK supports Least Developed Countries (LDCs) by:

- Chairing the Climate Risk and Early Warning Systems Initiative (CREWS), [399]
- Supporting the Least Developed Countries Initiative for Effective Adaptation and Resilience (LIFE-AR)[400] programme since 2020.

The government is also assisting in building resilience locally, the Weather and Climate Information Services (WISER)[401] programme enables communities and governments to better anticipate and prepare for climate shocks and stresses, reducing their impact and protecting lives, homes and livelihoods. To date, WISER has helped to avoid over £200 million worth of losses in East Africa through application of climate information and helped to improve the resilience of over 8 million people who use WISER services. Additionally, WISER in the Middle East and North Africa aims to deliver transformation in the generation and use of co-produced weather and climate services to support decision making at local, national, and regional levels.

3.21.1 Global Goal on Adaptation (GGA) Thematic target 6 - Livelihoods

The UK has been a leading supporter and contributor to several climate finance programmes internationally that have embedded gender inclusion within their design and combine both gender mainstreaming and gender focussed programming. For example:

[398] Home Page | REAP
[399] CREWS
[400] Supporting the LDC Initiative for Effective Adaptation and Resilience (LIFE-AR)
[401] Weather and Climate Information Services (WISER)

The UK has been the leading supporter to date of the United Nations Development Programme (UNDP)'s Climate Finance Network (CFN), which has a dedicated workstream on Gender and Social Inclusion and Climate Change Finance and supports the network's countries in integrating gender and social inclusion into climate change planning and budgeting processes.

The UK has also worked to build women's and girl's climate resilience through investment in more inclusive core and shock-responsive social protection. Through the Better Assistance in Crisis (BASIC) and Gender-responsive Social Protection (GSP) programmes we are providing technical assistance and expertise to support partners on how to ensure social protection systems and interventions can respond to climate risks and the differential needs of women and girls, in the COVID-19 response and recovery.

3.22 Strengthening scientific research and knowledge related to: (i) Climate, including research and systematic observation and early warning systems, to inform climate services and decision-making; (ii) Vulnerability and adaptation; (iii) Monitoring and evaluation.

Research and information sharing are integral to building capability. Increased awareness of climate risks will improve risk management plans and enable the public, businesses and other organisations to make more informed decisions. This is why the government is supporting and funding several innovative research programmes.

Under the UK's COP26 Presidency, we launched the Adaptation Research Alliance (ARA)[402], a global coalition of over 180 organisations across the spectrum – from research to action – from 60 economies. The ARA supports action-oriented research that informs adaptation solutions and reduces risks from climate change at the scale and urgency demanded by the science. The Climate Adaptation and Resilience (CLARE) programme[403] is a UK-Canada framework research programme on climate adaptation and resilience, aiming to enable socially inclusive and sustainable action to build resilience to climate change and natural hazards in Africa and Asia-Pacific. Bridging critical gaps between science and action, CLARE develops new tools and supports partner governments, communities, and the private sector to use evidence and innovation to drive effective solutions to the climate challenge, whilst building the capacity of both those carrying out the research and those using the resulting evidence.

[402] https://www.adaptationresearchalliance.org/
[403] https://clareprogramme.org/

3.22.1 Policy innovation and pilot projects.

The government has committed to support world-leading science and evidence, such as the UK Climate Projections and jointly fund a £15 million UK Research and Innovation/Defra programme to support the research and innovation needed to deliver adaptation action.

As part of UK Research and Innovation's 'building a secure and resilient world' and 'building a green future' strategic themes, the Maximising UK Adaptation to Climate Change (MACC) programme will identify the skills, standards and data provision needed to increase adaptation capability across government and wider society.

The MACC programme will build capacity, knowledge, and skills that will offer practical and scalable solutions to meet the UK's challenges in the face of a changing climate and put the UK at the forefront of climate adaptation strategies at both the local and national level. The programme will also fund transdisciplinary research to collaborate and facilitate two-way transfer of knowledge between research, policy and other end users to drive transformation, helping the UK to adapt to climate change, focusing on four themes:

- **theme one**: societies' exposure and vulnerability to extreme climate hazards
- **theme two**: adaptation solutions
- **theme three**: future resilience and decision making
- **theme four**: enablers of adaptation

UK government investment in climate services helps to provide information for the public and businesses. Evidence from a range of studies suggests that weather and climate services, including early warning systems, can lead to economic benefit-cost ratios of around 9:1, arising from the information used to improve decision making.[404] Supported by this investment, the Met Office Hadley Centre delivers world-leading evidence on climate variability to better inform decision-making, including the UK Climate Projections. As part of the 2024-27 Met Office Hadley Centre Climate Programme (MOHCCP), the UK government is working with the Met Office, academic partners and users of UKCP to develop further climate science capability to support adaptation.

The UK is also the current chair and board member of the Climate Risk and Early Warning Systems Initiative (CREWS)[405], a specialised financing mechanism launched in 2015 that responds to the urgent need to address climate related risks and their impacts on vulnerable communities – specifically LDCs and SIDS, whilst empowering the leadership of women.

[404] UK Climate Risk
[405] CREWS

Chapter 4: Information on financial, technology development and transfer and capacity-building support provided and mobilised

4.1 Information on national circumstances

4.1.1 Description of the systems used to track and report on support provided and mobilised

The UK has committed to spend £11.6 billion of International Climate Finance (ICF) between financial years 2021/22 to 2025/26. This is new and additional climate finance support from the UK's previous ICF commitment of £5.8 billion between 2016/17 and 2020/21. The UK spent £5.98 billion within this previous commitment period.

The UK aims to achieve a balance between mitigation and adaptation support through its £11.6 billion ICF commitment. We have made the following further key sub-commitments:

- £1.5bn adaptation spend in 2025;
- At least £3bn on development solutions that protect and restore nature and biodiversity, including £1.5bn on forests, and
- Up to £1bn on clean energy research and demonstration programmes through the Ayrton Fund[406].

UK ICF targets strong outcomes for climate mitigation and adaptation, nature and biodiversity. We use our ICF to reduce poverty through supporting resilience and accelerating the global shift to net zero by giving developing countries access to more, better and faster finance and helping to mobilise finance from the private sector to meet climate and nature goals.

The UK balances our ICF spend between support for mitigation and adaptation. We invest in mitigation where there are opportunities for green-growth, where emissions are growing rapidly and in nature-rich countries that play a role as major carbon sinks to reduce future climate impacts.

Our ICF programmes support the most vulnerable, helping build the capacity of people and communities to adapt and become more resilient to the impacts of climate change, supporting transformation of systems, and helping countries and communities deal with impacts when they occur. There is more detail about our adaptation support for developing countries in chapter three.

[406] Guidance on Ayrton Fund

UK ICF supports accelerating the clean energy transition in both energy-producing and energy-consuming sectors to help countries provide access to affordable, reliable, and clean energy for all. This transition will reduce or avoid high emissions pathways, making use of innovation, different technologies, and carbon pricing and addressing social and gender barriers to clean energy access.

In line with the recommendations from the Dasgupta Review[407]and the commitments set out in the Kunming-Montreal Global Biodiversity Framework[408], we use ICF to protect, sustainably manage and restore nature, reviving natural and degraded terrestrial and marine ecosystems. We help the transition to nature positive economies by supporting governments, central banks, businesses, and financial institutions to integrate the value of nature into their decision-making.

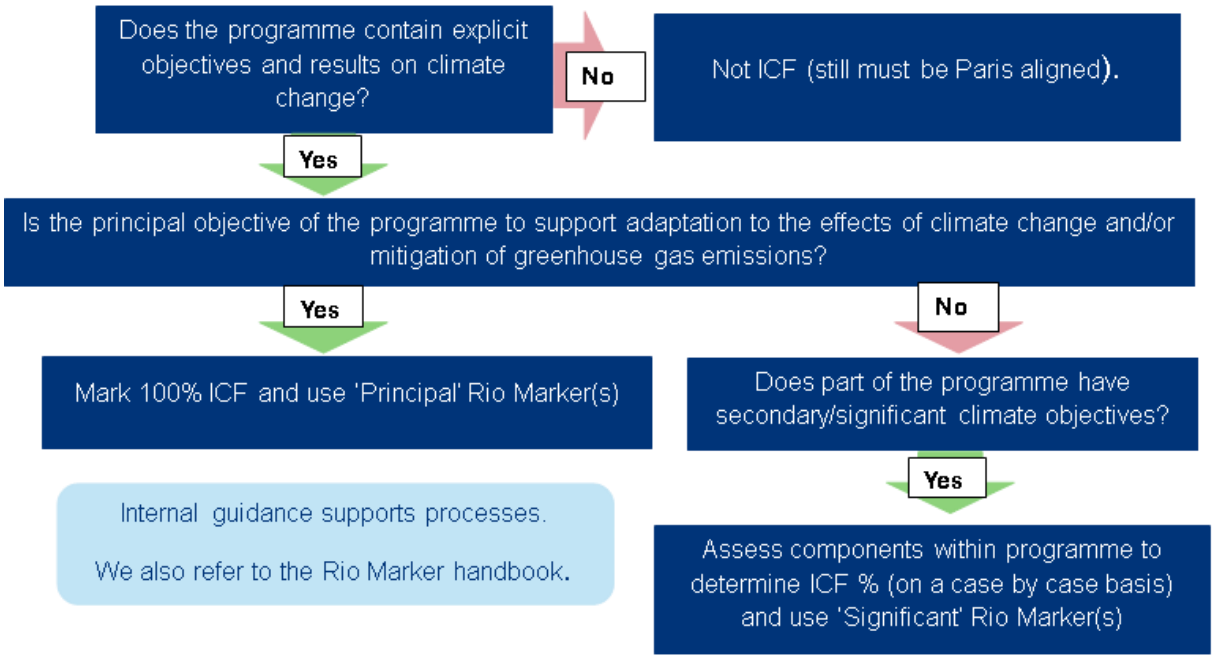
ICF is part of the UK's Official Development Assistance (ODA) budget. The UK met our commitment to ensure that all new bilateral UK aligned with the Paris Agreement in 2023. In addition to ICF from the ODA budget, from 2021 onwards the UK has also reported climate eligible outflows from British International Investments (BII). The UK also puts ICF into BII; to avoid double counting, ICF inflow amounts are deducted from climate eligible outflows for reporting.

The UK's ICF is spent through these government departments: the Foreign, Commonwealth and Development Office (FCDO), the Department for Energy Security and Net Zero (DESNZ), the Department for Environment, Food & Rural Affairs (Defra), and the Department for Science, Innovation and Technology (DSIT). ICF is allocated to these departments via a wider process called a Spending Review, where budgets are allocated to departments over a set period. The most recent Spending Review completed at end of October 2024 allocated funding for UK financial years 2024/25 to 2025/26 (i.e. April 2025 to March 2026). For UK ICF, this means budgets have been allocated to cover the full £11.6bn commitment.

Departments are responsible for their ICF expenditure but draw on shared guidance and methodologies where possible. An example of where methodologies are being improved is in DSIT. DSIT is developing a methodology to categorise, and attribute spend to ICF eligible projects with the view of providing a full project list with updated ICF spend during the course of 2025. The figure below outlines how ICF expenditure is identified as programmes are developed:

[407] Final Report - The Economics of Biodiversity: The Dasgupta Review
[408] COP15: Final text of Kunming-Montreal Global Biodiversity Framework

Figure 23: Identification of ICF



To measure the quality and impact of the UK's ICF, we aim to apply these four elements to all our ICF programmes:

1. Each programme has a **Theory of Change** and a logframe, with indicators and milestones for Outputs, Outcomes and Impacts.
2. **Annual Reviews**[409]: Each year, each programme is scored against how well it is delivering against the Theory of Change and logframe.
3. Across the portfolio of ICF programmes, we monitor and publish a core set of **Key Performance Indicators**[410] measuring impact.
4. **Evaluation and Learning**[411]: Many ICF programmes have independent evaluations and lessons learnt are collected and shared on a regular basis.

ICF portfolio data is collected at departmental level and regularly collated at a cross-government level to support the overview of the portfolio and strategic decision making. The table below sets out when we report externally on UK ICF and data becomes publicly available.

[409] https://devtracker.fcdo.gov.uk/
[410] Climate Finance Results
[411] International Climate Finance Programmes Synthesis of Learning

Table 31: Overview of ICF reporting

Frequency	What is reported	Source
Monthly	Primarily financial transactions.	Data is reported via the International Aid Transparency Initiative (IATI)[412] Data is automatically transferred to upload relevant programme pages on devtracker[413]
Annually	Programme annual reviews. (Programme business cases will get published at this source once they approved).	Reported via the devtracker[414]
Annually	ICF portfolio level results – these include figures on finance mobilised from both public and private sources.	Reported via the UK's internationally climate finance results[415]
Annually	ICF spend data as part of overall ODA reporting.	Final ODA statistics are published on gov.uk.[416] Data is also uploaded on UK pages on OECD-DAC Creditor Reporter System [417](CRS)
Biennially	Reporting obligations under UNFCCC. This includes two years of programme level ICF data and a narrative chapter.	Reported via The UK's 5th Biennial Report[418]

4.1.2 Description of challenges and limitations

Impact of external global events

The previous UK government temporarily reduced the UK's annual ODA target from 0.7% of Gross National Income (GNI) to 0.5%. We will remain one of the most generous donors amongst the G7, and our ODA offer will continue to grow in line with GNI. We will restore ODA spending to 0.7% of GNI as soon as fiscal

[412] https://iatistandard.org/en/iati-tools-and-resources/iati-registry/
[413] https://devtracker.fcdo.gov.uk/
[414] https://devtracker.fcdo.gov.uk/
[415] International Climate Finance Results
[416] Statistics on International Development
[417] https://data-explorer.oecd.org/
[418] UK's 5th Biennial Report and 8th National Communication

circumstances allow. Despite these challenges we remain committed to meeting our commitments to climate finance.

Granular data tracking

Our programme level data tables contain several hundred individual programmes. Each programme is likely to involve several delivery partners from the original recipient of UK funding right through to the recipient of support on the ground. Each stage in the delivery chain could be at a different geographical level and be mobilising other sources of finance.

It is therefore challenging to track ICF at a granular level. It requires capacity and capability to manage this and overall internal resources to deliver the ICF are not unlimited. It also requires data and information from external sources.

Finance mobilised from Technical Assistance

As part of the set of Key Performance Indicators (KPIs) developed to monitor and track outcomes and impacts from across UK ICF programmes, there are indicators for measuring private and public finance mobilised for climate action. However, these build on the Organisation for Economic Co-Operation and Development (OECD) methodologies for mobilised finance, so do not capture the widest extent of finance catalysed by ICF interventions, or mobilised through technical assistance

The UK welcomes the scrutiny of other organisations on our ICF to provide external assurance and identify areas of improvement. An example of this is from the Independent Commission for Aid Impact's (ICAI) rapid review of the ICF that was published in February 2024[419]. The government response to this report was published[420] in December 2024.

4.1.3 Information on experience and good practices to incentivise further private climate financing and investment

Incentivising private climate financing

A key focus of the UK's ICF is mobilising private finance to support the transition to low-carbon and climate-resilient development pathways in developing countries. Our latest cumulative ICF results show that our ICF spend has mobilised £7.8bn in private finance to support climate change. The annual amounts reported for 2021 and 2022 in our CTF tables are £2.085bn and £1.28bn.

The UK uses a variety of financial instruments, including grants, concessional loans, returnable loans, performance-based incentives, guarantees, and insurance, to mobilize private finance. These instruments are designed to reduce the perceived

[419] UK Aid's International Climate Finance Commitments
[420] Independent Commission for Aid Impact's Review of UK Aid's International Climate Finance Commitments: UK Government Response

risks associated with low-carbon investments, making them more attractive to private investors. An example is the Renewable Energy Performance Platform (REPP).

DESNZ/FCDO case study: REPP

REPP provided technical and financial support to private sector developers of small-scale renewable energy projects in sub-Saharan Africa. REPP provided tailored support and funding required in individual project finance deals to enable developers to overcome barriers to investment. These barriers include a lack of early-stage funding, costly risk mitigation instruments, underdeveloped capital markets and weak or immature policy and regulatory frameworks. To overcome these barriers, REPP provided project development capital to support work such as feasibility studies. It also provided viability gap finance using a range of financial instruments and structures.

Some examples of REPP results are a US$1m development loan to construction of Mpanda 10.2MW run-of-river hydropower plant in Burundi, US$1.2m mezzanine loan to Tanzania's first ever wind farm, which began operations in July 2020, providing much-needed energy security to a growing rural population and US$2.9m to Bboxx data-driven platform that provides access to innovative products and services like plug-and-play solar home systems (SHS), solar-powered water pumps and e-mobility solutions to cash-loan funding. Bboxx is making good progress in transforming the utility sector through its increased presence in West Africa.

The UK is also using its ICF to mobilise private finance by providing technical assistance to support regulatory reforms and build the capacity of key institutions in developing countries. This helps create a stable and predictable investment environment that encourages private sector participation in climate projects.

The UK funds research, development, and demonstration projects to accelerate the commercialization of innovative clean energy technologies. This includes supporting early-stage testing and scaling of new technologies and business models. Some examples of this can be seen further on in this chapter.

Supporting policy change

The third Portfolio Evaluation of UK ICF, Support for Policy Change[421], found evidence that ICF had supported some aspects of policy change, and that the UK's approach was valued by most policymakers and other donors. We welcomed the findings of this evaluation and published a Management Response[422]. Key findings were:

- ICF works in a collaborative, non-prescriptive style in partner countries, to support the types of policy changes beneficial to climate and the environment. This collaborative approach creates a sense of ownership by partner

[421] PE3 Support For Policy Change
[422] Response To Portfolio Evaluation 3 (PE3) Support for Policy Change

governments which increases the likelihood of policy change occurring, and it being effective and sustainable.

- ICF has been effective in supporting changes to forestry and land-use policy in Colombia and Indonesia, and renewable energy policy in Uganda.
- Four types of intervention were successful in supporting policy change in national and sub-national government:
    1. Generating and brokering evidence to convince people to change policy
    2. Exploiting opportunities to convince a critical mass of decision makers to change
    3. Empowering others to advocate for or deliver policy change through capacity-building, and
    4. Providing resources to deliver policy change.
- Five types of intervention were successful in supporting policy change in global institutions:
    1. Financial leverage
    2. Creating momentum through coalitions of support
    3. Building confidence through UK expertise
    4. Leadership, and
    5. Building capability through experience.

Case study: REDD+ Early Movers (REM) Programme

DESNZ has supported the REM programme, which aims to reward countries or jurisdictions considered as pioneers in forest protection and climate mitigation. One of the areas the REM programme operates in is Mato Grosso in Brazil, where the programme has delivered a project called Muxirum Quilombola. The main objectives of the Muxirum Quilombola project were to ensure communities could be empowered politically, socially, culturally and economically, with a focus on Quilombolo women and youth. Muxirum Quilombola has benefitted more than 500 Quilombola families, promoting sustainable management, environmental preservation and income generation.

Case Study: Nationally Determined Contributions Partnership

DESNZ has supported the NDCP (Nationally Determined Contributions Partnership), which is a partnership of over 120 countries and almost 100 institutions, formed after the signing of the Paris Agreement, to help countries effectively implement their commitments and access finance, supporting ambitious climate action whilst enhancing sustainable development.

Through the NDCP, the UK supports developing countries to turn their NDCs and other relevant climate plans into specific strategies and measures, support their implementation, as well as coordinating major climate donors to more effectively meet the needs identified.

An example of the impact of the NDCP is in Colombia. Here, the Colombian government requested the support of the NDCP to improve the quality and ambition of their NDC, and mobilise financial resources for NDC investment projects. The British Embassy in Colombia was able to support this process, using their strong

relationship with the Colombian government facilitated by the UK-Colombia Partnership for Sustainable Growth[423]. Five embedded advisor roles, including in-country facilitators and a climate finance advisor, were recruited by the NDCP Support Unit, utilising funds from the UK Country Engagement Fund. These roles were dispersed across the Colombian Ministries of Environment and Sustainable Development, National Planning, Finance, and Agriculture.

The support from the NDCP helped the Colombian government to agree a revised NDC in 2020 that included a more ambitious mitigation target of not emitting more than 169.4 $MtCO_2eq$ by 2030, equivalent to a 51% reduction in emissions from a revised 2030 reference scenario, as compared to a 20% reduction in their first NDC.

Thus far the Climate Finance Broker Facility **(**established via the NDCP facilitator in the Colombian Ministry of National Planning) has supported 7 projects with over US$1m of funding from institutional members such as the Global Green Growth Institute (GGGI), the United States Agency for International Development (USAID), the United Nations Department of Economic and Social Affairs (UNDESA) and the World Wildlife Fund (WWF). Coordination across these members would not be possible without NDC Partnership support.

4.1.4 Efforts taken to enhance comparability and accuracy of information reported

To ensure the UK's ICF information is accurate and comparable to other sources of climate finance, we work through several mechanisms. We engage closely through the UNFCCC transparency process, not only in reports such as this, but in the Facilitative Multilateral Consideration of Progress and through the in-donor peer review process, where we participate both as an assessee and an assessor.

We also work closely with the Organisation for Economic Co-operation and Development's Development Assistance Committee (OECD-DAC) and member countries. For example, we attend regular meetings of OECD DAC's Working Party on Development Finance Statistics (WP-STAT) to discuss technical issues related to ODA reporting. A significant amount of recent work has been on harmonising OECD and UNFCCC climate finance reporting practices and aligning key guidance such as the Rio Marker handbook with the Paris Agreement.

The UK, through its COP26 presidency, led on the development of the $100bn climate finance delivery plan[424] and has been closely involved in subsequent work with the OECD and donors to publish follow up reports on progress towards the $100bn goal. The most recent of these was published in May 2024[425], reporting that

[423] Colombia-UK Partnership for Sustainable Growth
[424] UK COP26 Presidency publishes Climate Finance Delivery Plan led by German State Secretary Flasbarth and Canada's Minister Wilkinson ahead of COP26
[425] Climate Finance and the USD 100 billion goal

in 2022 a total of $115.9bn of climate finance was mobilised for developing countries, the first year that the $100bn goal has been exceeded.

The UK government is committed to supporting the greater use of International Aid Transparency Initiative (IATI) data and other aid information across all recipient countries of ODA and works closely with other donors in country to support development outcomes.

The UK government is actively engaged in efforts to fortify international aid transparency standards. This is achieved through collaboration with IATI, Civil Society Organisations, implementing partners, and other donor countries by advocating for higher aid transparency standards. The UK encourages our implementing partners to publish data on UK-funded activities in accordance with the IATI standard and provides them with the necessary guidance to do so. In line with this, information on ODA programming managed by UK government Departments is available on the IATI Datastore[426] and the UK's Development Tracker website (DevTracker)[427]. Our commitment to this cause remains steadfast as we continue to work towards enhancing transparency in international aid.

We ensure the accuracy of our financial information by having all payments go through an internal approval process involving a programme team, a financial team and finally senior management. In the case of DESNZ, a third party provides finance services such as payment processing, meaning additional checks will be carried out. Once payments are made, they are recorded on the finance journal, which also goes through an internal checking process. ICF teams will use the journal data to record the payment in internal data systems, which in turn are used for external reporting. Data for external reporting will also be quality assured to check for accuracy. For example, the ICF programme level data was originally collated for the UK's annual provisional ODA publication and then collated again for the UK's final ODA publication. It has also been compiled and provided to the OECD-DAC to support their work on reporting on progress towards $100bn.

For reporting mobilised finance, the UK developed a Key Performance Indicator (KPI 12)[428] for applicable ICF programmes to report against. To ensure comparability, the methodology for this KPI is aligned with OECD DAC methodologies for measuring the amounts mobilised from the private sector by official development finance interventions. Accuracy is ensured through a robust quality assurance process: each ICF programme reports results, these are quality assured by an analyst working closely with the programme lead. The results are then aggregated up by department and quality assured as a whole, then DESNZ results are signed off by the Head of ICF Portfolio and Strategy and the Head of International Climate and Energy Analysis. Results are then aggregated across FCDO, DESNZ and Defra and quality

[426] https://iatistandard.org/en/iati-tools-and-resources/iati-datastore/
[427] https://devtracker.fcdo.gov.uk/
[428] Volume of private finance mobilised for climate change purposes as a result of ICF

assured again, then assembled into an annual statistics publication and signed off again by Senior staff in each department before publication[429].

ICF will continue to place a strong focus on Monitoring, Evaluation and Learning (MEL) to improve the effectiveness of our investments and those of our partners. This will be achieved through strengthening the evidence base and facilitating learning about sustainable approaches to reduce poverty and tackle climate change and environmental degradation.

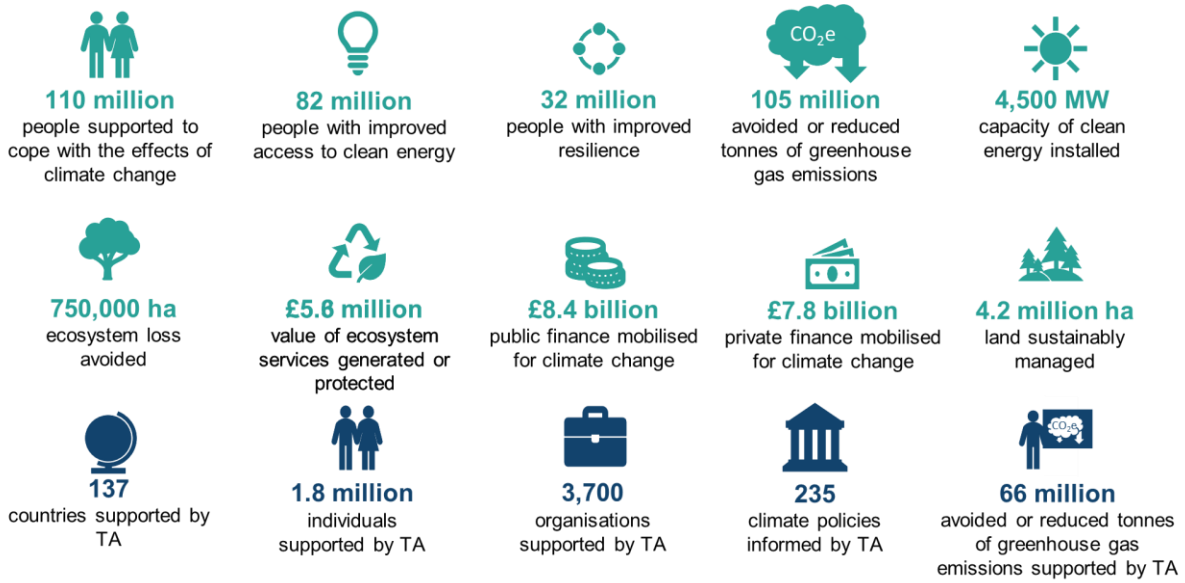
The intended impact is to deliver transformational climate change programmes. We will build on our robust cross-government results framework and will continue to publish results annually, to allow the public to track progress against our Key Performance Indicators (KPIs).

All ICF programmes are required to collect and report on relevant ICF KPIs, disaggregated by gender, age, and disability where possible, alongside other programme-specific indicators. Where the UK co-funds a programme with other donors, only 'UK-attributed' ICF results are included, in proportion to the UK's donor share.

For each key performance indicator, results are added together across all relevant programmes and over time, to give cumulative results across the whole ICF portfolio. We use ICF KPIs alongside a broad range of evidence to evaluate the success of our ICF programmes and inform funding decisions to maximise value for money and the successful delivery of our strategic climate, nature and sustainable development objectives. We will continue to review the ICF KPIs and the way we use them to inform our decision-making, to ensure that we are achieving climate, and nature impacts in line with our priorities and the needs of developing countries.

[429] UK Climate Finance Results has links to methodologies and the most recent results publication

Figure 24: ICF results achieved from April 2011 to March 2024



The Independent Committee for Aid Impact (ICAI) regularly undertakes external assessments of the ICF performance – two reviews focused on low-carbon and forestry ICF programmes have rated different aspects of operation as 'Green-Amber'. ICAI recommendations as well as evidence generated through monitoring and evaluation are actively fed back into strategy, programme development and implementation. For the current phase of delivery, ICF analysts are working across government to update our approach to portfolio monitoring and evaluation, building on lessons learnt from ICF to date.

4.2 Information on institutional arrangements for the provision of technology development and transfer and capacity-building support

The UK government departments responsible for delivering our ICF commitment work together in several ways for the provision of technology development and transfer and capacity building support. There is more detail on technology development and transfer later in this chapter. Drawing on each department's expertise, FCDO, DESNZ and DSIT work together on the Ayrton Fund. DSIT have key research organisations such as UK Research and Innovation (UKRI) as some of their arms-lengths bodies and deliver many of their ODA projects through UK universities. FCDO draw on their overseas network and use this to ensure support can be country specific. Whilst DESNZ are responsible for much of the domestic policy on areas such as energy transition and draw on this expertise in a developing country context.

This complementary approach across departments is also used for the provision of capacity building support. We have used some case studies below to demonstrate this.

Case study: FCDO overseas network engagement with UK-based teams

FCDO has a large network of individuals with significant skills and experience in international delivery of ODA programmes. FCDO's people, presence, instruments and systems allow us to deliver catalytic global leadership, multilateral and private sector leverage, and significant direct, real-world, bilateral results and impact. The FCDO has a strong Climate and Environment Cadre based overseas and in the UK. Additional Cadres such as the Food and Agriculture and Urban and Infrastructure are deeply engaged in delivery of our international climate finance. Programme Managers are a key element of the strong expertise that exists across FCDO for ICF delivery, overseeing spend and tracking results and will work closely with advisors.

Case study: Sustainable Cooling and Cold Chain Solutions (SCCCS) programme

Sustainable Cooling and Cold Chain Solutions (SCCCS) works with United Nations Environment Programme (UNEP) in partnership with the University of Birmingham to influence the uptake of cooling and cold-chains solutions across Africa and India. SCCCS uses a 'hub and spoke' model; setting up regional hubs and developing SPOKES (Specialised Outreach and Knowledge Establishments) to share research, innovation and knowledge on cooling and cold-chains for both food and vaccine supply chains. There are additional workstreams supporting the development of modelling, policies and tools that implement global best practice and provide technical assistance for policy makers. Since its establishment in 2019 the programme has influenced the uptake of cooling and cold-chains solutions in 51 developing countries and supported over 1,600 people to adapt to the effects of climate change by improving food and vaccine preservation.

Case study: UK PACT

UK Partnering for Accelerated Climate Transitions (UK PACT) supports ODA-eligible countries with high mitigation potential to increase their climate ambitions and implement that ambition more rapidly, more effectively, and more equitably. UK PACT is jointly funded and governed by the FCDO and DESNZ.

Key features of UK PACT are that it aims to respond explicitly to partner government demand for capacity building interventions, and that it shares UK expertise (for example in areas such as climate legislation, green finance, and smart energy). UK PACT operates through a 'hybrid' model of dedicated programme funded teams of FCDO Officials based overseas providing local context to programme strategy and implementation in-country, and UK based officials providing global programme strategy and delivery.

Between April 2021 and March 2022, UK PACT delivered 114 mitigation technical assistance projects across 16 partner countries.

30 skill-shares and seven secondments were delivered, with 6,265 people receiving training, with training beneficiaries rating the trainings as 4.5/5 in terms of usefulness.

The programme delivered full scale country programmes in Colombia, Mexico, South Africa, China, and extensions were agreed to extend 44 projects from the first funding rounds to provide multi-year delivery.

Case study: Small Island Developing States Capacity and Resilience Programme (SIDAR)

Announced at COP26 in Glasgow, the SIDAR programme aims to raise £40m over 5 years to ODA-eligible Small Island Developing States (SIDS) to increase capacity and improve international funding and policy frameworks. This will enable SIDS governments to better access and utilise climate finance available to them.

The SIDAR programme has delivered some important outcomes. These include:

- Supporting the Resilient and Sustainable Islands initiative (RESI) to launch the Resilient monthly podcast series;
- Hosting the first public engagement and high-level technical discussions on the UN's Multidimensional Vulnerability Index (MVI);
- Putting in place two regional agreements supporting the Caribbean Community Climate Change Centre and Global Green Growth Institute in the Pacific;
- Supporting two events that considered how to address financing and economic issues facing SIDS, and;
- Taking forward a new partnership for sustainability and resilience through OECD Development Assistance Committee and the Alliance of Small Island States (AOSIS) Taskforce[430].

4.3 Underlying assumptions, definitions and methodologies

The UK's climate finance reporting methodology is set out below:

4.3.1 Reporting Year

Calendar year. We have reported spend for 2021 and 2022 in our data tables referenced in section 3. The £11.6bn ICF commitment starts in the UK fiscal year 21/22, which runs from April to March. So, 2021 calendar year figures will include some spend from the previous ICF commitment.

4.3.2 Exchange Rate

We report in pound sterling and convert to United States dollars using the OECD annual exchange rate[431] for the relevant year.

[430] Partnership for Action on SIDS
[431] OECD Exchange Rates

4.3.3 Funding Status

We use the 'committed' status for our reported spend. This reflects that the money has been accounted as spent from government budgets and the figures we report are the same as how we are tracking the budget internally. We do not report political pledges that have not yet been followed up with actual funding being provided. For some programmes, such as our contributions to multilateral funds, we use a funding instrument called a Promissory Note. This commits a level of funding to the named recipient of the note, who is then able to request cash drawdowns from the note, which the government (as the note issuer) provides. For accounting purposes (and therefore our reporting methodology) we report the spend at the point the Promissory Note is formally issued and not the subsequent cash drawdowns.

4.3.4 Channel

We report the channel as multilateral for those funds and core contributions to organisations already pre-named on the multilateral tab[432] In addition if we have reported the spend as multilateral for our wider ODA reporting to the OECD-DAC, we will also use this channel.

All other spend will be reported under the bilateral channel. We will use the multi-bilateral channel for specific programmes via multilateral organisations. We don't use the regional channel.

4.3.5 Funding Source

Most of our reported climate finance comes from the UK's ODA budget. The only exception are climate eligible outflows from the British International Investments (see section 1.1 for further information).

4.3.6 Financial Instrument

We report most of our spend as grant as this finance is provided with no requirement for return of funds back to us (except where funding is unused once a programme has finished or in cases where funding has been misused). We do report some spend as equity as this relates to programmes where we invest in vehicles that will purchase assets where we have a legal right to returns made on these assets. There is also a programme that uses a combination of grant and equity finance.

4.3.7 Concessional finance

As most of our climate finance comes from the UK's ODA budget it must comply with the OECD-DAC rules on ODA eligibility as well as spending requirements set out in the UK's International Development Act[433]. We use OECD-DAC PSI (Private Sector

[432] Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its third session, held in Glasgow from 31 October to 13 November 2021. - page 27
[433] International Development Act 2002

Instrument) rules for our equity spend which includes assessments both as the institutional level (the entity that receives our funding) and at the instrument level (the downstream investment made by that entity) to ensure the finance is concessional and the value reported reflects the development effort made. Returns from these instruments that come back to UK government count as negative ODA and will count against ODA targets unless re-spent.

4.3.8 Type of support

We assess whether our support is mitigation or adaptation as part of the overall process set out in figure 1, where we use the OECD Rio Marker guidance. We only report spend as cross-cutting where we are not able to split the amounts for example subscription payments to the UNFCCC.

4.3.9 Sector/sub-sector

For the sector classification, we assess the programme to see which of the drop-down sectors is the best fit (Energy, Transport, Industry, Agriculture, Forestry, Water and Sanitation, Cross-Cutting or Other). We will use 'Other' where the other main sector choices don't seem a good match and will include a more specific sector, typically this will be the sub-sector choice.

For sub-sector classification we report the same OECD-DAC 5-digit sector code as used for the same programme when reporting the spend to the OECD-DAC.

4.3.10 Capacity building and/or technology development and transfer objectives

Many of the programmes we support with our ICF will be contributing to these objectives. For example, capacity building and other types of technical assistance are often an essential element to ensuring the other objectives of the programme can be achieved. In our reporting we select a set of examples that showcase how our ICF is supporting these objectives rather than attempting to report every programme that is contributing.

We use our knowledge of the programme to identify which programmes to tag and will draw on other sources of information e.g. the summary description of the programme on DevTracker (see footnote 4) or if the programme (for tagging as capacity building) has been marked with the 'Free-Standing Technical Co-operation' marker under our OECD-DAC reporting.

We've recently developed an additional four Key Performance Indicators to monitor ICF technical assistance programmes – covering countries supported, individuals and organisations supported, climate policies informed, and emissions reduced or avoided supported by ICF technical assistance[434].

[434] UK Climate Finance Results has the detailed methodologies

4.3.11 Climate specific support

Please see figure 1 for an overview of the process used to identify if our programmes are climate specific and the level of climate finance we should report. Again, the Rio Marker guidance is used to support this assessment.

4.3.12 Avoiding double counting

We report our climate finance spend at the point the money leaves government; this means we do not double count contributions made by other donors. For example, our contribution to a multi-donor trust fund such as the Green Climate Fund (GCF) is done when we make contributions to the GCF itself rather than when the GCF makes downstream payments into specific projects, at which point all the donor contributions will be mixed increasing the risk of double-counting.

For private finance reporting, where possible we use project level information to make sure that there is no double-counting. The data we report to the OECD is also used in their climate finance provided and mobilised report, after the OECD has done additional checks to make sure there's no double-counting across donors. By using the OECD DAC methodologies for measuring the amounts mobilised from the private sector by official development finance interventions we are minimising the likelihood of double counting occurring.

We don't use ODA to purchase carbon credits for compliance with our own domestic climate targets, so we avoid double-counting in this type of support under Article 6 of the Paris Agreement.

Unless we are the sole funder or there is clear country specific agreement associated with our funding, we don't attribute our spend to specific individual countries. If a programme is benefitting multiple countries (and the selection is specific enough to mean that a less granular geographic level e.g. global or regional is not more appropriate) then we will list those countries for that programme reporting line in our data tables under section 3. But we won't report a specific spend amount per country.

As covered under section 1.1 we avoid double counting the climate finance spend through BII by deducting the ICF inflow amount from the climate eligible outflows we report.

4.3.13 Private finance

Funding is only classified as 'mobilised private climate finance' if it meets three definitional tests:

Private finance test: Is the finance provided by a private organisation?

Finance is classified as public or private based on the type of organisation providing the finance. In general, organisations are defined as public if they are government agencies, or if governments own more than 50% of equity/shares in an organisation with multiple shareholders (for example, a bank with both public and private shareholders). In all other cases, they are classified as private organisations.

In some cases, this ownership-based approach may not accurately reflect the character of financial transactions made by organisations that are publicly owned but operate according to market-oriented commercial or private principles. In these cases, programmes may classify reporting based on who exercises control of investment decisions or based on the principles used to make investment decisions.

Climate finance test: Is the finance intended for climate change adaptation or mitigation purposes?

Finance is categorised as climate finance if the purpose of the project/programme includes support to meet climate change mitigation and/or adaptation goals, based on OECD Statistical Reporting Directives. Climate financing is not determined based on whether the source of the finance is nominally drawn from a climate change fund/window/etc.

If finance also provides support to other (non-climate) goals, only the portion of the funding directed towards climate goals is counted as climate finance.

Mobilised finance test: Has the finance been mobilised by the ICF, i.e. is it additional and causally linked to ICF funding or support?

Mobilised finance is funding from another actor that has been directed to an objective, project or programme that would otherwise not have benefitted from these funds and is a direct result of the original mobilising actor's efforts.

This doesn't include finance that would have occurred anyway without the initial ICF. This definition requires funds to be additional, in that they would not otherwise have been allocated to a climate objective or activity, and that the ICF programme can identify a causal link between its funding or actions and the mobilised finance.

Mobilised resources need to be estimated based on boundaries to define the scope and account for the total private finance that could be associated with different public interventions. We aim to establish these boundaries at project-level, according to different instruments:

- Project-level boundaries for grants, loans and syndicated loans. In these cases, mobilised financing might include upfront project level financing (i.e. resources committed to the project from the private sector at the time of project approval) or subsequent financing following UK investment (i.e. resources mobilised after the project has been operating, such as when commercial banks or venture capital funds finance a project part-designed or financed by the UK government).
- For other types of financial instruments, such as guarantees and Collective Investment Vehicles, the precise boundaries will vary according to the level and quality of available data, as well as causality considerations based on conservative approaches.
- We follow the guidance in the OECD DAC methodologies on reporting for specific instruments, including on setting appropriate boundaries at the instrument level.

Mobilised private finance is reported based on the year in which the finance is legally committed by the organisation/actor. To note in our private finance mobilised data set submitted as part of this BTR - The amount mobilised reported by the UK represents the private finance mobilised that can be attributed to the UK within the given year only (i.e. 2022 only) whilst the amount of resources used to mobilise the support represents the total UK commitment to the programme and not the amount committed in the given year. This means the two figures cannot be directly compared across programmes as the amount mobilised is an in-year value whilst the amount of resources is a cumulative figure.

4.3.14 Ensuring support addresses needs and priorities of developing countries

The UK uses a variety of approaches to ensure that its climate finance support is addressing the needs and priorities of developing countries. The UK's work on aligning all ODA with the Paris Agreement includes a requirement that the spend must be aligned, and where possible elevate, to countries NDC's and adaptation plans. Individual programme business cases (which are publicly available via the DevTracker website) will set out in more detail how this requirement is being met.

The UK provides support for programmes that developing countries can bid into, where the application and assessment process will require that the funding proposals are aligned with a country's climate action plans. For example, the Mitigation Action Facility[435] or the Green Climate Fund[436] where a funding proposal must be supported by a letter from the recipient country government.

The UK also supports programmes that facilitate wider access to climate finance for countries climate action plans. These include the UK setting up the Taskforce on Access to Climate Finance and supporting programmes such as the NDC Partnership[437] and the Climate Finance Accelerator[438].

4.3.15 How support is in line with the long-term goals of the Paris Agreement

As referenced elsewhere in this chapter, the UK has committed to align its bilateral ODA spend with the Paris Agreement and delivered on this from 2023. The UK will continue to engage with our multilateral partners to ensure our multilateral ODA can also be aligned. The UK is implementing this commitment by:

- Undertaking climate risk assessments for ODA programming
- Using carbon pricing in ODA programme appraisals

[435] https://mitigation-action.org/
[436] https://www.greenclimate.fund/
[437] https://ndcpartnership.org/
[438] Climate Finance Accelerator

- Ensuring ODA programming is line with the UK government's fossil fuel policy[439]
- Ensuring that ODA programming is aligned to, and where possible elevate, countries NDCs and adaptation plans.

4.3.16 New and additional finance

The UK determines that its climate finance is new and additional as our £11.6bn commitment is completely new climate finance from our previous £5.8bn commitment. Also, the finance reported under section 3 has not been reported in previous UNFCCC biennial reports.

4.3.17 How the information provided represents a progression from previous levels of finance under the Paris Agreement

The UK's current five year £11.6bn ICF commitment is a doubling of its previous five-year commitment of £5.8bn. Within the £11.6bn, the UK has a target to spend £1.5bn on adaptation in 2025, which is a doubling of the adaptation the UK spent in 2019.

There will be annual fluctuations in the UK's level of climate finance based on the budget allocations made in the Spending Review process and these in turn can be impacted by in-year pressures (see section 4.2 for examples of these). But the overall volumes of climate finance the UK is providing are increasing.

4.3.18 Multilateral finance

The UK uses a combination of in-flow and outflow approaches to determine the level of multilateral finance reported. Where the UK has deemed that a multilateral is providing 100% climate finance e.g. Climate Investment Funds, then our full in-flow contribution is reported as climate specific. Where a multilateral fund or programme is deemed as providing less than 100% climate finance e.g. Global Environment Facility, then the UK splits the level of its inflow contribution as general and climate specific. The assessment on the level of climate finance is estimated by the scope of the fund/programmes activities to determine what amount is climate specific.

For the years covered under this BTR report (2021 and 2022) the UK is not reporting as climate finance its core contributions to multilateral banks e.g. World Bank. However as set out in the UK's Written Ministerial Statement (see footnote 7) in future years, the methodology will change and climate specific shares from multilateral bank core contributions will be reported.

[439] Support For the Fossil Fuel Energy Sector Overseas

4.4 Information on financial support provided and mobilized under Article 9 of the Paris Agreement

4.4.1 United Kingdom

The UK has included the relevant information and data in the climate finance reporting tables.

4.4.2 Jersey

Jersey Overseas Aid (JOA) is the Island's independent, publicly funded relief and development agency. Its annual budget is distributed through development and humanitarian funding streams. JOA allocates its funding through bilateral partnerships with pre-approved international non-governmental organisations (NGOs), multilateral organisations and UN Agencies.

Between 2018-2022, JOA streamlined its development programme – operating in six countries across three thematic areas: Dairy for Development, Financial Inclusion and Conservation Livelihoods. Each of the themes contain cross-cutting components that indirectly contribute to Article 9 of the Paris Agreement. In particular, the Conservation, Lives and Livelihoods portfolio contributes to climate resilience and conservation efforts with a strategic focus on 'the link between human development and environmental protection.

In addition, JOA's humanitarian funding stream includes direct response to the effects of climate change globally.

4.4.3 Guernsey

The Guernsey Overseas Aid & Development Commission (GOA&DC) is part of the Guernsey government and is mandated to distribute funds for aid and development overseas by making contributions to charity programmes and to disaster and emergency relief. The GOA&DC does not provide bilateral funding. Its overall budget for 2022 was £3.225 million. This increased to £4.397million by 2024. The majority of its budget is spent on four workstreams. The Single Year Project Grant Aid Awards are grants of up to £55,000 (£50,000 in 2022) each for projects being undertaken by charities registered in the United Kingdom, Guernsey or Jersey. Many of these projects, but not all, relate to or include elements that help to mitigate the impact of climate change. The 2022 Budget for this workstream was £2.354 million. The Multi Year Project Grant Aid Awards are similar to the above except they are grants of up to £165,000 (£150,000 in 2022) each for projects over a three year period. In addition, the GOA&DC considers Multi Year Awards which demonstrate a particular focus on mitigating the impact of climate change or 'reaching the further first' (e.g. on the grounds of disability, ethnicity, displacement, etc.). The 2022 Budget for this workstream was £300,000. The third main workstream is Disaster and Emergency Relied Awards. Applications are welcomed from Charities already known to the Commission, or donations are made to the Disasters Emergency Committee (DEC) Live Appeals. These often are for climate related emergencies. The 2022 Budget for this workstream was £360,000. The final main workstream is Community Partnerships which encourages Guernsey community groups to raise funds for

international development through this match funding scheme. The 2022 Budget for this workstream was £125,000.

The Table only shows Awards made in 2021 and 2022 which fully or partially relate to mitigating climate change.

4.4.4 Isle of Man

The Isle of Man International Development annual budget is distributed via five funding streams, which in 2018 – 2019 included an increase of £100,000, raising the budget from £2.4 million to £2.5 million. Emergency funding is reserved for the Disasters Emergency Committee (DEC) Live Appeals, which is allocated where necessary and focused on specific disaster situations, including climate related emergencies such as flooding and cyclones. The largest funding stream, International Development Partnerships, is a 2-year funding cycle worth £1.2 million per year and which is open to application by charities registered in the UK or Isle of Man. Since 2020 and remaining for 2024-2026, Climate Change is one of two designated themes for this funding stream, inviting applications for projects specifically tackling the causes and impacts of climate change globally. More locally, the Small Grants funding stream is open only to Isle of Man registered charities for up to £100,000 each per funding round, to carry out an International Development project of their design. This stream similarly welcomes applications which address the effects of climate change. All Isle of Man government funding streams are open to application by registered organisations except for Disaster and Emergency Relief, which is allocated to be mobilised at short notice.

*Exchange rate calculated using historical exchange rates on the given payment date from Exchange Rates website[440]

Please see **annex 1**: Support provided by Crown Dependencies.

[440] British Pound to US Dollar Spot Exchange Rates for 2018

4.5 Information on support for technology development and transfer provided under Article 10 of the Paris Agreement

4.5.1 Strategies employed to support technology development and transfer, including case studies

UK development assistance is actively supporting the development of new and improved technologies and business models which help tackle climate change, while also reaching the poorest; providing life changing services, creating green jobs, building resilience and boosting local and national economies.

- The UK uses international climate finance (ODA) and other levers to support technology-driven innovation that will help developing countries decarbonise high-emission sectors and move towards clean energy systems.
- The UK is committed to a comprehensive, long-term and co-ordinated UK capability-building offer on clean energy access and transition for emerging and developing countries, enhancing their implementation of nationally determined contributions (NDCs).
- This includes accelerating and scaling up the transition to clean and affordable technology in sectors such as energy and mobility, working through programmes and partnerships, such as the COP26 Breakthrough Agenda, the Energy Transition Council, and others, as well as investing and working with partners to increase global funding for decarbonisation through multilateral initiatives such as the international Climate Investment Funds, Mitigation Action Facility, ESMAP, and the global NDC Partnership.
- The Ayrton Fund[441] is a UK International Climate Finance (ICF) commitment of up to £1 billion on clean energy innovation. It is part of the wider £11.6 billion of ICF and provides Official Development Assistance (ODA) for the Research, Development, and Demonstration (RD&D) of innovative, clean energy technologies and business models for developing countries over the five-year period between April 2021 and March 2026.
- The Ayrton Fund focuses on a series of high priority Ayrton Challenge technology areas, which are critical but off-track for delivery of UN Sustainable Development Goals 7 and 13, and where the UK is well-placed to support. These include areas such as energy storage, next generation solar, sustainable cooling, clean hydrogen, smart energy systems and more.
- By the end of Year 3 of the Ayrton Fund (FY 23/24), UK innovation-focused ICF reached **27m** people in developing countries with improved access to clean energy, leveraged over **£1.8 billion** in private and public finance,

[441] Ayrton Fund

reduced **4.1m** tonnes of CO_2 (equivalent to the annual carbon footprint of over 700,000 people in the UK[442]), and created and supported **169,000** green jobs.

- Under the Breakthrough Agenda[443] launched by World Leaders at COP26, we are building coalitions, partnerships and platforms with the ambition that developing countries have ready access to aggregated, coordinated and impactful assistance in each sector of the economy.

Case Studies

- **UK support to the Energy Sector Management Assistance Programme (ESMAP)** assists low and middle-income countries to reduce poverty and boost growth through environmentally sustainable energy solutions. They work to accelerate the energy transition required to achieve UN Sustainable Development Goal 7 to ensure access to affordable, reliable, sustainable, and modern energy for all.
- The ESMAP-IFC Offshore Wind Development Program supported by the UK enables sharing of expertise for countries developing their own offshore wind roadmaps. It received the Collaboration Award at the Global Offshore Wind Awards 2023, recognising the Program's efforts to accelerate deployment of offshore wind in emerging markets.
- A further example is , **SunCulture**, a Nairobi-based solar irrigation start-up supported by the FCDO and partners since 2018, has recently raised investment from British International Investments and also $27m [444] in Series B funding including from the Private Infrastructure Development Group (PIDG) to expand delivery of its "pay-as-you-pump" solar water pumping equipment which has already reached more than 40,000 farmers in East Africa, tripling typical yields and actually reducing overall water use with more efficient irrigation approaches – boosting livelihoods and helping people adapt to more variable rainfall.

4.5.2 Support provided at different stages of the technology cycle

The UK provides support at different stages of the technology cycle and across different technology readiness levels.

For example, the Ayrton Fund covers a range of UK ODA-funded clean energy Research, Development & Demonstration (RD&D) support, focused on delivering real change across three interconnected themes which describe the whole energy system and its applications, and link with the three pillars of supply, demand, and delivery, while supporting the Global Net Zero agenda. The diagram below illustrates the key types of intervention made by programmes across the Ayrton portfolio.

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[442] 2023 UK carbon dioxide net emissions were estimated at 384.2 million tonnes (Mt) / or an estimated 5.7 per capita - DESNZ, 2023 UK greenhouse gas emissions.
[443] World Leaders Summit – Statement on the Breakthrough Agenda
[444] SunCulture Raises $27M in Series B Funding

Further information on these interventions can be found within this section of chapter four.

Table 32: Key types of interventions

Ayrton Research and Development	Ayrton Demonstration	Wider ICF Energy
Foundational Research and Training	Demonstration Projects	Policy Technical Assistance
Open Calls		Investments at scale
Technology Accelerators		
Venture investing		
Market Building		

4.5.3 Foundational Research and Training

The UK's Ayrton Fund, has been developing targeted research, knowledge, and information products on a range of topics (e.g. clean energy access[445], energy system models[446], low carbon development[447], modern cooking[448], efficient appliances[449], etc.); targeted training, job placements and internships[450] in clean energy businesses; new clean energy master's courses and modules[451] in developing country universities; UK Chevening clean energy access scholarships[452] for southern scholars; and research partnerships with local clean energy access institutions and organisations in the South. Ayrton Fund activities under this intervention have benefited 67 countries in Sub-Saharan Africa, South Asia, and the Indo-Pacific.

For example, the UK's Clean Climate Growth (CCG) programme's tools and training supported the development of Uganda's Energy Transition Plan[453] (ETP). The ETP sets Uganda's pathway to achieve universal access to modern energy and sustainably power the country's economic transformation. The ETP was developed

[445] Transforming Energy Access (TEA) - supporting renewable energy projects, energy access and green technologies in Africa and Asia.
[446] Climate Compatible Growth – Providing research and global public goods to help countries develop strategies, plans, and policies to attract investment into low-carbon growth opportunities.
[447] Climate Compatible Growth – Providing research and global public goods to help countries develop strategies, plans, and policies to attract investment into low-carbon growth opportunities.
[448] Home - Modern Energy Cooking Services
[449] Low Energy Inclusive Appliances - Efficiency for Access
[450] Job Placements and Internships
[451] Transforming Energy Access – Learning Partnership
[452] Transforming Energy Access (TEA) | Chevening
[453] Uganda Energy Transition Plan – Analysis - IEA

by Uganda's Ministry of Energy and Mineral Development, with support from the International Energy Agency (IEA) in partnership with CCG. CCG provided training to Ugandan government officials in the use of CCG open-source modelling tools and supported them in the creation of energy systems models. The resulting analysis provided an input in the development of the ETP.

4.5.4 Open Calls

The UK is stimulating a pipeline of new ideas and innovations in clean energy technologies and business models that have the potential to be commercialised and scaled-up in developing countries, particularly through UK-international joint ventures. The UK is achieving this by supporting open funding competitions through Energy Catalyst, which is funded through the Transforming Energy Access (TEA)[454] platform and the Global Challenges Research Fund (GCRF)[455] and has provided financial and technical support to over 90 UK-led R&D projects in Sub-Saharan Africa, South Asia and the Indo-Pacific, across the full spectrum of Ayrton thematic challenges. There have also been a series of Open Calls focused on the R&D of productive use appliances (PREO)[456], efficient appliances suited to off-grid contexts (LEIA)[457], mobile-based technologies (GSMA Fund)[458], and energy innovations in humanitarian contexts (Humanitarian Grand Challenge Fund)[459].

4.5.5 Technology Accelerators

The UK has conducted a series of funding calls by the Modern Energy Cooking Services (MECS)[460] programme focused on solving modern cooking challenges (including around supply chains, integration with mini-grids, alternative cooking fuels etc.) and via the Cross Boundary Mini-Grids Innovation Lab[461] which convenes mini-grid developers around priority prototypes testing new business model innovations for mini-grids. This intervention type should see significant growth with the start of new projects funded through the flagship Zero Emissions Generator[462] (ZE-Gen) initiative, and Next Generation Solar projects funded through a new partnership between the TEA[463] platform and the Sunrise Network[464].

[454] Transforming Energy Access (TEA) - supporting renewable energy projects, energy access and green technologies in Africa and Asia.
[455] Global Challenges Research Fund – UKRI
[456] Home - PREO Powering Renewable Energy Opportunities
[457] Low Energy Inclusive Appliances - Efficiency for Access
[458] GSMA Innovation Fund | Mobile for Development
[459] Home - Humanitarian Grand Challenge
[460] Challenge fund - Modern Energy Cooking Services
[461] https://crossboundary.com/advisory/mini-grid-innovation-lab/Home - CrossBoundary Group
[462] Home - ZE-Gen
[463] Transforming Energy Access (TEA) - supporting renewable energy projects, energy access and green technologies in Africa and Asia.
[464] About Us - Sunrise

4.5.6 Venture-building

We are providing financial and technical support to innovative start-ups, and small and medium sized businesses (SMEs) to scale-up their clean energy offers in developing countries, mostly in Sub-Saharan Africa and South Asia, through stategic partnerships with organisations like the Shell Foundation[465], Acumen[466], GSMA[467], the Global Innovation Fund[468], and the World Bank[469].

4.5.7 Market-building

The UK has supported a range of market-enabling intitutions, market-supporting digital platforms, and specialist funds working mainly in Sub-Saharan Africa. Developments in the last year include the Shell Foundation-led Market Institutions Facility[470], Mirova's Gigaton Fund[471], Odyssey's Results Based Finance platform[472], the Carbon Value Exchange[473] (CaVex), the ongoing work of the Global Distributors Collective[474], and action across several Crowfunding Platforms[475].

4.5.8 Country Demonstrators

At COP28, the UK announced its intention to develop a **Climate Innovation Pull Facility (CIPF**) providing up to £185 million to pull-up innovative climate mitigation solutions in developing countries, to the point at which they help shape local markets and are ready for large scale deployment in those contexts. In turn, this will help accelerate global climate action in line with the Paris Agreement, and progress on the Sustainable Development Goals

In November 2023, a **£40m scale-up of the Transforming Energy Access (TEA) platform** was included in the UK announcement[476] at COP28 in Dubai, to facilitate clean energy demonstrators funded by FCDO Country Posts and to scale-up work on sustainable cooling and energy efficiency. So far, new demonstrators have been agreed in Tanzania, the Pacific and Indonesia, with additional demonstrators currently in design in Zambia, Somalia, and Rwanda, showing strong uptake on the new mechanism.

This financial year 2023/24**, £9.1m was awarded to 16 innovation projects via Energy Catalyst Round 10**[477], that started from April 2024, and to improve clean

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[465] Our strategic partnerships - Shell Foundation
[466] Acumen's investment portfolio
[467] GSMA Innovation Fund | Mobile for Development
[468] Global Innovation Fund | Improving lives through social innovation
[469] Industrial Decarbonization | Program Profile | ESMAP
[470] Building Impactful Markets: The role of Institutional Support - Shell Foundation
[471] Mirova announces first closing of Mirova Gigaton strategy
[472] Access Financing for Your Next Project | Odyssey Energy Solutions
[473] Cavex | Climate finance with impact
[474] Home - The Global Distributors Collective
[475] Crowdfunding energy access- State of the market report 2022
[476] PM to call for 'era of action' at COP28 climate summit - GOV.UK
[477] Round 10 - Energy Catalyst

energy access in 11 countries in Sub-Saharan Africa, South Asia, and the Indo-Pacific (including Fiji, Papua New Guinea, and Indonesia). This is part of a broader UK government investment of £40.3m in 67 innovation projects to be funded by the FCDO and the UK Department for Science, Innovation and Technology. It includes 4 projects funded by the Tanzania British High Commission via the new TEA demonstrator offer.

In November 2023, a **£15m scale-up of the UK's Modern Energy Cooking Services (MECS) programme** was included in the UK's Ayrton Fund announcement[478] at COP28 in Dubai, to facilitate clean energy demonstrators funded by FCDO Country Posts. So far, new demonstrators have been agreed in Tanzania and Uganda to scale-up and demonstrate eCooking from April 2024.

4.5.9 Support for the development and enhancement of endogenous capacities and technologies of developing country Parties

Through the UK's Ayrton Fund programming, the UK has been supporting the endogenous capacities of developing countries:

The UK's Clean Climate Growth (CCG) Fund launched a new partnership with the International Energy Agency (IEA) on their Affordable and Sustainable Energy System for Sub-Saharan Africa programme[479], which provides support to selected countries to improve their data management and long-term planning to facilitate development of low-carbon energy systems. CCG will provide training in its modelling tools to government officials in target countries such as Ethiopia, Ghana, Kenya, Nigeria, Democratic Republic of Congo, Rwanda, Uganda, Zambia, etc.

BRILHO Mozambique: is a country programme that catalyses private sector investment and innovation, and government support in Mozambique, to increase energy access through supply of household solar, mini-grids and improved cooking solutions.

- The programme has provided technical support to the government of Mozambique in drafting the regulatory framework for off-grid areas, making Mozambique a more attractive market for investors in the renewable energy sector.
- In 2023/24, BRILHO held workshops[480] with government and industry representatives in the areas of leadership, gender equality and social inclusion, and women's empowerment. These sought to strengthen the capacity of institutions in the energy sector to create a gender-sensitive, inclusive, and conducive environment for the implementation of business

[478] PM to call for 'era of action' at COP28 climate summit - GOV.UK
[479] Energy Sub-Saharan Africa – Programmes - IEA
[480] BRILHO

models that tackle the needs of vulnerable people and increase the representation of women in the energy sector value chain.

UK support to **Mission Efficiency** funded the development of three innovation roadmaps under the Ayrton Fund's Industrial Decarbonisation challenge in Brazil, Kenya, and Vietnam. It also funded a publicly accessible toolkit[481] that facilitates more integrated support on energy efficiency by identifying priority sectors by country and leveraging existing tools from partner programs and platforms, as well as other leading institutions around the world.

4.5.10 Efforts to encourage private sector activities related to technology development and transfer and how such efforts support developing country Parties

Our ICF programmes are having a global impact, as set out in our published annual International Climate Finance (ICF) results[482]. Since 2011 UK ICF has leveraged £7.8 billion of private finance for climate change. Examples of UK efforts to encourage private sector activity through Ayrton Fund programming:

4.5.10.1 Transforming Energy Access (TEA) platform

- Between 2016 and 2024, the £265m FCDO Transforming Energy Access[483] (TEA) platform, which invests in early-stage testing and scale-up of new clean energy technologies and business models for developing countries, leveraged £1.5 billion in additional investment into clean energy research, innovation and scale-up from both public and private sources.

- TEA-supported innovators have gone on to raise significant investment capital, including for example Sheffield-based Mobile Power[484] who developed an innovative battery swapping and distribution system in use in Sierra Leone, the Democratic Republic of Congo, Liberia, Uganda, Zambia, Gambia and Nigeria and have raised over £5m in follow on investment. Mobile Power have rented their portable batteries over 16 million times to date and have 55,000 active customers who use these batteries to power electric motorbikes, for phone charging, lightening, and for powering small DC appliances such as TVs and fans.

- Another example of a TEA-supported innovator is Wales-based SureChill[485] who developed a unique cooling technology approved by the World Health Organisation that ensures a refrigerator remains perfectly cool during any power outage, and who raised over £7 million in follow on investment.

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[481] Toolkit - Mission Efficiency
[482] UK International Climate Finance results 2024
[483] Transforming Energy Access (TEA) - supporting renewable energy projects, energy access and green technologies in Africa and Asia.
[484] MOPO — Redefining energy and transport in Africa
[485] https://www.surechill.com/

SureChill refrigerators are used in several countries in Sub-Saharan Africa including Kenya, Senegal, Nigeria, Zambia, and Mali.

4.5.10.2 Africa Clean Energy Programme (ACE)

- **The Africa Clean Energy Programme (ACE)** is a regional programme including a Challenge Fund supporting start-ups or expansion of household solar energy businesses in nine countries in Sub-Saharan Africa and supporting the deployment of mini grids through the African Development Bank.

- During the Ayrton Fund period, the programme leveraged £2.8 million in private finance in support of programme activities and is estimated to have provided 0.67 MW of installed off-grid clean energy capacity.

4.5.10.3 Global Facility to Decarbonise Transport (GFDT)

- The **GFDT** is a new, first of its kind World Bank Trust Fund[486] that provides financial and technical assistance to support transport decarbonisation in low and middle-income countries. Its mission is to accelerate innovation and investment in climate-smart mobility solutions, with the goal of achieving net zero in the global transport sector by 2050. GFTD funding and project preparation helps move big transport decarbonisation projects that otherwise would not go forward. In doing so, the Fund empowers low and middle-income countries to build transport systems that not only reduce emissions, but are also safe, modern, inclusive, and resilient.

- Three GFDT innovation-focused projects have been badged as Ayrton to date, including in India (developing a new business model to help unlock commercial financing at scale for e-buses, e-motorcycles and electric 3-wheelers),

4.5.11 Efforts to accelerate, encourage and enable innovation, including research, development and deployment efforts, and collaborative approaches to research and development

Examples of Ayrton Fund activities accelerating innovation include:

4.5.11.1 International Science Partnership Fund (ISPF)

- International Science Partnership Fund (ISPF)[487] will facilitate participation of world-class UK academic researchers and their international partners in cutting-edge research. This is an existing fund that supports world-class

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[486] Global Facility to Decarbonize Transport (GFDT)
[487] International Science Partnerships Fund (ISPF)

research in cutting-edge science and innovation to tackle the major themes of our time: Planet, Health, Tech, and Talent.

- Under the theme of 'Resilient Planet', ISPF will give researchers and innovators access to global talent, large-scale facilities, research ecosystems and markets to swiftly move forward ideas to greater maturity, applicability, and commercialisation.

- The programme will build on DSIT's small portfolio of energy research and ensure a strong strategic direction of the work and coherence with other government departments. It will comprise a combination of scaling-up of existing activities, such as Innovate UK's Energy Catalyst and EPSRC's energy access projects, and new thematic projects in areas such as solar/biofuels, whole systems, heating/refrigeration, sustainable transport, and industrial energy.

- The fund launched in December 2022 with an initial £119 million. A further £218 million was announced in November 2023 for research and innovation partnerships with low and middle-income countries to support sustainable development.

- Research partnerships that bring together multiple countries and both university and private sector expertise, produce game-changing technologies, innovations and evidence, benefiting hundreds of millions of people in lower-income countries. The UK's International Science Partnerships Fund is an example of how we can foster prosperity by solving shared global research and innovation challenges. Genuine partnerships are essential to achieve the ambitions set out in the UK's Science and Technology Framework and the International Technology Strategy.

Transforming Energy Access (TEA) platform

- The £265m FCDO Transforming Energy Access[488] (TEA) platform funds the research, development and demonstration of new clean energy technologies and business models for developing countries.

- Between 2016 and 2024, through effective partnerships and collaborative approaches with the private sector, academia, NGOs and international organisations, TEA has stimulated UK-led research and development of **662 new clean energy technologies and business models** in areas such as energy storage[489], sustainable cooling, electric pressure cookers, remote network management, energy access crowdfunding[490], improving clean

[488] Transforming Energy Access (TEA) - supporting renewable energy projects, energy access and green technologies in Africa and Asia.
[489] MOPO — Redefining energy and transport in Africa
[490] Energise Africa | Change the world & target a return of up to 6%

energy access for **27 million people** in developing countries (including 13 million women).

- It has also **leveraged £1.5 billion** of additional investment into clean energy technology research, innovation and scale-up from both private and public sources; created and supported **125,000 sustainable long-term jobs** (including 27,000 jobs for women); supported **759 young Africans** with job placements and **1135 managers** with specialist training in clean energy access businesses; and led to the **avoidance of 2.7 million tonnes of carbon dioxide emissions.**

4.5.12 Clean Energy Innovation Facility (CEIF)

- The CEIF 1.0 programme, under the umbrella CEIF platform, aims to accelerate the commercialisation of innovative clean energy technologies in developing countries along key themes such as industrial decarbonisation, sustainable cooling, smart energy, and energy storage. A programme extension of up to £55m (CEIF 2.0) has been approved and started in March 2024. The CEIF 2.0 programme will focus on piloting and demonstrating innovative technologies across three key themes - industrial decarbonisation, sustainable cooling, and smart energy.

- Up to 2023/24, CEIF 1.0 supported 55 sustainable cooling technologies with 62 pilots in Colombia, Mexico, Nigeria, Kenya, Rwanda, India, and Bangladesh. The pilots focused on key themes, namely cooling in cities, cold chains, temperature-controlled logistics, space cooling, and cooling-as-a-service (CaaS) business models. Alongside this, the International Finance Corporation (IFC) - delivery partner for CEIF - launched the India Cooling Innovation Lab[491] in December 2023 bringing together technology innovators and local companies to pilot innovative smart energy technologies.

- Under the Industrial Decarbonisation theme, in 2023 CEIF supported 17 ongoing projects in Morocco, Mexico, Dominican Republic, Colombia, Türkiye, Pakistan, India, Vietnam, Bangladesh, as well as regional activities in East Asia and Pacific and those with a global reach. Under the Smart Energy theme, CEIF redefined the fund based on lessons learnt over the past 4 years and planned a strong pipeline of projects showcasing the impact of these changes.

4.5.13 Knowledge generated

- The **UK's Climate Compatible Growth (CCG)** programme has produced knowledge products which are being used in teaching and research within seven universities or research institutes in Low and Middle-Income Countries.

[491] TechEmerge Sustainable Cooling – India Cooling Innovation Lab - TechEmerge

- Further to attending CCG training courses, academics within these seven universities are either teaching CCG tools in their courses or using CCG tools in their research. Examples include: at Strathmore University[492] in Nairobi, Kenya, the CCG energy systems modelling tool OSeMOSYS[493] is being taught as part of the Masters of Science in Sustainable Energy Transitions; at the Addis Ababa Institute of Technology for Research Advancement[494] CCG tools are being used to assess the potential impact of climate change on hydropower supply in Ethiopia; at Makerere University[495] in Kampala, Uganda CCG tools including Model for Analysis of the Energy Demand (MAED) and OSeMOSYS[496] are being taught in the "Master of Energy Economics and Governance" course.

- **The Accelerating Smart Power and Renewable Energy in India (ASPIRE)** seeks to leverage carbon financing to provide market-driven solar-powered induction cooking solutions to target households in India that are below the poverty line and use firewood as their primary cooking fuel. In 2023/24, the programme facilitated 17 strategic engagements between Indian and UK organisations, disseminated 50 technical study reports enriching knowledge exchange, and empowered 1,800 senior level stakeholders through capacity building workshops.

[492] Strathmore University
[493] OSeMOSYS - Home
[494] Addis Ababa University | Seek Wisdom, Elevate your Intellect and Serve Humanity
[495] Welcome | Makerere University
[496] OSeMOSYS - Home