Office for Statistics Regulation

Systemic Review Programme

Accessibility and coherence of UK climate change statistics

October 2021

Executive Summary

Why is this review needed?

Climate change is widely seen as the most important challenge facing the world today. With a rising global temperature resulting in warming oceans and more extreme weather events, it is an issue that is becoming ever more pressing. Climate change is already having wide-ranging effects on all areas of life, and the impact will become more severe as temperatures continue to rise. The Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report, published in August 2021, was the starkest warning yet of the major effects of climate change caused by human activities and shows the urgent need for significant policy action and a strong evidence base to underpin decisions.

Relevant, accessible, and insightful statistics are essential to support delivery of the UK's climate change goals – they are crucial for informing the design, monitoring and evaluation of policies that reduce or preventing the emission of greenhouse gases (mitigation) and those that prepare us for the expected impacts of climate change (adaptation). The statistics also help the public understand the nature and impacts of climate change, which is pivotal in effecting the wider societal change needed to tackle the problem. Looking in detail across the UK climate change statistical landscape is thus timely and sheds light on the value of these important statistics.

We have looked at what we consider are the main climate change-related official statistics produced by UK government departments and the devolved governments. In doing so, we have focused on two key aspects of current climate change statistics: their accessibility – how they are presented to meet the needs of different types of users and whether users can find the information they need – and their coherence – how well sets of statistics work together to inform the bigger picture.

We have focused on exploring the following:

- What producers of climate change statistics have recently done and are currently doing to enhance the accessibility and coherence of their statistics.
- How statistics producers are working together to achieve improvements to the statistics.

What we found

The UK climate change statistics, data and analysis landscape is broad, complex and changeable.

Many new official statistics have been developed in the last decade to support user need and add insight on climate change, which we welcome. However, the development and use of common climate change-related statistics frameworks has also served to highlight data gaps that must be addressed. This is particularly true for the area of adaptation, where there are very few official statistics, and most adaptation indicators rely on proxy variables that are produced for other policy areas.

It is important that the development of statistics continues, not only to fill existing gaps, but also to ensure they keep pace with scientific advances and evolving policy priorities, to help inform decisions and support public understanding. Statistics producers should be open and transparent about their approach to the development of their statistics, setting out their plans and timetables, and explaining the scope and nature of the development.

We found that statistics on climate change have become more accessible. The development of interactive dashboards, data tools and maps as means of disseminating statistics has enhanced understanding, use and reuse of the statistics. These types of tools are helping make the statistics more accessible to a wider range of users, including non-specialists.

Responsibilities for statistics on the same topic area can lie across a number of government departments, and what is measured in the statistics largely reflects the specific needs of the department. For example, separate greenhouse gas emissions statistics are produced by the Department for Business, Energy and Industrial Strategy (BEIS), the Office for National Statistics (ONS) and the Department for Environment, Food and Rural Affairs (Defra). Whilst there exists the potential for confusion – different producers publishing very similar figures – we found that, in the case of greenhouse gas emissions, statistics producers provide good guidance for users on how the statistics should and should not be used, and comparisons between the three estimates are published.

We found that compendium outputs which bring together related statistics and data are providing a much-needed joined-up narrative on climate change, but one which is largely restricted to a specific area, sector or government department producing the statistics.

There are currently no official statistics outputs at a UK level which draw together statistics on all areas of climate change (drivers, emissions, impacts, mitigation and adaptation). Such outputs would contribute to public knowledge and understanding of climate change-related issues and could help inform behavioural changes. UK Government should work towards producing UK-level climate change statistics outputs that meet the needs of both a specialist and non-specialist audience.

In the short term, until such outputs can be produced, the website landing pages for climate change statistics could be improved to help users find relevant and related sets of statistics. Currently, cross-referencing and signposting across different sources of information is not particularly clear, especially between policy pages and related sets of statistics from different producers. The climate change and energy portals on GOV.UK currently contain a long list of links to statistics, with no introduction or context, and adding additional supporting information would benefit users.

Collaboration between statistics producers is essential to support the development and improvement of climate change statistics. We found good levels of collaboration across government and several examples of proactive engagement between analysts in different government departments.

Currently, a significant focus for cross-government engagement and collaboration on climate change statistics is the development of a new UK climate change portal, led by ONS. The climate change portal is one of several pilots for ONS's Integrated Data Service (IDS). The IDS is being developed as a digital collaborative environment that aims to unlock the potential of linked data and build up data standards, tools and approaches. At present, the target audiences for the pilot climate change portal are government analysts, policy teams and other experts. ONS told us it is planning to further develop the portal to make it more accessible to the wider public.

The project has significant potential to improve climate change statistics. We anticipate that, by providing a central repository of information, it will make the existing statistics and data more accessible and will expand opportunities for data linkage, both within climate change datasets and with statistics on connected topics, such as the economy and transport.

We encourage ONS to make the most of this opportunity by delivering a portal that not only makes data open, accessible, and consistently formatted, but also presents data in an engaging and interactive way for a wide range of users, to meet the information needs of society.

Climate change is such a high-profile, strategic challenge and deserves this level of prominence from the UK's national statistical institute.

We are recommending:

- UK Government should work towards producing UK-level climate change statistics outputs that meet the needs of both a specialist and non-specialist audience.
- The climate change statistics and data frameworks developed by the United Nations Economic Commission of Europe (UNECE), the Climate Change Committee (CCC) and others are helping highlight gaps in the UK official statistics. Relevant producers should attempt to address these as a matter of urgency and in the short-term, where possible, proxy variables should be identified to add insight and support understanding.
- Producers should ensure that experimental statistics have a clear development plan that covers how they intend to develop them and across what timeframe.
- Government landing pages should include clear guidance for users about which sources and datasets are available, how they can be used to answer different questions on climate change and improve cross-referencing and signposting across different sources of information.
- When statistics are used by government which have more than one official source, for example greenhouse gas emissions or green jobs, it should be clearly stated which source is being used and why.
- Statistics producers should be transparent and publish information about their coordination arrangements. This helps statistics users understand the extent of collaboration and engagement across government and how this supports high quality and valuable statistics on climate change.

We would encourage ONS, in its development of the climate change portal, to consider the following:

- To promote the portal, ONS should lead on publishing a development plan for the portal, which includes regular progress updates.
- We recommend that ONS clearly communicates the target audience and deliverables to all stakeholders.
- It is important that the climate change portal is resourced to support long-term delivery and is able to respond to changing policy priorities and evolving datasets.
- Any central narrative will need to align with that of the existing statistics and this will require close collaboration across government departments.
- We fully support ONS's ambition to develop a public-facing version of the portal. In doing so, user engagement will be vital for understanding the needs and gathering the views of all types of users.
- It is important that ONS, alongside statistics owners, considers how it communicates information about the quality, strengths and limitations of all data sources in the portal, including those which are not official statistics.

Introduction

Why is this review needed?

Climate change is widely seen as the most important challenge facing the world today. With a rising global temperature resulting in warming oceans and more extreme weather events, it is an issue that is becoming ever more pressing. Climate change is already having wide-ranging effects on all areas of life, and the impact will become more severe as temperatures continue to rise.

In August 2021, the Intergovernmental Panel on Climate Change (IPCC) published its Sixth Assessment Report, which was the starkest warning yet of the major effects of climate change caused by human activities. It highlights how new simulations, analysis and methods have led to a greater understanding of the human influence on a wide range of climate variables and how the scale of recent changes across the climate system has been unprecedented. This shows the urgent need for significant policy action and a strong evidence base to underpin decisions.

The majority of UK climate change policy originates from the Climate Change Act 2008 which initially set a target to reduce greenhouse gas (GHG) emissions to 80% of 1990 levels. At the United Nations' 21st Conference of Parties (COP21), held in Paris in 2015, the UK signed up to the Paris Agreement which set a further requirement to limit global temperature change to two degrees Celsius above pre-industrial levels and with nations expected to make a concerted effort to achieve a limit of 1.5 degrees. As part of the UK Government's approach to achieve this, a 2019 amendment to the 2008 Act was introduced which set a target of net zero carbon emissions by 2050. This target has spurred the development of a range of policies and strategies, including the main net zero strategy and decarbonisation plans for individual sectors including energy, transport and heat and buildings.

While the UK Government is responsible for meeting international obligations such as the Paris Agreement, the devolved governments in Scotland, Wales and Northern Ireland have their own powers to set climate targets and strategies. In Scotland the main target is set out in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 which commits the Scottish Government to the more ambitious target of achieving net zero emissions by 2045. The Environment (Wales) Act provides the statutory emissions reduction framework for Wales' low carbon transition. It establishes a system of targets and carbon budgets to net zero by 2050, with interim emissions reduction targets for the years 2020, 2030 and 2040 and a system of carbon budgeting that together create an emissions reduction pathway to the 2050 target. The Northern Ireland Executive has not yet passed any legislation setting out its own targets, but bills are currently passing through the Northern Ireland Assembly. While climate change policy itself is devolved, areas such as energy are not devolved, and for those areas, devolved governments are reliant on UK Government decisions.

Climate change policy is broader than reducing or preventing the emission of greenhouse gases (mitigation). It is also important to plan and prepare for the expected impacts of climate change (adaptation). A November 2020 National Audit Office report, Achieving government's long-term environmental goals, has highlighted

the need for joint action across government on both mitigation and adaptation to climate change.

Relevant, accessible, and insightful statistics are essential to support delivery of the UK's climate change goals – they are crucial for informing the design, monitoring and evaluation of policies on mitigating and adapting to climate change. The statistics also help the public understand the nature and impacts of climate change, which is pivotal in effecting the wider societal change needed to tackle the problem. Looking in detail across the UK climate change statistical landscape is thus timely and sheds light on the value of these important statistics.

Climate change statistical landscape

What exactly are climate change statistics?

The UK climate change statistics, data and analysis landscape is broad and complex. Climate change evidence and analysis comes in many different forms, including official statistics produced by government and other public bodies, and scientific/research data and models. Official statistics are a vital part of this landscape, as they are the key data sources against which progress on climate change-related targets are measured.

There is no one definitive set of climate change official statistics, and what is included as climate change statistics means different things to different people. Climate change statistics are much broader than greenhouse gas emissions; they also cover topics as diverse as household energy efficiency, biodiversity, and land use.

There are a number of common global frameworks for climate change statistics. These include the United Nations Economic Commission for Europe's (UNECE) framework for climate change-related statistics, which sets out a core set of indicators and statistics on six areas of climate change: climate and weather; emissions (greenhouse gas emissions and their human causes); drivers (human causes of climate change that deal with sources of emissions); impacts (impacts of climate change on human and natural systems); mitigation; and adaptation. There are also a range of UK frameworks that cover climate change statistics and data, including the Climate Change Committee's (CCC) set of adaptation indicators and the Department for Environment, Food and Rural Affair's (Defra) Outcome Indicator Framework for the 25 Year Environment Plan .

Due to the cross-cutting nature of climate change, the responsibilities for setting UK climate policy and achieving net zero and are spread across a number of UK Government departments including the Department for Business, Energy and Industrial Strategy (BEIS), Defra, the Department for Transport (DfT) and the Department of Levelling Up, Housing and Communities (DLUHC). Official statistics on climate change-related topics reflect these responsibilities and are also produced by a number of different government departments.

Climate change policy is a devolved matter. The devolved administrations in Scotland, Wales and Northern Ireland have the powers to set their own climate change policy and publish their own climate change statistics and analysis. However, for many climate change-related topics, including greenhouse gas emissions and energy efficiency, data are collected in consistent ways across the UK.

The scope of this review

We have taken a broad look at what we consider are the main climate change-related official statistics produced by UK government departments and the devolved governments. These are listed in Annex A.

In doing so, we have focused on two key aspects of current climate change statistics: their accessibility – how they are presented to meet the needs of different types of users and whether users can find the information they need – and their coherence – how well sets of statistics work together to inform the bigger picture.

We first looked at the accessibility and coherence of climate change statistics in 2011. We found that improvements to the statistics were needed in several areas and recommended that the following be developed: a central repository for all climate change data; improved data quality guidance when data are used to support official statistics; a climate change report covering all aspects of the topic for non-specialists; interactive maps to better inform the public; and an intuitive framework that could be used to structure statistics and information about climate change.

Accessibility and coherence of the statistics are as important now as they were ten years ago. Mindful of our previous recommendations, we have looked widely across the statistical landscape, including statistics on drivers, emissions, impacts, mitigation and adaptation. This review was carried out using a mix of desk research and a series of interviews. Due to the focused scope, these interviews targeted organisations producing and using data within government, as opposed to the wider user community or the general public. We also engaged with some organisations outside the official statistics system that hold or use relevant data, including the Met Office and the Climate Change Committee.

We have focused on exploring the following:

- What producers of climate change statistics have recently done and are currently doing to enhance the accessibility and coherence of their statistics.
- How statistics producers are working together to achieve improvements to the statistics.

This latter point is particularly important, given that collaboration between statistics producers is essential for achieving coherent statistics.

What we found

Statistics are continually evolving

Since we started looking at these statistics ten years ago, a range of new data collections and statistics have been developed. These new statistics reflect the evolving policy landscape and are adding insight on climate change-related topics. Some key examples include statistics on:

- **Green economy** – The Office for National Statistics (ONS) has established a Low Carbon and Renewable Energy Economy Survey, an annual survey of businesses which estimates the size of the UK's green economy. It informs a key set of official statistics on the UK's green economy, a topic of growing importance as the UK transitions to net zero and aims to deliver a green industrial revolution.
- **Energy efficiency** – The Department for Business, Energy & Industrial Strategy (BEIS) has developed a National Energy Efficiency Data-Framework (NEED), which matches gas and electricity consumption with information on energy efficiency measures installed in UK homes, from a range of databases and schemes. It allows users to access granular, property-level data through different routes. BEIS is currently reviewing its NEED work programme. The Department for Levelling Up, Housing and Communities (DLUHC) publishes statistics on Energy Performance of Buildings Certificates which provides data on the energy efficiency of buildings in England and Wales and allow users to examine trends and changes in efficiency.
- **Carbon footprint** – The Department for Environment, Food and Rural Affairs (Defra) and Scottish Government now publish estimates of the UK's carbon footprint and Scotland's carbon footprint, respectively, an approach to measuring greenhouse gas emissions which is based on the consumption of all goods and services by households. These estimates provide a fuller picture of the UK's/Scotland's carbon emissions on a global scale.
- **Transport** – The Department for Transport (DfT) is maximising the value of existing BEIS and Defra data by reusing them in a transport context. It has developed new outputs on transport and environment statistics which are helping it understand greenhouse gas emissions from transport and changes in electric vehicles and charge points across the UK.

While some of these statistics are National Statistics, meeting the highest standards of trustworthiness, quality and value, many of these recently developed statistics are currently published as experimental statistics. This means they are still undergoing development and evaluation. Experimental statistics are published to involve users and stakeholders in the assessment of their suitability and quality at an early stage. Ongoing development and innovation will continue to be needed to ensure that climate change official statistics keep pace with the rapidly evolving policy landscape and meet user demand for statistics and data.

However, it is important that experimental statistics are developed so that they go on to meet the standards of the Code of Practice for Statistics. They should undergo a period of evaluation to determine whether the statistics are of sufficient quality and value to be published as official statistics. The length of this period and how users can contribute feedback should be clearly communicated. It is not acceptable for statistics without a clear development plan to remain as experimental over the longer term. Producers should also explain how any new statistics link to existing and related climate change statistics.

It is worth noting that statistics on certain areas of climate change are more established than others. For example, energy and greenhouse gas emissions statistics have been published on a consistent basis for years, whereas there are very few official statistics on adaptation, and most adaptation indicators rely on proxy variables that are produced for other policy areas.

Due to the increased policy activity on climate change, there is greater demand in government for climate change evidence and analysis. Many government departments are prioritising climate change and net zero statistics and analysis, for example, by establishing dedicated climate change and/or cross-cutting analytical teams. Examples include:

- Department for Levelling Up, Housing and Communities (DLUHC) has created a new directorate on buildings and net zero that focuses on the decarbonisation of buildings.
- ONS is creating a new climate change and net zero strategic plan and created a dedicated division focusing on Environment, Net Zero and Natural Capital.
- Defra has a dedicated team for cross-cutting analysis on climate change adaptation.
- Department of Agriculture, Environment and Rural Affairs (DAERA) has set up a new climate change statistics branch.

Statistics are being presented in new ways

We found that statistics on climate change have become more accessible to a wide range of users. A key contributor is the development of interactive dashboards, data tools and maps as ways of disseminating statistics. Several producers of climate change statistics have published such products in recent years, reflecting a wider trend across the UK statistical system.

These dashboards, data tools and maps cover a broad range of topics. These include:

- **Greenhouse gas emissions** – DAERA publishes a Northern Ireland greenhouse gas inventory interactive dashboard alongside the bulletin which presents trends in emissions by sector. The National Atmospheric Emissions Inventory (NAEI) website (managed by BEIS) hosts two emissions interactive maps, which allow users to explore UK greenhouse gas emissions at a 1km^2 resolution and CO_2 emissions from local authorities. And DfT has recently developed an interactive dashboard which compares greenhouse gas emissions of example journeys across the UK.

- **Green transport** – DfT has developed an interactive map which shows the location of electric vehicle charging devices available in the UK.
- **Energy** – BEIS's energy consumption in the UK dashboard allows users to interact with and visualise these data, and the Scottish Government's Scottish energy statistics hub is intended to be a 'one-stop shop' for all Scottish energy data.
- **Energy efficiency** – all energy performance of buildings data for England and Wales can be searched and downloaded on DLUHC's Open Data Communities website. BEIS has developed a NEED data explorer, which allows users to investigate energy consumption comparisons by different property and household characteristics, as well as the domestic energy map which allows users to map both energy and energy efficiency measures.

The purpose and functionality of these outputs varies. Most dashboards, including the greenhouse emissions ones listed above, are essentially interactive data visualisation tools released alongside a statistical bulletin, allowing users to produce and download customised charts and data tables. Others, like the Scottish energy statistics hub, are more advanced and provide commentary alongside the charts to help users understand the key messages of the statistics. The DLUHC open data portal aims to make the rich energy performance dataset available for data analysis to inform research into energy efficiency issues such as fuel poverty and climate change.

These tools enhance accessibility in two ways – they facilitate understanding, use and reuse of the statistics by allowing users to explore the data; and they make the statistics more accessible to a wider range of users, including non-specialists. For instance, the DfT interactive dashboard on greenhouse gas emissions of example journeys is an intuitive, practical guide to the relationship between modes of transport and greenhouse gas emissions.

We also heard about products that were developed for a specific group of users. BEIS told us it funded the development of a scatter tool that allows local authorities to take the CO_2 emissions statistics for their own local authority and add the data to their own reports. This not only improves accessibility but also supports coherence of the statistics by increasing consistency in reporting at the local authority level.

We are pleased that producers are considering different types of users when presenting statistics, and that they are innovating in the ways they present and release this information. There is scope to further develop some of these dashboards and data tools to maximise their value, for example by integrating commentary and adding more supporting information about the quality of the data. Some dashboards, data tools and maps could be signposted more clearly across different outputs to maximise their visibility. For example, BEIS's NEED data explorer, which covers Great Britain, could be referenced in the Scottish Government's energy statistics outputs.

One impressive tool we wanted to draw attention to is BEIS's MacKay Carbon Calculator, which allows users to explore different pathways for reducing the UK's greenhouse gas emissions to the net zero target. It is based on scientific data and there are two versions – a universal version for the public and a more-detailed version.

It is a good example of an engaging and user-friendly product that helps a general audience better understand the likely impact of different changes in emitting sectors, such as vehicle usage, on UK greenhouse gas emissions.

Websites are improving accessibility of the statistics, but further improvements can be made

Overall, the GOV.UK and devolved government websites are a rich resource containing useful and relevant information on climate change that is easily accessible. The landing pages of key sets of statistics such as BEIS's UK greenhouse gas emissions statistics are comprehensive, bringing together all the main statistical outputs as well as links to the key policy pages. However, there are some general areas where improvements could be made to enhance the accessibility and coherence for those using the statistics.

- Cross-referencing and signposting across different sources of information could be improved, especially between climate change policy pages, statistics landing pages and related sets of statistics from different producers. For example, users would benefit from greater signposting between BEIS, Defra, DfT and DLUHC statistics, as this would help them more easily find and make connections between different areas of climate change.
- The series of climate change and energy portals on GOV.UK are not the most user-friendly for statistics users; they contain a long list of links to statistics with no introduction or context. It would be helpful if producers worked together to develop clear guidance for users about which sources and datasets are available and how they can be used to answer different questions on climate change.

Spotlight on coherence

Greenhouse gas emissions statistics

Greenhouse gas emissions statistics are one of the key set of statistics on climate change, as they are used to determine progress towards national emissions reduction targets. In reviewing these statistics, we came across potential coherence issues, but found that statistics producers are explaining these issues to users and are helping them understand related sets of statistics.

There are now three approaches to measuring greenhouse gas emissions, which have different uses. These different greenhouse gas emissions statistics are published separately by BEIS, ONS and Defra.

- BEIS publishes the UK greenhouse gas inventory, a database of estimates of the sources and sinks of the six main greenhouse gases. It measures greenhouse gases on a "territorial" basis, which means that only emissions occurring within the UK's borders are included. These are the estimates which allow the UK to monitor its progress towards international and domestic targets. The inventory is consistent over time and is comparable with those of

other countries, as it is compiled in line with methods set out in international guidance from the Intergovernmental Panel on Climate Change (IPCC).

- Estimates can also be compiled on a "residency" basis, which only includes emissions from UK residents and UK-registered businesses. These are published by ONS as part of the UK Environmental Accounts.
- Lastly, there are "consumption-based" emissions, which takes account of the emissions embedded in the manufactured goods and services which the UK imports and exports. These estimates are known as the UK's carbon footprint and are published by Defra.

BEIS, ONS and Defra publish clear and accessible information about the comparability and coherence of these different approaches. They provide guidance for users on how the statistics should and should not be used. BEIS's UK greenhouse gas emissions statistics bulletin presents comparisons between the three estimates and the background quality information contains a detailed description of all aspects of coherence. ONS publishes bridging tables that show the relationship between the residency basis and territorial basis emissions time series. ONS has also published an article on net zero and the different official measures of the UK's greenhouse gas emissions which is very clear about what each set of emissions estimates does and does not include and their origin and purpose. And Defra's UK carbon footprint bulletin explains the relationship with the other measures of greenhouse gas emissions and presents comparisons of the three estimates.

There are separate greenhouse gas inventories for the devolved administrations, which provide estimates of territorial greenhouse gas emissions for England, Wales, Scotland, and Northern Ireland. These are produced annually, on a consistent basis with the overall UK estimates, and are published by the inventory agency (Ricardo Energy & Environment) on behalf of the devolved governments. Scottish Government and DAERA also publish separate bulletins based on these inventories. These outputs add insight for users in Scotland and Northern Ireland and support decision-making by the devolved governments. Both bulletins compare trends in emissions for all four UK nations and explain the impact of major revisions to the UK and country-level greenhouse gas inventories on the comparability with inventories of other countries. Scottish Government and Welsh Government also report on international aviation and shipping emissions attributed to Scotland and Wales. Scottish Government also publishes estimates of Scotland's carbon footprint, and the relationship with the territorial greenhouse gas emissions is well-explained. Welsh Government told us it will be developing its own carbon footprint estimates next year.

We heard that one of the main challenges to the coherence of UK greenhouse gas emissions statistics is mapping and transposing the territorial basis estimates onto the Standard Industrial Classification (SIC) codes. These are a list of codes that are used to classify businesses by the type of activity they undertake. Because SIC-level estimates present greenhouse gas emissions at the level of relevant industries rather than their whole-economy sector, it provides insight into the big industry emitters at a more granular level. BEIS recently started publishing emissions by SIC code to aid understanding and comparability with other datasets. However, we understand that additional work is being undertaken to enhance coherence at this level. We welcome

that BEIS is carrying out an internal sector review to investigate existing emissions taxonomies, including SICs and National Communication sectors, with a view to improving our ability to map and compare emissions outputs across sectors and taxonomies more easily. We encourage BEIS to publish the findings of this review.

The challenge of measuring green jobs

Although the term is now becoming commonplace, there is no single definition of a "green job". A range of approaches exist for measuring green jobs. ONS recently published a methodology article on this topic which helps frame the issue and provides an accessible overview of the different definitions and their strengths and limitations. There are three main definitions:

- International Labour Organisation (ILO) definition – a broad definition which includes activities such as community adaptation to climate change. According to this definition, a green job must also be a "decent" job, meaning it is a good quality job.
- United Nations System of Environmental Economic Accounting definition – the Environment Goods and Services Sector (EGSS) covers "areas of the economy engaged in producing goods and services for environmental protection purposes, as well as those engaged in conserving and maintaining natural resources".
- Low Carbon and Renewable Energy Economy (LCREE) definition – a narrower definition developed by ONS which focuses on the number of jobs which are "low carbon" or relate to renewable energy in 17 sectors (not the same as the activities in the EGSS definition). Data are collected through a survey of businesses.

Currently, ONS publishes two sets of official statistics on green jobs, on an EGSS and LCREE basis. There are other sources of data, such as academic research and industrial studies, which also present estimates of green jobs. However, these tend to use a range of other approaches including reviewing jobs within individual sectors or focusing on skills, and often multiple definitions are used together.

Due to this range of definitions and approaches, there is a potential risk of reduced coherence and confusion for users of the statistics. The ONS article mentions that the best definition will depend on the question people are trying to answer. We agree that measuring green jobs may require a flexible approach. The UK Government has set an ambition to create two million green jobs by 2030. It is essential that statements about the number of green jobs are supported by a description of the definition used or a link to the relevant statistics, so users know how green jobs are being measured and which statistics are being referred to.

Compendium outputs support coherence

One way to achieve coherence is to bring together related statistics and data on the same topic and present a clear and insightful narrative that helps users understand the bigger picture.

There are several compendium outputs which do this well for a single area of climate change. For instance, BEIS's annual Digest of UK Energy Statistics (DUKES) is the most comprehensive, coherent source of information on the main drivers of greenhouse gas emissions in the UK, namely: energy production, trade and consumption. It gives an overview of the trends in all aspects of energy. The Scottish Government and the Department for Economy (Northern Ireland) produce similarly detailed and accessible compendium reports for Scotland and Northern Ireland, which provide a "whole system" view of the energy systems in those countries. The Welsh Government has also published compendium reports about energy use and energy generation, which are not official statistics outputs but draw on a range of official statistics.

Climate change is one of the main drivers of biodiversity loss. Defra and the Joint Nature Conservation Committee (JNCC) jointly produce an annual UK Biodiversity Indicators report. (Defra additionally produces an England Biodiversity Indicators report.) These compendium publications usefully summarise broad trends in: species and habitats; pressure; benefits; and actions, to give an indication of the state of UK biodiversity, and report on UK progress towards meeting national and international biodiversity actions, goals and targets. They contain one climate change-specific indicator, on pressure from climate change. While it is not an official statistics output, the UK State of Nature report, produced every few years by a collaboration of conservation and research bodies and including the JNCC, brings together a range of data, including official statistics from the UK Biodiversity Indicators. UK State of Nature presents an overview of how the country's wildlife is faring, looking back over nearly 50 years of monitoring to see how nature has changed in the UK, its Crown Dependencies and Overseas Territories.

There are also a number of informative sector-specific compendium outputs. Defra's agriculture statistics and climate change publication brings together existing statistics on agriculture in England to inform understanding of agriculture and greenhouse gas emissions. It covers research and development around greenhouse gas emissions and mitigation methods. DfT's new transport and environment statistics publication presents statistics on greenhouse gas emissions from transport and electric vehicles (which are a core part of the UK's transport decarbonisation strategy), which helps users understand the impact of transport on the environment. While it is not an official statistics output, the Building Research Establishment Trust's The Housing Stock of the United Kingdom report uses official statistics to present information on the comparability of the housing stock of the England, Scotland, Wales and Northern Ireland, including on areas related to climate change, such as heating, fuel type, insulation and energy efficiency. These outputs provide a single, coherent climate change-related view of the agriculture, transport and buildings sectors.

Lastly, there are climate change progress or monitoring reports. At the UK level, the Climate Change Committee (CCC), the UK's independent, statutory advisory body on climate change, produces two progress reports for Parliament: an annual progress in reducing emissions report and a biennial progress in adapting to climate change report. These reports provide a comprehensive account of climate change mitigation and adaptation, respectively, by presenting statistics and data from a wide range of sources, including official statistics. At the country-level, Scottish Government

publishes an annual statutory monitoring report against its updated Climate Change Plan, which covers policy outcome indicators on all key sectors (electricity, buildings, transport, industry, waste, Land-Use Change and Forestry (LULUCF), and agriculture). It is not an official statistics output but complements the Scottish greenhouse gas emissions official statistics and is meant to be read alongside those statistics. Welsh government told us it has developed, but not yet published, similar indicators for tracking work towards its first carbon budget and 2020 emissions target; these will cover the same key sectors.

We welcome this diversity of outputs, some of which were developed relatively recently. They are providing a much-needed joined-up narrative on climate change, but one which is largely restricted to a specific area, sector or government department producing the statistics.

There are currently no official statistics outputs at a UK level which draw together statistics on all areas of climate change (drivers, emissions, impacts, mitigation and adaptation). Such outputs would contribute to public knowledge and understanding of climate change-related issues and could help inform behavioural changes. We consider that the responsibility for such statistics sits within government. Whilst they are not official statistics, the Climate Change Committee reports draw on official statistics and are currently undertaking this role for specialist audiences.

UK Government should work towards producing UK-level climate change statistics outputs that meet the needs of both a specialist and non-specialist audience.

Collaboration across government is supporting improvements

Collaboration between statistics producers and government departments is essential to support the development and improvement of climate change statistics. It also reduces the risks of inconsistent approaches and duplication. Currently there are a number of groups and committees which have a focus on climate change data needs.

The National Inventory Steering Committee (NISC) is the formal governance structure for prioritising and implementing changes and improvements to the UK greenhouse gas inventory. NISC meets twice a year, is chaired by BEIS, and attended by representatives from Defra, DfT, DLUHC, the devolved governments, local government and Ricardo (the inventory agency), among others. All producers we spoke with who are involved in NISC were positive about the effectiveness and impact of the group. NISC focuses primarily on improving the quality and accuracy of the inventory and associated statistics, but we were told that it also helps producers stay apprised of emerging trends and narratives around climate change and that there is desire to open up documentation and make it more accessible to a wider audience. NISC is a well-established, successful forum that drives continuous improvement to the greenhouse gas emissions official statistics.

Several new policy coordination and governance groups have been established since the UK government set its net zero target in 2019, as outlined in the National Audit Office's (NAO) Achieving net zero report. This includes the Climate Change National Strategy Implementation Group (NSIG), which has an analytical sub-group that provides advice on where government can add to the evidence base on climate

change. We understand that senior officials from the main UK government departments responsible for climate change policy and analysis are represented on this group.

Outside formal governance groups, we came across several examples of proactive engagement between analysts in different government departments. For example, we heard that the BEIS climate change analytical teams has regular bilateral meetings with the ONS Environmental Accounts team, and that this has helped identify and address coherence issues in their greenhouse gas emissions estimates (see above). The climate change analysis team in DAERA told us it is actively seeking greater Northern Ireland representation on UK advisory boards and groups through closer engagement with the relevant UK government departments.

The increased collaboration and demand for analysis requires good engagement between analysts and internal stakeholders and users. Most producer teams we spoke to told us they have a close working relationship with policy teams and scientists. For example, the Scottish Government climate change statistics team told us it is very engaged with policy teams across different directorates. In some cases, analysts are embedded within policy teams, which means that they have a good awareness of the analysis needs of internal stakeholders and are well-placed to provide advice. For instance, the Welsh Government has an analyst embedded in its decarbonisation policy team. And the BEIS greenhouse gas inventory team is embedded in the Science and Innovation for Climate and Energy group, which means it has strong knowledge and connections to the latest scientific developments.

Improvements could be made around the transparency and accessibility of information about coordination and governance groups. For instance, information about NISC is scattered across different departmental GOV.UK pages, and there is no publicly available information about the NSIG analytical sub-group. To help users understand the extent of collaboration and engagement across government and how this ensures high quality and valuable statistics on climate change, it would be helpful if statistics producers published information about their coordination arrangements.

ONS Integrated Data Service

Currently, a significant focus for cross-government engagement and collaboration on climate change statistics is the development of a new UK climate change portal, led by ONS. This portal, powered by the Integrated Data Service (IDS), has the potential to lead to significant improvements to the accessibility and coherence of climate change statistics and to greatly add value to the climate change policy area.

As the portal is still in development and there are as yet no outputs for us to review against the Code of Practice for Statistics, we cannot carry out a full review of the value of the portal. Instead, we have looked at what benefits it is expected to bring and areas that ONS may want to consider as it continues to develop the portal.

Background

In late 2020, the government published its National Data Strategy which sets out how the vast array of data across the UK could be better leveraged to create value. The

development of an Integrated Data Service (IDS) is an integral part of delivering the outcomes of the strategy.

The IDS is being developed by ONS as a digital collaborative environment that aims to unlock the potential of linked data and build up data standards, tools and approaches. Users of the IDS should be able to draw on the most up to date evidence and analysis to support policy development. Establishing a climate change portal is one of several pilots for the IDS.

Integrated Data Service and climate change statistics

The new climate change portal, which is currently being developed, has several main aims and objectives. These include bringing data together into a central location to support future climate change analysis and to increase links across government and improve the coherence of statistics, as per the GSS coherence work programme. This is being realised across three different workstreams: a statistics stream which is identifying the data sources that should be brought in; a portal stream that is in charge of developing the product; and lastly an analysis stream to work on the outputs from the portal.

To inform the development of the climate change portal and guide which data should be included, ONS has created a framework to structure the evidence base and present the statistics. This framework takes elements from several existing frameworks, including the United Nations Economic Commission for Europe's (UNECE) framework for climate change-related statistics, the Sustainable Development Goals (SDGs), the Sendai framework, Defra's 25 Year Environment Plan, and the Climate Change Committee's (CCC) adaptation indicator framework. Currently, the framework that ONS is using has not been shared publicly.

The planned scope of the portal is broad, both in terms of the range and types of data. The portal aims to bring in data from arm's length bodies such as the Met Office in addition to the official statistics produced by central government departments and the devolved administrations.

ONS is launching a climate change portal prototype in October 2021 that will include a dashboard and a data catalogue that aims to initially cover around 35 out of a total of over 250 potential indicators, with the intention being to add more as development continues, across the UNECE's six climate change topic areas (climate and weather, emissions, drivers, impacts, mitigation and adaptation).

The climate change portal is not initially being designed to be a public-facing product; the target audience is government analysts and policy teams. We spoke to most of the government teams involved in this work to understand their awareness of, contribution to and hopes for the portal.

The project has significant potential to improve climate change statistics. We anticipate that, by providing a central repository of information, it will make the existing statistics and data more accessible and will expand opportunities for data linkage, both within climate change datasets and with statistics on connected topics, such as the economy and transport.

We encourage ONS to make the most of this opportunity by delivering a portal that not only makes data open, accessible and consistently formatted, but also presents data in an engaging and interactive way for a wide range of users, to meet the information needs of society.

Climate change is such a high-profile, strategic challenge and deserves this level of prominence from the UK's national statistical institute.

The development of the portal is an excellent example of cross-government collaboration. Representatives from several UK Government departments, the Devolved Administrations as well as the Met Office and Climate Change Committee (CCC) sit on the project steering or advisory groups. ONS has been proactive in engaging and seeking views. The project is drawing on expert input and advice from across government, and this has been particularly beneficial when developing the portal's framework.

Maximising the value of the portal

The climate change portal project is ambitious and has the potential to deliver significant impact. Below we set out some considerations for ONS as they continue to develop the portal:

- To promote the portal, ONS should lead on publishing a development plan for the portal, which includes regular progress updates. Currently, it is difficult for anyone outside of the project to find information about the development of what is expected to be a step change in climate change statistics.
- We heard that more clarity is needed on the target audience and deliverables of the climate change portal. We understand the ONS team developing the portal has a clear plan and target audience in mind and this is shaping the development of the prototype. We recommend that ONS clearly communicates the target audience and deliverables to all stakeholders
- To ensure the portal becomes a permanent solution that will add value for a variety of users and supports the government's future climate change and net zero statistical needs, it is important that the climate change portal is resourced to support long-term delivery and is able to respond to changing policy priorities and evolving datasets.
- The launch of the climate change dashboard potentially creates a new coherence challenge for producers of the statistics. Currently, individual departments who produce statistics are responsible for presenting a clear, insightful and coherent narrative, but the portal will draw together data across a range of areas and topics. Any central narrative will need to align with that of the existing statistics and this will require close collaboration across government departments.
- While the initial launch will be open to the public it will not be designed with them in mind; ONS told us it is planning to further develop the portal to make it more accessible to the wider public. As climate change is an area of significant public interest, we fully support this ambition. When developing a more public-

facing version of the portal, user engagement will be vital for understanding the needs and gathering the views of all types of users.

- The portal is drawing in data which are not official statistics. This presents significant opportunities but also challenges that will need to be addressed. Public confidence in data which are not official statistics can be supported through voluntary application of the Code of Practice for Statistics. This is an established approach for climate change-related data. For example, BEIS voluntarily applies the Code to its greenhouse gas reporting conversion factors and Defra voluntarily applies the Code to its Outcome Indicator Framework for the 25 Year Environment Plan, one of the frameworks which has informed the development of the portal. It is important that ONS, alongside statistics owners, considers how it communicates information about the quality, strengths and limitations of all data sources in the portal.

What does all this mean for climate change statistics?

The UK climate change statistics, data and analysis landscape is broad, complex and changeable.

Many new official statistics have been developed in the last decade to support user need and add insight on climate change, which we welcome. However, the development and use of common climate change-related statistics frameworks has also served to highlight data gaps that must be addressed. This is particularly true for the area of adaptation, where there are very few official statistics, and most adaptation indicators rely on proxy indicators that are produced for other policy areas.

It is important that the development of statistics continues, not only to fill existing gaps, but also to ensure they keep pace with scientific advances and evolving policy priorities, to help inform decisions and support public understanding. Statistics producers should be open and transparent about their approach to the development of their statistics, setting out their plans and timetables, and explaining the scope and nature of the development.

We found that statistics on climate change have become more accessible. The development of interactive dashboards, data tools and maps as means of disseminating statistics has enhanced understanding, use and reuse of the statistics. These types of tools are helping make the statistics more accessible to a wider range of users, including non-specialists.

Responsibilities for statistics on the same topic area can lie across a number of government departments, and what is measured in the statistics largely reflects the specific needs of the department. For example, separate greenhouse gas emission statistics are produced by BEIS, ONS and Defra. Whilst there exists the potential for confusion – different producers publishing very similar figures – we found that, in the case of greenhouse gas emissions, statistics producers provide good guidance for users on how the statistics should and should not be used, and comparisons between the three estimates are published.

We found that compendium outputs which bring together related statistics and data are providing a much-needed joined-up narrative on climate change, but one which is largely restricted to a specific sector or the government department producing the statistics.

There are currently no official statistics outputs at a UK level which draw together statistics on all areas of climate change (drivers, emissions, impacts, mitigation and adaptation). Such outputs would contribute to public knowledge and understanding of climate change-related issues and could help inform behavioural changes. UK Government should work towards producing UK-level climate change statistics outputs that meet the needs of both a specialist and non-specialist audience.

In the short term, until such outputs can be produced, the website landing pages for climate change statistics could be improved to help users find relevant and related sets of statistics. Currently, cross-referencing and signposting across different sources of information is not particularly clear, especially between policy pages and related sets of statistics from different producers. The climate change and energy portals on GOV.UK currently contain a long list of links to statistics with no introduction or context and adding additional supporting information would benefit users.

Collaboration between statistics producers is essential to support the development and improvement of climate change statistics. We found good levels of collaboration across government and several examples of proactive engagement between analysts in different government departments.

Currently, a significant focus for cross-government engagement and collaboration on climate change statistics is the development of a new UK climate change portal, led by ONS. The climate change portal is one of several pilots for ONS's Integrated Data Service (IDS). The IDS is being developed as a digital collaborative environment that aims to unlock the potential of linked data and build up data standards, tools and approaches. At present, the target audiences for the pilot climate change portal are government analysts, policy teams and other experts. ONS told us it is planning to further develop the portal to make it more accessible to the wider public.

The project has significant potential to improve climate change statistics. We anticipate that, by providing a central repository of information, it will make the existing statistics and data more accessible and will expand opportunities for data linkage, both within climate change datasets and with statistics on connected topics, such as the economy and transport.

We encourage ONS to make the most of this opportunity by delivering a portal that not only makes data open, accessible, and consistently formatted, but also presents data in an engaging and interactive way for a wide range of users, to meet the information needs of society.

Climate change is such a high-profile, strategic challenge and deserves this level of prominence from the UK's national statistical institute.

In summary, we are recommending:

- UK Government should work towards producing UK-level climate change statistics outputs that meet the needs of both a specialist and non-specialist audience.
- The climate change statistics and data frameworks developed by the United Nations Economic Commission of Europe (UNECE), the Climate Change Committee and others are helping highlight gaps in the statistics. Relevant producers should attempt to address these as a matter of urgency and in the short-term, where possible, proxy variables should be identified to add insight and support understanding.
- Producers should ensure that experimental statistics have a clear development plan that covers how they intend to develop them and across what timeframe.

- Government landing pages should include clear guidance for users about which sources and datasets are available, how they can be used to answer different questions on climate change and improve cross-referencing and signposting across different sources of information.
- When statistics are used by government which have more than one official source, for example greenhouse gas emissions or green jobs, it should be clearly stated which source is being used and why.
- Statistics producers should be transparent and publish information about their coordination arrangements. This helps statistics users understand the extent of collaboration and engagement across government and how this supports high quality and valuable statistics on climate change.

We would encourage ONS, in its development of the climate change portal, to consider the following:

- To promote the portal, ONS should publish a development plan for the portal, which includes regular progress updates.
- We recommend that ONS clearly communicates the target audience and deliverables to all stakeholders.
- It is important that the climate change portal is resourced to support long-term delivery and is able to respond to changing policy priorities and evolving datasets.
- Any central narrative will need to align with that of the existing statistics and this will require close collaboration across government departments.
- We fully support ONS's ambition to develop a public-facing version of the portal. In doing so, user engagement will be vital for understanding the needs and gathering the views of all types of users.
- It is important that ONS, alongside statistics owners, considers how it communicates information about the quality, strengths and limitations of all data sources in the portal, including those which are not official statistics.

Annex A – list of climate change-related statistics

Official statistics

We have compiled a list of what we consider are the main climate change-related official statistics produced by UK government departments and the devolved governments. This is not a complete list of all statistics that could be considered as climate change statistics – as we outlined in the report, what is included as climate change statistics means different things to different people.

Statistics	Producer	Coverage	Status
Final UK greenhouse gas emissions statistics	BEIS	UK	NS
Provisional UK greenhouse gas emissions statistics	BEIS	UK	NS
UK local authority and regional carbon dioxide emissions statistics	BEIS	UK	NS
Digest of UK Energy Statistics (DUKES)	BEIS	UK	NS
Energy trends	BEIS	UK	NS
Energy consumption in the UK	BEIS	UK	NS
National Energy Efficiency Data Framework (NEED)	BEIS	UK	NS
Household energy efficiency statistics	BEIS	UK	NS
Northern Ireland greenhouse gas inventory	DAERA	Northern Ireland	OS
UK's carbon footprint	Defra	UK	OS
UK biodiversity indicators	Defra / JNCC	UK	NS
Agriculture statistics and climate change	Defra	England	OS
Farm Practices Survey	Defra	England	NS
Funding for flood and coastal erosion risk management in England	Defra	England	OS
Energy in Northern Ireland	Department for the Economy	Northern Ireland	OS
Transport and environment statistics	DfT	UK	ES
Electric vehicle charging device statistics	DfT	UK	NS

Statistics	Producer	Coverage	Status
Energy Performance of Building Certificates in England and Wales	DLUHC	England and Wales	ES
Land use in England	DLUHC	England	OS
Forestry statistics	Forest Research	Great Britain	NS
UK environmental accounts	ONS	UK	NS
UK natural capital accounts	ONS	UK	ES
Low carbon and renewable energy economy statistics	ONS	UK	ES
Scottish greenhouse gas statistics	Scottish Government	Scotland	OS
Scotland's carbon footprint	Scottish Government	Scotland	ES
Annual compendium of Scottish energy statistics	Scottish Government	Scotland	OS
Emissions of greenhouse gases by year	Welsh Government	Wales	OS

Other statistics, data and analysis

There are also a range of other climate change-related statistics, data and analysis produced by UK government departments, the devolved governments, and public bodies which are not official statistics. We have compiled a list of some relevant outputs which are not official statistics.

Statistics	Producer	Coverage
Energy and emissions projections	BEIS	UK
Greenhouse gas reporting: conversion factors	BEIS	UK
The housing stock of the United Kingdom	BRE	UK
Progress reports to Parliament (progress on reducing UK emissions and progress on preparing for climate change)	CCC	UK
Independent Assessment of UK Climate Risk	CCC	UK
UK Carbon Budget	CCC	UK
Outcome Indicator Framework for the 25 Year Environment Plan	Defra	UK

Statistics	Producer	Coverage
International Climate Finance results	FCDO, BEIS, and Defra	UK
UK State of Nature report	JNCC and conservation and research bodies	UK
UK climate maps and data	Met Office	UK
UK climate dashboard	Met Office	UK
UK Climate Projections (UKCP)	Met Office	UK
Sustainable Development Goals (SDGs)	ONS	UK
UK Greenhouse Gas Inventory: Annual report for submission under the Framework Convention on Climate Change	Ricardo Energy & Environment	UK
Climate Change Plan: monitoring report	Scottish Government	Scotland
Energy generation in Wales	Welsh Government	Wales
Energy use in Wales	Welsh Government	Wales

Abbreviations

BEIS Department for Business, Energy and Industrial Strategy

BRE Building Research Establishment

CCC Climate Change Committee

DAERA Department for Environment, Food and Rural Affairs

Defra Department for Environment, Food and Rural Affairs

DfT Department for Transport

DLUHC Department for Levelling Up, Housing and Communities

ES Experimental statistics

FCDO Foreign, Commonwealth and Development Office

JNCC Joint Nature Conservation Committee

NS National Statistics

ONS Office for National Statistics

OS Official statistics