



Scotland's centre of expertise connecting  
climate change research and policy

## Monthly Report on Research and Policy Developments - Energy and Climate Change

July 2020

Purpose: This document provides a summary of recent key developments in policy and research relating to energy and climate change. It has been prepared by the [ClimateXChange](#) Secretariat and is intended to keep policymakers informed of issues relevant to the Scottish Government's Energy and Climate Change policy portfolio.

### International Climate and Energy Research and Policy

#### **Landmark climate sensitivity study**

The most comprehensive analysis of climate sensitivity undertaken has revealed with more confidence than ever before how sensitive the earth's climate is to carbon dioxide. It finds that climate sensitivity is unlikely to be in the lowest part of the 1.5-4.5°C range, the long-standing estimated range for global warming in response to every doubling of atmospheric carbon dioxide compared to preindustrial levels. The widely reported [study](#), written over four years and published in *Reviews of Geophysics*, says warming will probably be in the 2.6-3.9°C range. Narrowing the range has been a significant scientific challenge. The [new estimate](#) is designed to be used in the IPCC's next major report in 2021 or 2022.

#### **Renewables beat fossil fuels in EU in first half**

Renewable electricity generation exceeded fossil fuel generation, for the first time ever in the EU-27 in the first half of 2020, according to a [report](#) from think-tank Ember. Renewables - wind, solar, hydro and bioenergy – rose by 11% to generate 40% of electricity against 34% for fossil fuels. Driven by new installation and favourable weather conditions, wind and solar alone achieved a record 21%. For the first time, Poland generated more coal-fired electricity than Germany, and as much as the remaining 25 EU countries combined.

#### **EU energy and hydrogen strategies**

The EU [adopted](#) energy and hydrogen strategies to transform its energy system, which accounts for 75% of the bloc's greenhouse gas emissions. The [Strategy for Energy System Integration](#) provides a framework for the green energy transition, helping remove energy consumption silos, boost efficiency, reduce costs, and increase electrification and clean fuels, it said. The [EU Hydrogen Strategy](#) will prioritise renewable hydrogen produced using mainly wind and solar power. However, it says in the near-term other forms of low-carbon hydrogen are needed to rapidly reduce emissions and support the development of a viable market. It launched the [European Clean Hydrogen Alliance](#) to support the strategy and develop an investment pipeline for scaled-up production.

### **Ireland's mitigation plan quashed**

Ireland's Supreme Court has quashed the country's 2017 National Mitigation Plan on grounds it provides insufficient detail on how the state will reduce greenhouse gas emissions, in a ruling [commentators said](#) would have environmental policy implications elsewhere in Europe. In a unanimous ruling, the court said the plan fell far short of the level of specificity required by Ireland's 2015 climate legislation. The case was brought by Friends of the Irish Environment (FIE), an activist group formed to ensure EU environmental regulations are upheld in Ireland.

### **Biden unveils \$2 trillion climate plan**

Joe Biden, the presumptive Democrat nominee for president, has released a [\\$2 trillion plan](#) to boost investment in clean energy and halt carbon emissions from US power plants by 2035. He also said that, if elected, the US would re-join the Paris Agreement. Among other things, his plan includes retrofitting 6m buildings with energy efficiency measures; creating an Environmental and Climate Justice Division within the Department of Justice; and increasing support for electric vehicles, hydrogen production and energy storage.

### **WMO five-year forecast**

The annual mean global temperature is likely to be at least 1° Celsius above pre-industrial levels (1850-1900) in each of the coming five years (2020-2024) and there is a 20% chance that it will exceed 1.5°C in at least one of these years, according to the [World Meteorological Organization](#) (WMO). The earth's average temperature is already over 1.0 C above the pre-industrial period. The last five-year period has been the warmest on record.

### **UN chief speaks out on coal**

Antonio Guterres, the UN secretary general, used a [speech](#) in Beijing to urge China and other nations to stop funding coal projects, warning the Paris Agreement goals will slip out of reach without a green recovery from Covid-19. He said there was no place for coal in any "rational recovery plan" and that it was deeply concerning new coal power plants were being approved, when renewables offer three times more jobs and are cheaper than coal in most countries. His comments come as coal plant building is rebounding in China. According to the [Global Energy Monitor](#), China's provinces approved more new coal-fired capacity between 1 January and 15 June this year than during 2018 and 2019 combined.

### **Record methane emissions**

Global emissions of methane have hit the highest level on record according to the latest [update](#) to the Global Methane Budget. The estimates for 2017, the most recent data, show that annual global emissions reached almost 600m tonnes, 9% higher than the 2000-06 average.

### **CCUS and power sector**

Combining carbon capture utilisation and storage (CCUS) and bioenergy may be critical for offsetting emissions in harder to abate sectors, according to a new International Energy Agency (IEA) [report](#) on the role of CCUS in low-carbon power.

### **IEA/UNEP urge action on cooling**

Coordinated international action on energy-efficient cooling could avoid as much as 460bn tonnes of GHG emissions – roughly equal to eight years of global emissions at 2018 levels – over the next four decades, according to a [report](#) from the United Nations Environment Programme (UNEP) and the International Energy Agency (IEA). Countries can institutionalise many of the actions needed by integrating them into their implementation of the [Kigali Amendment to the Montreal Protocol](#) on reducing hydrofluorocarbons, climate-warming refrigerant gases. The report says the Covid-19 pandemic has underlined the importance of cooling, for example, in refrigerating vaccines, but warns that increasing demand for cooling, such as air conditioning, is contributing significantly to climate change.

### **Coal and a ‘just transition’**

Phasing out coal requires expanding the notion of a ‘just transition’ and a roadmap for coal plant retirement according to a comment piece in [Nature Climate Change](#). Coal combustion accounts for 40% of global CO<sub>2</sub> emissions from energy and its use is unlikely to decline substantially in the medium term: reductions in the US and Europe are being offset by growth in China, India and other Asian countries, it says. Focusing on coal’s environmental and health impacts is unlikely to be sufficient to phase it out. Policymakers need to understand in more detail who will be affected, how such groups can be compensated and how powerful vested interests can be counterbalanced.

### **Carbon prices and emissions**

Countries with carbon prices have significantly lower average emissions growth rates, according to the largest-ever [study](#) of the impact of charges on emissions from fuel combustion. The researchers analysed data for 142 countries over more than two decades, 43 of which had a carbon price of some form by the end of the study period. The [results](#) show that countries with carbon prices have annual carbon dioxide emissions growth rates about two percentage points lower on average than countries without them. Given the average emissions growth rate for the 142 countries was about 2% per year, this level of effect adds up to very large differences over time, the study says.

### **CDR definition**

Defining Carbon Dioxide Removal (CDR) will be the watershed between climate action and greenwashing in the EU, argues a [report](#) from the Zero Emission Platform. The European Climate Law, aiming for climate neutrality by 2050, acknowledges the role of CDR. However, there is no official accepted definition of what CDR technically means. The report sets out guiding principles for a definition of CDR to ensure EU climate goals are met.

## UK Climate and Energy Research and Policy

### State of the UK Climate 2019

Last year was the 12<sup>th</sup> warmest year since 1884 with four UK high temperature records, according to the Met Office's annual [State of the UK Climate report](#). The records included an all-time record of 38.7°C in July in Cambridge and a new winter record of 21.2° C in London in February, the first time 20° C has been exceeded in the UK in the winter. Most of the UK received above average rainfall, with total rainfall 107% of the 1981-2010 average. Since 2009 the UK has had its wettest February, April, June, November and December on record.

### Low-carbon heat

UKERC has [said](#) that the measures outlined in the UK government's consultation on future support for low-carbon heat are not ambitious enough. It says they need to be set within a coherent and ambitious package of policies to drive the UK's transformation to sustainable heating fast enough to achieve net-zero emissions by 2050. It urges immediate action on heat system decarbonisation and says, among other things, the current proposals on heat pumps are insufficient.

### Decarbonising heat

Decarbonising the UK's heating system is the greatest challenge the UK faces in meeting its net-zero 2050 target, according to a [report](#) from a CBI and University of Birmingham [joint commission](#). It says that although heat is the largest source of carbon emissions in the UK, there is no clear government plan on how to tackle them. The report outlines the scale of the task and makes 13 key recommendations.

### £350m for UK green recovery

The UK government announced a £350m package to cut emissions in heavy industry and drive recovery from the coronavirus pandemic. The package includes: [£139m](#) to support the transition from natural gas to hydrogen power, and scale up CCS; £149m to drive the use of innovative materials in heavy industry; £26m to support new building techniques reducing costs and emissions in the construction industry; and a National Space Innovation Programme. It also confirmed it would publish a long-term Industrial Decarbonisation Strategy in spring 2021.

### New UK hydrogen project

Equinor, the Norwegian energy group, has [announced](#) plans to build one of the world's first at-scale facilities to produce hydrogen from natural gas in combination with CCS, at a chemicals park outside Hull. The project provides the basis for a decarbonised industrial cluster in the Humber region, the UK's largest by emissions, and supports UK government aims to establish at least one low-carbon industrial cluster by 2030. The facility would

enable industrial customers to fully switch over to hydrogen, and the park's power plant to move to a 30% hydrogen to natural gas blend. Equinor said the plant could upgrade to powering a large-scale hydrogen network, using CCUS facilities developed by the Zero Carbon Humber Alliance. The project will be part of a bid for UK government co-funding.

## Climate Science, Impacts and Adaptation

### Significant carbon reduction from ERW

Spreading rock dust on cropland could save a tenth of the world's 'carbon budget', the amount of carbon dioxide we can afford to emit without triggering catastrophic levels of global warming, according to [research](#) published in *Nature*. Rocks naturally absorb CO<sub>2</sub> but a process known as enhanced rock weathering (ERW) amplifies this by grinding them up and increasing their surface area. Factoring in countries' climate, cropland area and evolving energy systems, the researchers found that ERW could remove between 0.5 and 2 gigatonnes (GT) of CO<sub>2</sub> annually by 2050. If 2GT were removed annually over half a century, it would save up to 12 per cent of the global carbon budget. ERW has the added appeal of not requiring changes to land use and there is growing evidence it may also boost crop yields, the [study](#) says. Success will depend upon overcoming political and social inertia to develop regulatory and incentive frameworks.

### Hydrogen and solar breakthrough

Researchers at the Australian National University (ANU) have achieved a new [efficiency record](#) for hydrogen cells that can convert water into hydrogen simply using sunlight. The research, published in *Advanced Energy Materials*, found significant costs benefits to the approach. Previous methods of converting water to hydrogen have had a low overall energy conversion efficiency. The study used inexpensive semiconductor materials and resulted in a 17.6 per cent solar-to-hydrogen efficiency, close to the efficiency of solar panels installed on rooftops, which have an efficiency of around 20 per cent.

### Tree planting and carbon stocks

Planting trees to mitigate climate change is not always the best strategy with some experimental sites in Scotland failing to increase carbon stocks, according to a new [study](#) from the University of Stirling and the James Hutton Institute, published in *Global Change Biology*. Researchers analysed four locations in Scotland where birch trees were planted onto heather moorland and found that, over four decades, there was no net increase in ecosystem carbon storage: any increase to carbon storage in tree biomass was offset by a loss of carbon stored in the soil.

### Property flood resilience in Scotland

Around 81,000 properties in Scotland might benefit from the uptake of some form of Property Flood Resilience (PFR), according to a [baseline study](#) published by ClimateXChange.

PFR involves practical measures to improve the resilience of properties to flooding and its emotional impacts on people. The next stage of the Scottish Government's Living with Flooding action plan will be to consider reasons for poor uptake of PFR and approaches to encourage it.

### **Climate modelling**

The North Atlantic climate is far more predictable than models imply, according to [new research](#) led by Met Office scientists published in [Nature](#). It finds that computer models are failing to predict correctly the long-term changes that are most influenced by large-scale wind patterns: rainfall, drought, flooding, and extreme storms. While the study – focused on the North Atlantic Oscillation, a large-scale wind pattern - does not question forecasts of overall global warming, it casts doubt on many regional forecasts.

### **New soil health index**

More than a third of arable land in England and Wales could be affected by degraded soils, according to new Rothamsted research published in the [European Journal of Soil Science](#). The researchers have developed a soil health measure that shows 38% of arable soils are degraded, compared with less than 7% of grassland and woodland soils. The new index is calculated by measuring the proportion of soil carbon to soil clay. Soils where there is at least 13 times more clay than carbon were rated as degraded.