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climate change research and policy

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

November 2021

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

#### **COP26 round-up**

The UN climate conference agreed the target for limiting heating must be 1.5°C rather than 2°C and that countries would revisit nationally determined contributions by next year's COP27 rather than waiting for 2025. The summit also agreed to 'phase down' coal-fired power generation. While many campaigners were disappointed the stronger 'phase-out' wording was not agreed, the inclusion of coal is still a first for COP agreements. A [blog](#) from the Scottish Parliament Information Centre (SPICe) summarises the summit's key outcomes while a [second SPICe blog](#) provides commentary. The Grantham Institute published a [blog](#) on progress from the financial sector perspective. Carbon Brief published: [an in-depth summary](#) of the main developments; a [guest post](#) welcoming the inclusion of scientific evidence in the final agreement; and a summary of [key outcomes for food, agriculture and land use](#). The Science Media Centre published [expert reaction](#) while The Conversation ran a [commentary](#) saying there should be more focus on the ocean and its mitigation role. A [Climate Change Committee briefing](#) outlines the key outcomes and next steps for the UK.

#### **Global carbon budget**

The Global Carbon Project's (GCP) [2021 global carbon budget](#) finds that CO<sub>2</sub> emissions have rebounded to near pre-pandemic levels, estimating they will rise by 4.9% this year, more than expected, after a 5.4% drop in 2020, the [BBC reported](#). The widely reported study also reassesses historical emissions from land-use change. It reveals that overall CO<sub>2</sub> emissions (fossil fuel and land-use change combined) may have been effectively flat over the past decade, [Carbon Brief reported](#).

#### **CAP reform**

The European Parliament approved reforms of the EU's Common Agricultural Policy (CAP) by a substantial majority despite criticism from green groups that the measures are

insufficient to address the biodiversity and climate crises, [Climate Home News reported](#). Carbon Brief published an [in-depth Q&A](#) on the package which comes into effect in 2023.

### **New coalition in Germany**

Germany's Social Democrats (SPDs), Greens and Free Democrats formed a coalition, with the SPD's Olaf Schulz replacing Angela Merkel as chancellor, [reported Deutsche Welle](#). Climate protection is central, with the parties aiming to phase out coal use by 2030, eight years ahead of schedule, [the BBC reported](#). They will also seek to use 2% of German territory for wind power and achieve 80% renewable electricity generation by 2030. [Reuters published a summary](#) of the key energy proposals and a [commentary](#).

### **G20 adaptation policies**

At least a tenth of the G20 countries' emissions are not being addressed at all due to policy adaptation gaps, according to a [paper](#) published in *Climate Policy*. The research analyses sectoral climate policy over 2000-19, identifying 50 key policy options. Adoption is particularly low for policies aiming to: phase out coal and oil and mandate energy reductions in electricity and heat supply; reduce industrial process emissions; and support use of renewable energy for cooking and heating/cooling purposes in buildings.

### **Carbon markets**

An [in-depth article in DeSmog](#) examines the rapid rise of voluntary carbon markets, including analysis of the taskforce led by Mark Carney, former Bank of England governor. The FT (paywall) examines the so-called Article 6 rules for a [new global carbon market](#) established at COP26 which, it says, pave the way for a boom in trading of emissions credits.

### **Emissions of richest 1%**

The CO<sub>2</sub> emissions of the richest 1% are on track to be 30 times greater than what is compatible with keeping global heating below 1.5°C, according to [research commissioned by Oxfam](#). It finds that every person on earth needs to reduce their CO<sub>2</sub> emissions to an average of 2.3 tonnes by 2030, about half today's level, [the Guardian reported](#). The richest 1% are on track to release 70 tonnes of CO<sub>2</sub> per person a year, 16% of the total.

### **Space-based solar power**

An [FT video](#) examines space-based solar power and whether it could soon be price-competitive with nuclear power. Being explored as a zero-carbon solution as well as by the US military. The UK Government commissioned a [report](#) to study the technology.

## **UK Climate and Energy Research and Policy**

### **Shell pulls out of Cambo**

Shell pulled out of the controversial Cambo oil field development west of Shetland, saying the investment case was "not strong enough", [the BBC reported](#). The move came a few days

after First Minister Nicola Sturgeon came out against Cambo's development after previously saying it should be 'reassessed'. The Conversation published an [analysis](#) of Shell's decision. In a separate development, the [FT reported](#) that Scotland was in talks with the [Beyond Oil and Gas Alliance](#), an initiative declined by the UK Government. The group was formed by Denmark and Costa Rica in September; its members – which include Wales - pledge to stop issuing exploration licences and to phase out oil production.

### **Emissions from waste**

Rising greenhouse gas emissions from the incineration of waste and stagnating recycling rates could stop the UK reaching net zero by 2050, according to the National Infrastructure Commission, [the Guardian reported](#). The Commission's [latest assessment report](#) finds that recycling rates in the UK are lower than in many other European countries, while burning waste to produce energy has increased, causing total greenhouse gas emissions from the waste sector to rise to just over 4% of the UK total.

### **Soil care subsidies**

Farmers are to be paid for looking after England's soils for the first time from next year, when UK Government post-Brexit support payments begin, the [Guardian reported](#). Farmers will receive between £20 and £58 per hectare in England for basic measures to protect and nurture their soils. Environmental groups, including the RSPB and the Wildlife Trusts, said the measures were insufficient and that the government was breaking promises to use Brexit to reduce farming's damaging impacts. Extensions to the scheme, which will involve payment for activities such as water stewardship, hedgerow improvement, tree planting and reducing livestock farming, will be announced in the coming months, [edie reported](#).

### **Tidal power included in CfD**

The UK government has set aside £20m a year in ring-fenced support for tidal power projects via the Contracts for Difference (CfD) scheme, [Reuters reported](#). An [article in The Conversation](#) examines the potential for tidal power in the UK.

### **Green jobs**

Efforts to create so-called green jobs need to intensify if the UK Government is to achieve its target of two million such roles by 2030, according to [research](#) from consultancy PwC, the [BBC reported](#). PwC said work was needed to ensure the move to a net-zero economy does not add to regional inequalities; its new barometer found that Wales, Northern Ireland and Yorkshire lagged behind in the transition to a greener economy. Scotland and London were the top performers. Separately, LSE's Grantham Institute published a [report](#) which examines the quantity and quality of the green labour market and whether green jobs are 'good jobs'.

### **Small nuclear reactors**

Rolls-Royce is to develop small nuclear reactors after receiving backing from a consortium of private investors and the UK Government, the [BBC reported](#). [The company said](#) it had

created a Small Modular Reactor (SMR) business following a £195m cash injection from investors and a £210m grant from the government. It is hoped the new business will create up to 40,000 jobs by 2050. The company said one SMR plant would occupy about a tenth of the size of a conventional nuclear plant and have the capacity to generate 470MW of power, enough to power around one million homes.

### **UKERC on the future of electricity markets**

UKERC has published [preliminary findings](#) from ongoing research and engagement on risk and investment in zero-carbon electricity markets. The discussion paper takes UK ambitions for expanding renewable energy as a starting point, particularly regarding offshore wind. Among other things, it explores how uncertainty about the future power generation system affects investment risk. Future work will explore whether potential system cost savings could be as large, or larger than, the £5bn per annum impacts of identified market price risks.

### **Low wind generation**

Low wind speeds pushed British wholesale energy prices to their second-highest level in at least three years on 15 November, the [Guardian reported](#). Energy prices exceeded £2,000 per MWh between 5-6pm, only the second time they have surpassed this level since 2018, with wind farms contributing 4% of electricity, down from an annual average of 21%. The power grid was forced to turn to gas-fired power plants and coal to make up for the low wind generation. The Conversation published a [commentary](#) highlighting the unusualness of this event and considering the effect of “wind-droughts” in future energy systems.

### **SSE ups clean energy investment**

SSE significantly increased its clean energy investment plans as part of efforts to see off calls by an activist hedge fund for it to be broken up, [Reuters reported](#). The Perth-based utility pledged to invest £12.5bn by 2026, up from the £7.5bn previously planned and will expand its renewable power fivefold to 50 terrawatt hours a year by 2031. The new investment will be split by 40% to networks, 40% to renewables and 20% to other flexible generation. The Guardian published a [commentary](#).

### **Whitelee hydrogen funding**

The UK Government [awarded](#) £9.5m for a ground-breaking hydrogen storage project at ScottishPower’s Whitelee wind farm near Glasgow, the [BBC reported](#). The facility will be able to produce up to 4 tonnes of green hydrogen per day and will be the UK’s largest power-to-hydrogen energy storage project, using a wind-powered electrolyser. The BBC also published a [commentary](#) on the project and on the prospects for hydrogen in Scotland.

### **BP green hydrogen plans**

BP announced plans for a new large-scale [green hydrogen production facility](#) on Teesside, set to be the UK’s largest, which could deliver up to 500MWe (megawatt electrical input) of

hydrogen production by 2030. HyGreen Teesside aims to start production by 2025, with an initial phase of some 60MWe of installed hydrogen production capacity. BP said the project was expected to fuel the development of Teesside into the UK's first major hydrogen transport hub. The combined 1.5GW capacity of HyGreen Teesside and H2Teesside, the oil major's blue hydrogen project, could deliver 30% of the UK government's target of developing 5GW of hydrogen production by 2030.

### **Bioethanol production in Scotland**

Growing sugar beet in Scotland and processing it at a purpose-built biorefinery, initially producing bioethanol, could support hundreds of jobs, according to a [study](#) published by Scottish Enterprise. It could also make a significant contribution to achieving net-zero emissions, [The Scotsman reported](#). The study finds that at least 815 jobs could be directly created. Meanwhile switching to a local supply, rather than importing bioethanol, could reduce the country's carbon footprint by more than 280,000 tonnes of CO<sub>2</sub> – the equivalent of taking nearly 61,000 cars off the road per year.

### **Electric vehicle chargers**

The UK Government's plans to require electric vehicle (EV) chargers at all new homes in England from next year risks making access to charge points "exclusive", leaving behind motorists from poorer areas, industry leaders have warned, [the Guardian reported](#). The plans risk benefitting wealthier areas with space for off-street parking; the Government should do more to make convenient, high-speed car charging more accessible to help give all motorists a realistic opportunity to switch to EVs.

## **Climate Science, Impacts and Adaptation**

### **Diet and emissions**

Men's meat-heavy diets are responsible for 40% more climate-heating emissions than those of women, according to a UK study, the [Guardian reported](#). The [research](#), published in the journal *Plos One*, also found a quarter of diet-related emissions were from 'optional' items, such as coffee, alcohol, cakes and sweets. Animal products were responsible for almost half of the average diet's greenhouse gas emissions: 31% from meat and 14% from dairy.

### **Renewables and electrification**

A [study](#), published in *Nature Energy*, examines the impact of declining renewable energy costs on electrification in low-emission scenarios, finding that, if the Paris Agreement targets are followed and carbon pricing introduced, electricity could become cheaper than carbon-based fuels. If warming is kept to 1.5°C, with limited bioenergy and carbon dioxide removal, electricity could account for two thirds of final energy by mid-century – three times current levels and "substantially higher" than in previous IPCC scenario estimates.

### **Carbon tax dividends**

Paying “large and immediate dividends” from a carbon tax to all citizens could help limit warming to 2°C while also reducing inequality and alleviating poverty, a [study](#) in *Nature Climate Change* suggests. Existing estimates of optimal climate policy ignore the possibility that carbon tax revenues could be used in a progressive way; model results therefore typically imply that near-term climate action comes at some cost to the poor, it says.

### **Soil types and carbon content**

Warmer soils store less carbon than their cooler counterparts – but the magnitude of this difference depends on soil makeup, according to a [study](#) in *Nature Communications*. The researchers used more than 9,000 profiles of soil from around the world and analysed how the carbon content of the sample varied with temperature and soil texture. On average, they find that for each 10°C of warming, soil carbon content decreases by 25%, but that the effect is stronger for “coarse-textured” soils than for finer ones.

### **Irrecoverable carbon**

Detailed new mapping has pinpointed the carbon-rich forests and peatlands that humanity cannot afford to destroy if climate catastrophe is to be avoided, the [Guardian reported](#). The [study](#), in *Nature Sustainability*, shows that global ecosystems hold nearly 140 gigatonnes of “irrecoverable” carbon – carbon which, if released to the atmosphere, could not be recaptured naturally by mid-century – and which face risks from land-use conversion and climate change. The researchers found that around half of the “irrecoverable” carbon was concentrated in hotspots covering only 3.3% of global land surface, highlighting opportunities for targeted efforts to increase global climate security. Forests and peatlands in Russia, Canada and the US are vital, it finds, as well as peat bogs in the UK.

### **Impacts of overshooting temperature targets**

Many future pathways for meeting the 1.5°C and 2°C warming targets by 2100 project that global temperatures will exceed these goals in the short term, requiring the use of negative emission techniques. However, two new papers - both in *Nature Climate Change* and [covered by Carbon Brief](#) - warn that such a temperature overshoot would worsen climate impacts and drive greater economic loss than non-overshoot pathways. The first [study](#) finds that staying below 2°C throughout this century reduces the risk of climate extremes, such as heatwaves; after mid-century, temperature overshoot leads to higher mitigation costs and greater economic losses. The second [study](#) highlights the longer-term economic benefits of limiting heating; it predicts that by 2100, global GDP will be up to 2% higher in scenarios that avoid overshoot compared to those that do not.