



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

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

April 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 Scottish policymakers informed of issues relevant to the Scottish Government's Energy and Climate Change policy portfolio.

International Climate and Energy Research and Policy

IEA: carbon emissions to decline by nearly 8% in 2020

The Covid-19 pandemic represents the biggest shock to global energy in more than seven decades, with carbon emissions set to drop by almost 8% in 2020, a record, according to the International Energy Agency. In its [Global Energy Review 2020](#) the agency forecasts energy demand will fall a "staggering" 6% this year, seven times the decline after the 2008 financial crisis. Advanced economies are expected to see the biggest impact, with demand set to fall by 9% in the US and 11% in the European Union. Lockdown measures are driving a major shift towards low-carbon sources of electricity including wind, solar PV, hydropower and nuclear and are set to account for 40% of global generation. Global demand for coal is projected to fall by 8%, the largest decline since WW2. The report is based on data from the first 100 days of the year.

Smaller scale technologies speed net-zero transition

Low-carbon technologies that are smaller scale, more affordable, and can be mass deployed are more likely to enable a faster transition to net-zero emissions than high-cost large projects, according to a new study published in [Science](#) by the [Tyndall Centre](#) and international colleagues. Innovations ranging from solar panels to electric bikes also have lower investment risks, greater potential for improvement in both cost and performance, and more scope for reducing energy demand, key attributes that will help accelerate progress on decarbonisation, the study says.

Designing climate-resilient energy systems

A new [study](#) in *Nature Energy* proposes optimisation methodology for designing climate-resilient energy systems to help ensure that communities will be able to meet future energy needs. The researchers investigated a wide range of scenarios for 30 Swedish cities. They found that climate variability could create a 34% gap between total energy generation and demand, and a 16% drop in power supply reliability, a situation that could lead to blackouts.

Health benefits of policies to reduce carbon emissions

A new [study](#) in the BMJ argues that policies to lower carbon emissions can also improve health, and that these benefits should be used to push for strong climate action. The study summarises key evidence on the health effects of climate change mitigation policies across four sectors responsible for a large proportion of emissions: power generation, housing, land transport, and food or diet.

Austria and Sweden go coal free

[Austria](#) and [Sweden](#) have joined Belgium in ceasing coal power generation, both closing their last coal-fired plants. They follow Belgium which phased out coal generation in 2016. The EURACTIV release notes that France, Slovakia, Portugal, the UK, Ireland and Italy are expected to follow suit by 2025 or earlier.

Clean energy to boost global GDP

Clean energy could boost cumulative global GDP by more than \$98tn by 2050, according to new research from the International Renewable Energy Agency (IRENA). In its first [Global Renewables Outlook](#), IRENA says investment of £130tn will be needed to make the energy sector fully carbon neutral but that the spending would be offset by socio-economic gains. Benefits could include a quadrupling of energy sector jobs to 42m.

Shell strengthens GHG reduction targets

Shell has laid out the oil and gas industry's most extensive [strategy](#) to reduce GHG emissions to net zero by 2050. It also lifted its targets for cutting its total carbon emission footprint from the products it sells by 30% by 2035 and by 65% by 2050, up from 20% and 50% respectively previously. It said it would pivot towards serving businesses that were net zero to help offset its absolute emissions.

Electrification could help Europe become climate neutral

Sector coupling, ie electrification of more areas of the economy, would enable countries in Europe to make substantial progress toward becoming the first climate-neutral continent by 2050, according to a new [study](#) led by Bloomberg. A plausible sector coupling trajectory for countries such as the UK or Germany envisages that power (directly or indirectly) supplies 50-60% of the final energy consumed by the coupled sectors by 2050, up from around a tenth today. Under such a scenario, the share of unabated fossil fuels would drop from nearly 80% to 23%. As a result, sector coupling could lower emissions by 60% over 2020-50 across transport, buildings and industrial users, a 71% reduction on 1990 levels.

Green hydrogen could offset up to a third of GHG emissions

Large-scale rollout of green hydrogen technologies could offset up to a third of the GHG emissions produced by fossil fuels and industry by 2050, according to a new [report](#) by BloombergNEF. It estimates renewable hydrogen could be produced for between \$0.8 to

\$1.6/kg in most parts of the world within three decades. But to reach that price point, about \$150bn of subsidies over the next 10 years would be needed.

EU's ETS delivering emissions' reductions

The EU's Emissions Trading System has made significant progress despite low prices in carbon markets, according to a [study](#) at the Universities of Strathclyde and Pittsburgh. The ETS was introduced in 2005 in response to the Kyoto Protocol. Governments set a cap on an allowable total amount of emissions over a certain period and also issue tradable emission permits. The study, published in the *Proceedings of the National Academy of Sciences*, finds the ETS saved around 1.2bn tonnes of CO₂ between 2008 and 2016, nearly half of countries' Kyoto commitments.

Clean hydrogen breakthrough

Researchers at Australia's Griffith University researchers reported a breakthrough in clean hydrogen electrolysis in a [study](#) published in *Nature Communications*. The scientists combined two processes to harness nanobelts in the oxidation or breakdown of water. The processes marginally improve nanobelt efficiency as an electrocatalyst when used separately, according to the researchers, but dramatically improve performance when combined.

UK Climate and Energy Research and Policy

Nearly half UK's carbon footprint imported

Nearly half the UK's carbon footprint from emissions is generated overseas, according to a [new report](#) commissioned by the [WWF](#). Researchers found that imported products such as clothing, processed food and electronics account for 46% of the UK's carbon footprint. The report says that between 1990 and 2016, emissions within the UK's borders fell by 41% but suggests the consumption-based footprint only dropped 15%, mainly due to imports.

New programme aims for first zero-carbon gas grid

The UK's five gas network companies are to create what they hope will be the world's first zero carbon gas grid. The [Gas Goes Green](#) programme aims to enable the network capable to transport zero-carbon hydrogen and biomethane; at present, it delivers methane-based natural gas. This would ensure gas infrastructure is ready for households and businesses to switch to hydrogen-ready boilers. The Energy Networks Association said creating a zero-carbon gas grid could help save consumers up to £13bn a year compared to alternative methods of decarbonising heat and transport.

Scottish industrial decarbonisation projects win UKRI funding

Two Scottish projects have [won](#) seed funding from a UK Research and Innovation (UKRI) competition to further their work on deploying carbon capture technologies in industrial

clusters. The first project, Scotland's Net Zero Infrastructure is to enable carbon capture and storage by linking CO₂ from industrial emitters around Grangemouth via a pipeline with the Acorn CCS Project. The second, Scotland's Net Zero Roadmap, builds upon work by Scottish Carbon Capture and Storage and by the University of Strathclyde, applying it to a high-value industrial cluster. The aim is to create the world's first net zero industrial cluster by 2040. Winning the funding enables both projects to progress to the next round of the UK Government's [Industrial Strategy Challenge Fund](#).

Crown Estate Scotland to invest £70m over three years

Crown Estate Scotland is to help accelerate the country's offshore wind power generation sector as part of its new [three-year corporate plan](#) 2020-23, the second since it was established in 2017. Overall, it said it would invest £70m and focus on five key objectives: supporting the blue economy; creating great places; promoting sustainable natural resource use; involving people in how the estate is managed; and using its skills to benefit others.

Decarbonising the UK residential sector

A new [study](#) in *Energy Policy* looks at decarbonising the UK residential sector, among the least energy efficient in Europe. Natural gas also remains dominant. The study, by UCL and University of Strathclyde researchers, combines long-term system-wide optimisation modelling with heat and electricity network models of representative residential locations, and investigates key heating alternatives.

Green Alliance calls for national carbon removal office

The UK should set up a national carbon removal office to monitor offsetting, Green Alliance says in a new [report](#). The think tank also proposes a Farm and Soil Carbon Code for farmers to verify carbon measures and generate income from carbon credits. It says that, at present, there is an issue with the quality of offsets, with no guarantee they will be effective in tackling climate change. A national body is needed to regulate the market and give confidence that carbon removal works.

Expert advice on green recovery

The Scottish Government has set up an [independent advisory group](#) to provide expert economic advice in response to the Coronavirus crisis. It said the emphasis would be on building a resilient economy that supported the transition toward a greener, net-zero country.

Climate Science, Impacts and Adaptation

Ocean captures more carbon than thought

The efficiency of the ocean's "biological carbon pump" has been "drastically underestimated" in its ability to capture carbon from the atmosphere, according to a new [study](#) by the Woods Hole Oceanographic Institution in the US, published in *Proceedings of the National Academy of Sciences*. The research found that the depth of the sunlit area where photosynthesis takes place varies significantly and that about twice as much carbon sinks into the ocean each year than previously estimated.

Mature forests and CO₂ storage

The capacity of mature forests to capture and store rising atmospheric CO₂ is limited for woodlands located on low-nutrient soil, according to an Australian [study](#) published in *Nature*. The findings may have global implications where existing models of future climate change assume mature forests will continue to absorb carbon over and above their current levels. In the first experiment of its kind applied to a mature native forest, Western Sydney University researchers exposed a 90-year old eucalypt woodland to elevated carbon dioxide levels. The trees took in about 12% more carbon but did not grow any faster. Analysis showed the extra carbon absorbed was turned into sugars, cycled through the soil, and returned to the atmosphere.

Rebuilding marine life by 2050

Biodiversity losses in the ocean are less pronounced than on land and many marine species are capable of recovery, even if many species and ecosystems have suffered "catastrophic declines" and are being further undermined by climate change, according to a new [study](#) published in *Nature*. The study looks at recovery rates from past events and finds that "substantial recovery" could occur if major pressures, including climate change, are mitigated. Examples of past "impressive resilience" include: the rebounding of fish stocks during World Wars I and II when fishing fell markedly; the recovery from nuclear testing in coral reefs in the Marshall Islands since 1958; and the improved health of the Black and Adriatic Seas following lower fertiliser use after the collapse of the Soviet Union.

Catastrophic biodiversity losses could be sudden

A warming global climate could cause sudden, potentially catastrophic losses of biodiversity in regions across the globe throughout this century, according to a new study led by UCL. The findings, published in *Nature*, predict when and where there could be severe ecological disruption in the coming decades, and suggest that the first waves could already be happening. The researchers found risk did not accumulate gradually but could go from low to high risk within a decade.

Peatland efficiency reduces under warming scenarios

Peatlands will remain carbon sinks until the end of this century, but their sink capacity will be substantially reduced after 2050, if the climate warms significantly, due to an increase in soil mineralisation rates, according to a new Nordic [study](#) published in *Global Change Biology*. In Europe, peatlands store five times more CO₂ than forests.

Global methane levels hit all-time high

Global methane levels reached an all-time high in 2019 according to [preliminary data](#) from the US government's National Oceanic and Atmospheric Administration. It said the concentration of methane in the atmosphere reached nearly 1,875 parts per billion, up from 1,866 billion in 2018. Methane stays in the atmosphere for about a decade but is more than 25 times more powerful than CO₂ at trapping the sun's heat.

Importance of forests for mitigation

A [special issue](#) of *Environmental Research Letters* focuses on the importance of forests and forest soils in meeting climate change mitigation goals. It includes papers on carbon accounting, forest bioenergy and the carbon cycle of tropical forests.