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climate change research and policy

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

March 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

#### **COP26 postponed**

November's COP26 UN climate change conference in Glasgow has been postponed until next year due to COVID-19, the UK government [announced](#) on April 1. The decision was taken by representatives of the COP Bureau of the UNFCCC (United Nations Framework Convention on Climate Change), with the UK and its Italian partners.

#### **European Climate Law published**

The European Commission (EC) published its draft [European Climate Law](#) on March 4. The law would make a legally binding commitment for the EU to reduce its greenhouse gas emissions to net zero by 2050. It would give the EC power to set binding short-term climate targets without the unanimous approval of all members, a measure some countries may resist. The EC also issued a new [Circular Economy Action Plan](#), one of the main building blocks of December's [European Green Deal](#). Provisions include embedding a "right to repair" in EU consumer and product policies by 2021, increasing green public procurement, and doubling the EU's circular material use rate in a decade. Applying ambitious circular economy measures could increase EU's GDP by 0.5% by 2030 and create around 700,000 new jobs, the EC said. It also launched a consultation on a [European Climate Pact](#) aimed at engaging the public on climate and the environment

#### **New wind or solar generation cheaper than 60% of operating coal plants**

Over 60% of global coal power plants are generating electricity at a higher cost than it could be produced by building new renewables, according to a [new report](#) by Carbon Tracker. By 2030 at the latest it will be cheaper to build new wind or solar capacity than continue operating coal in all markets, it says. Globally, 499GW of new coal power is planned or under construction at a cost of US\$638 billion; Carbon Tracker warns this investment may never be recouped because coal plants typically take 15 to 20 years to cover their costs. In China, 100GW of coal power is under construction and 106GW

planned. The country already has 982GW of coal power, 71% of which costs more to run than building new renewables.

### **Power sector CO<sub>2</sub> emissions fall 2% in 2019**

Global coal-fired electricity fell by 3% in 2019, leading to a 2% drop in power sector CO<sub>2</sub> emissions, the biggest falls since at least 1990. In its annual [Global Electricity Review](#), independent think-tank Ember found that, while coal use fell sharply in the EU and the US, Chinese coal generation rose and, for the first time, was responsible for half of global coal generation. Coal generation fell 24% in the EU and 16% in the US in 2019. However, the US is mainly switching to gas whereas the EU is leapfrogging from coal to wind and solar. Wind and solar generation rose by 15% in 2019, generating 8% of global electricity.

### **Growth in European energy storage in significant slow down**

The rapid growth in European energy storage slowed significantly last year due to fewer large-scale schemes for storing clean electricity from big renewable energy projects, according to the European Association for Storage of Energy (EASE). A new [study](#) found the European market grew by 1GWh in 2019, down from 1.47GWh in 2018. EASE said greater government support was needed.

### **Extreme disparity between rich and poor in energy use**

The lifestyles of the wealthy are fuelling the climate crisis with the richest 10% consuming about 20 times more energy than the bottom 10%, according to a new University of Leeds [study](#). The gulf is greatest in transport, where the top tenth use 187 times more fuel than the poorest tenth, the [study](#) found. The research, the first of its kind, combined European Union and World Bank data from 86 countries, also examining different countries' relative energy consumption. A fifth of UK citizens are in the top 5% of global energy consumers, along with 40% of German citizens. Only 2% of Chinese people are in the top global 5%. Even the poorest fifth of Britons consumes over five times as much energy per person as the bottom billion in India.

### **Utility-scale solar adds record 45GW of capacity in 2019**

Utility-scale solar added a record 45GW of new capacity last year, bringing the total to over 220GW, according to [analysis](#) by Wiki-Solar. It said the acceleration was mainly due to emerging markets. China, the US and India remain the biggest installers, adding 9.6GW, 7.8GW and 6.8GW respectively in utility-scale solar last year. The UK was in fourth place, followed by Japan, Germany, Spain, Australia, Mexico and France. Vietnam was the highest climber, rising 38 places to 11th in the table of cumulative installed capacity ranks.

### **CO<sub>2</sub> per person declines in dense populations**

A [study](#) of CO<sub>2</sub> emissions of 20 big cities has shown that, as population density increases, the carbon dioxide emitted per person declines, with some notable exceptions. The study also demonstrates how satellite measurements of CO<sub>2</sub> can enable cities to track emissions and

assess the impact of policy changes and infrastructure improvements on energy efficiency. Cities account for more than 70% of global CO<sub>2</sub> emissions associated with energy production. Until now, estimate of emissions has tended to be "bottom-up" – calculating emissions from industrial facilities, farms, transport and power plants. The study instead took a "top-down" approach, using NASA satellite-derived estimates of the carbon dioxide in the air. Cities with largescale power generation facilities, such as Yinchuan in China and Johannesburg, had higher emissions than their population density would otherwise suggest.

### **Soil carbon stores could offset up to 5.5bn tonnes of GHG a year**

Replenishing and protecting the world's soil carbon stores could help offset up to 5.5bn tonnes of greenhouse gases every year, according to a [new study](#) published in [Nature Sustainability](#). This is just under the annual emissions of the USA, the world's second largest polluter after China. Around 40% of this carbon offsetting potential would come from protecting soil carbon stores in existing forests, peatlands and wetlands, the study says. In many places, such soil-based "natural climate solutions" could come with co-benefits for wildlife, food production and water retention. The top metre of the world's soils contains three times as much carbon as the entire atmosphere, making it a major carbon sink alongside forests and oceans.

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

### **Climate and energy budget announcements**

The government is [to invest £800m](#) in carbon capture and storage (CCS) to support its deployment at at least two sites over the next decade. It will also support at least one privately financed gas-fired power station fitted with CCS via a consumer subsidy. The [budget](#) also pledged £500m over five years for charging infrastructure for electric cars while investment in the flood and coastal defence programme in England was doubled to £5.2bn over six years. From April 2022, the government is introducing a new tax on plastic packaging containing less than 30% recycled plastic, to be levied at a rate of £200 per tonne.

### **Comeback of onshore wind**

The UK government has [announced](#) that onshore wind farms will be able to participate in its [2021 Contracts for Difference \(CfD\) rounds](#), its main mechanism for supporting low-carbon electricity generation. This reverses a previous decision which prevented onshore wind projects bidding for a price guarantee for the electricity they produce. New onshore wind capacity fell to its lowest level in a decade in 2019. Campaigners said that, because of planning restrictions, most of the new projects were likely to be built in Scotland rather than England.

### **Strong growth in renewable energy planning applications**

The number of new renewable energy projects applying for planning permission reached a four-year high in the UK last year. There were 269 planning applications for new wind, solar and bioenergy projects, up from 204 in 2018, according to an [analysis of government data](#) by energy consultancy PX Group, a 75% increase on three years ago. Planning submissions for clean energy projects are expected to rise again due to onshore wind being invited to participate in the 2021 CfD rounds.

### **Big shift in public attitudes to climate change**

Concern over climate change in the UK has doubled since 2016, with 40% of respondents to a [Cardiff University survey](#) saying they were now "very or extremely worried". The researchers said there had been a "remarkable shift" in public opinion: in 2016 just 2% (ranked 13<sup>th</sup>) of the population said climate change was the most pressing issue against 23% now, second only to Brexit. Climate change scepticism was low: almost two thirds (64%) said Britain was already feeling the effects of climate change, against 41% in 2010.

### **Publication of Scotland's Climate Change Plan update delayed**

The Scottish Government will not publish an [update to its Climate Change Plan](#) at the end of April as planned due to the coronavirus outbreak. Climate Change Secretary Roseanna Cunningham said she had written to the Committee on Climate Change asking for advice on the best way forward and how, in due course, the update could contribute to a green recovery for Scotland.

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

### **Restoring mangroves cost-effective in managing flooding**

Without mangroves, flood damage would increase by more than \$65 billion annually, and 15 million more people would be flooded, according to a new [study](#) published in *Scientific Reports*. Climate change is increasing the risk of coastal flooding by causing sea levels to rise and hurricanes to become more intense. The researchers estimated the economic value of mangrove forests for flood risk reduction across more than 700,000 kilometres of coastlines worldwide. Combining engineering and economic models, they show when, where, and how mangroves reduce flooding, and identified ways to fund their protection.

### **Conservation could limit risk of mass extinctions**

Limiting climate change to 2°C and conserving 30 percent of terrestrial area could halve the risk of plant, bird and mammal extinctions compared to the consequences of uncontrolled climate change and no increase in conservation areas, according to a [study](#) published in *Ecography*. The authors, led by Conservation International, used data on almost 290,000 species and varied the extent of protected land from less than 17 percent to 50 percent. Existing research shows the planet is on the verge of a sixth mass extinction if conservation [www.climatexchange.org.uk](http://www.climatexchange.org.uk)

efforts are not stepped up. The analysis is believed to be the first to examine the combined impact on extinction rates from limiting climate change and increasing conservation areas.

### **Climate change could help wipe out half of sandy beaches**

Climate change and sea level rise are on track to wipe out half the world's sandy beaches by 2100, according to [new research](#) published in *Nature Climate Change*. Sandy beaches occupy more than a third of the global coastline and have high socioeconomic value, also providing protection from marine storms and cyclones. The study shows that ambient trends in shoreline dynamics, combined with coastal recession driven by sea level rise, could result in the near extinction of almost half of the world's sandy beaches by the end of the century. Moderate GHG emission mitigation could prevent 40% of shoreline retreat. A substantial proportion of the threatened sandy shorelines are in densely populated areas. Australia could be hit hardest, according to the findings, followed by Canada, Chile, the US, Mexico and China.

### **Great Barrier Reef suffers third mass bleaching event in five years**

Scientists have detected [widespread bleaching](#) of Australia's Great Barrier Reef, including extensive patches of severe damage, following warmer sea temperature, particularly in February. The reef is the world's largest reef system and a World Heritage site of "enormous scientific and intrinsic importance". Two-thirds of the reef was damaged by similar events in 2016 and 2017. The Great Barrier Reef Marine Park Authority said its latest aerial surveys had shown that the severity of bleaching varied across the reef but that more areas had been damaged than in previous events.

### **Large ecosystems can collapse much more quickly than expected**

Large ecosystems, such as the Amazon rainforest, will collapse and disappear alarmingly quickly, once a crucial tipping point is reached, according to a [new study](#) published in *Nature Communications*. The study calculates the speed at which ecosystems of different sizes will disappear, once they have reached a point beyond which they collapse. For example, once the 'point of no return' is reached, the iconic Amazon rainforest could shift to a savannah-type ecosystem with a mix of trees and grass within 50 years, the study says. Larger systems were found to shift relatively faster than small ones. A forest that is 100 times bigger than another forest, for example, will not take 100 times longer to collapse – it collapses much more quickly.

### **Predictions based on historical data underestimating future extreme weather**

A new Stanford University [study](#) reveals that a common scientific approach of predicting the likelihood of future extreme weather events by analysing how frequently they occurred in the past can lead to significant underestimates. The research, published in *Science Advances*, found that predictions that relied only on historical observations underestimated by about half the actual number of extremely hot days in Europe and East Asia, and the number of extremely wet days in the US, Europe and East Asia. The paper illustrates how

even small increases in global warming can cause large upticks in the probability of extreme weather events, particularly heat waves and heavy rainfall.

### **Threat to drinking water**

More than half of the world's population faces a looming threat to the quality and availability of their drinking water because climate change and urbanisation are expected to cause an increase in groundwater organic carbon, according to new research from the University of New South Wales, Australia. The [research](#), published in *Nature Communications*, predicted organic carbon concentrations would rise because of projected changes in temperature and rainfall due to climate change, as well as increased urbanisation. Dissolved organic carbon (DOC) is a naturally occurring component of groundwater, but the higher its concentration, the more difficult and expensive it is to make groundwater drinkable. Groundwater is the planet's largest source of freshwater, providing essential drinking water for more than half of the world's population.