MITIGATION

Committed power plants

Environ. Res. Lett. **13**, 054019 (2018)

Credit: Roman Bykhalov / Alamy Stock Vector

Power and heat generation is responsible for more GHG emissions than any other sector. The infrastructure for fossil fuel-based power generation has a typical lifetime of 35–40 years, so the estimated US$7.2 trillion invested in power plants carries a significant emissions commitment. The compatibility of these with the remaining carbon budgets required to meet climate targets has implications for the achievability of those targets and the economic viability of current and planned power-generating infrastructure.

Alexander Pfeiffer at the Oxford Martin School, UK, and co-authors analyse the historic development of emission commitments from power plants to estimate the emissions committed for current and planned plants. They find that currently operating power plants imply cumulative future emissions of around 300 $GtCO_2$, enough to exceed the available generation-only carbon budget (around 240 $GtCO_2$) needed to achieve a 430–480 ppm CO_2 scenario. In other words, even without any expansion, up to 20% of global fossil-fuelled generation capacity is at risk of being stranded — prematurely decommissioned, underutilized or subject to costly retrofitting — to meet Paris Agreement goals. When planned plants are considered, committed emissions are almost doubled. *AB*

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DECARBONIZATION

Shipping emissions

Clim. Policy http://doi.org/cppx (2018)

Efforts to control CO_2 emissions from the global shipping industry are notably absent from the Paris Agreement. However, the Agreement's temperature goals imply that reductions in emissions are required from all sectors, including shipping, which currently accounts for around 2.2% of global emissions.

Michael Traut of the Tyndall Centre for Climate Change Research UK and colleagues investigate how a global CO_2 budget can be apportioned to international shipping and estimate the reductions in CO_2 intensity needed to meet the Agreement's temperature goals. For the 2.0 °C scenario, an annual reduction rate between 6.7% and 8.8% is required from 2020 onwards, depending on future demand for sea transport. Cuts to CO_2 intensity that are consistent with the 1.5 °C target range from 22.5% to 24.3% annually. In the long term, full decarbonization is needed to bring the industry in line with the Paris Agreement.

The International Maritime Organization has recently adopted a strategy requiring emissions reductions of at least 50% by 2050. The results of Traut and colleagues, together with this new effort, point to an immediate need for low- and zero-carbon shipping technologies. *AY*

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ATMOSPHERIC SCIENCE

Aerosol–cloud interactions

Atmos. Chem. Phys. **18**, 5821–5846 (2018)

Interactions between clouds and aerosols represent a large source of uncertainty in future climate projections. It is unclear, for example, how the lifecycle of mid-latitude storm systems — which includes the albedo and total lifetime of its clouds — are influenced by the presence of anthropogenic aerosols, confounding estimates of climate sensitivity. Using high-resolution global convection-permitting model simulations and satellite observations, Daniel McCoy from the University of Leeds, Paul Field from the UK Met Office and colleagues investigate how mid-latitude storm cloud properties are affected by increased aerosol concentrations.

In comparing pristine versus polluted storms, it is shown that aerosols increase the liquid water content, cloud cover and consequently the albedo of polluted systems, enhancing outgoing short-wave radiation by upwards of 4 W m^{-2} within the storm. Such changes were also observed in a natural case study — the 2014–2015 Holuhraun volcanic eruption in Iceland — confirming the existence of an indirect aerosol-induced effect on mid-latitude storms. This improved understanding of aerosol–cloud interactions within extratropical cyclones will help constrain estimates of anthropogenic radiative forcing, and thereby improve climate projections. *GS*

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CLIMATE CHANGE ADAPTATION

Isolated decision-making

Glob. Environ. Change **50**, 178–189 (2018)

Credit: Kieran Findlater

Farmers have always had to cope with weather and climate variability, and so may be particularly adept at incorporating climate change adaptation into their decision-making. However, despite an expressed willingness to adapt, farmers in South Africa's Western Cape have inconsistently adopted Conservation Agriculture techniques that could reduce vulnerability to climate change and promote food security, undermining these long-term benefits.

Kieran Findlater and colleagues from University of British Columbia and University of Cape Town interviewed commercial grain farmers in South Africa about the farming risks they faced. Coding of explicit references to climate change revealed that these farmers believed that climate change was occurring, were concerned about its impacts and thought that these impacts could be managed through farm-level adaptation. However, modelling of the expressed causal relationships between risks and agricultural practices revealed that farmers did not connect adaptations to climate change with adaptations to weather and other 'normal' risks. This suggests that while farmers are explicitly sensitive to the risks posed by climate change, they do not implicitly incorporate them into their existing risk-management practices. *JR*

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