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Energy and Climate Policy: Synergies, Conflicts, and Co-Benefits

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Energy and climate policy have been closely linked ever since the 1970s when scientists stepped up efforts to model the warming effect of greenhouse gases (GHGs) on the earth's climate.[1] Carbon dioxide (CO_2) from fossil fuel combustion represents the largest source of GHG emissions, accounting for well over 60 percent of global emissions and around three quarters of GHG emissions in industrialised economies such as the US and the EU.[2,3]

At current trends, the world is not on track to meet the target of keeping global warming below a 2^{o}C average temperature rise. Instead, twice this amount of warming appears likely.[4] In the context of rapidly growing global energy consumption, the use of fossil fuels is projected to increase despite an unprecedented expansion of renewable energy generation.[5] For a range of scenarios which assume higher average temperatures rises than 2^{o}C, the Intergovernmental Panel on Climate Change assumes not only a reduction in energy demand and greatly improved energy efficiency, but also estimates that low-carbon energy sources will grow 185-275 percent by 2050.[6] However, globally there is currently a large gap between targets for climate mitigation and sobering trends in energy generation/consumption– with

[1] Spencer R Weart, 'The idea of anthropogenic global climate change in the 20th century', (2010) 1 *Wiley Interdisciplinary Reviews: Climate Change* 67, 81.
[2] International Energy Agency (IEA), *CO2 Emissions from Fuel Combustion: Highlights* (OECD/IEA 2013).
[3] The US accounts for around 16 percent of total global GHG emissions and the EU for 11 percent. (Source: PBL Netherlands Environmental Assessment Agency, *Trends in Global CO_2 Emissions* (2014) <http://edgar.jrc.ec.europa.eu/news_docs/jrc-2014-trends-in-global-co2-emissions-2014-report-93171.pdf> accessed 04 January 2015.
[4] World Bank, *Turn Down the Heat: Confronting the New Climate Normal* (2014).
[5] MIT Joint Programme on the Science and Policy of Global Change, *2014 Energy and Climate Outlook* (2014).
[6] Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014 Synthesis Report: Summary for Policymakers* (2014) < http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_SPMcorr1.pdf> accessed 04 January 2015

renewables only accounting for 5 percent of global energy generation in 2013.[7] While the EU has set relatively ambitious energy and climate targets[8], the global situation reflects the fact that energy and climate typically remain two distinct spheres of policy-making.

Energy Policy

In the realm of energy policy, the concept of energy security has long been dominant. It is often defined as "access to secure, adequate, reliable, and affordable energy supplies".[9] Less state-centric and more 'society-centred' perspectives have equally risen to the fore. The notion of energy justice embodies the quest for a fair distribution of benefits/harms from energy generation as well as inclusive and respectful procedures for public participation in decision-making.[10] Energy security, however, is prioritised in this chapter because it encapsulates governments' striving for security of supply (diversified supplies and reliable energy infrastructure) and affordability (concerning economic competitiveness and social welfare).

Energy needs and endowments differ greatly across the world. National energy policies are context-specific, as shown historically by the contrast between energy-exporting countries (which typically have low domestic energy prices) and energy-importing countries (with stronger interest in energy efficiency and technological innovation).[11] Only a few countries, such as Denmark or Japan, have responded to a relative lack of domestic fossil fuel reserves by developing long-term strategies based on stringent energy efficiency standards, alternative electricity generation (renewables, nuclear power), and higher overall energy prices. By contrast, countries with considerable fossil fuel reserves – including (at least historically) the US – have typically used their relative abundance to export energy resources. They have also kept domestic prices low for socio-economic reasons and to increase the economic competitiveness of domestic companies.

Climate Change Mitigation

Meeting ambitious or even moderately demanding climate mitigation targets would require a far-reaching decarbonisation of national economies. Given its carbon footprint and long investment cycles, the energy sector is justifiably at the top of the climate policy agenda. A truly radical low-carbon energy strategy would include all of the following components:

- Significant increase in funding for energy research & development which remains at low levels in most countries, e.g. only 0.03% of GDP in the US[12]
- Dramatic improvements in energy efficiency across all sectors, but especially for fast-growing emissions in transport and residential sectors

[7] BP, *Statistical Review of World Energy* (2014) <http://www.bp.com/en/global/corporate/about-bp/energy-economics/statistical-review-of-world-energy.html> accessed 04 January 2015.
[8] The 2030 Framework for Climate and Energy Policies aims to reduce the EU's GHG emissions by 40 percent (compared to 1990 levels) and increase both the share of renewable energy and energy efficiency by 27 percent.
[9] Jason Bordoff, Manasi Deshpande, and Pascal Noel, 'Understanding the Interaction between Energy Security and Climate Change Policy' in Carlos Pascual and Jonathan Elkind (eds), *Energy Security: Economics, Politics, Strategies, and Implications* (Brookings Institution Press 2009).
[10] Darren McCauley, Raphael J Heffron, Hannes R Stephan, and Kirsten Jenkins, 'Advancing Energy Justice: The Triumvirate of Tenets' (2013) 32 IELR 107.
[11] Michael Bradshaw, *Global Energy Dilemmas* (Polity 2013).
[12] Jim DiPeso, 'Advanced Energy R&D: Hitting the Climate Policy Reset Button?' (2011) 20 *Environmental Quality Management* 95, 102.

- Concerted management of energy consumption through technological solutions and behavioural change
- Providing a credible and effective economic framework for decarbonisation by putting a price on CO2 (through carbon taxes and/or cap-and-trade schemes)
- Phasing out all subsidies for the production of fossil fuels and exploration of new reserves
- Giving generous economic incentives to emerging industries in the low-carbon energy sector, such as wave and tidal power as well as carbon capture and storage

Such a profound transformation of energy systems around the world and the construction of genuinely low-carbon economies are not utopian in a technical sense. The necessary policies have frequently been devised, many low-carbon technologies are already being deployed, and some of the more advanced technologies, such as affordable, large-scale batteries for storing electricity, are nearly within reach.

However, the political economy of the low-carbon energy transition poses a tremendous challenge. Concentrated industrial interests that rely on fossil fuels have often fought against such an energy transformation – most successfully in countries (incl. the US) which are wedded to forms of export- and growth-driven 'carboniferous capitalism' based on cheap and abundant non-renewable natural resources.[13] By contrast, accustomed to greater resource scarcity, European countries have typically been more open to constructing greener, more resource-efficient economies.

Synergy, Conflict, and Co-benefits

In both the US and the EU, strong political and economic coalitions would be needed to counter the influence of incumbent actors defending the status quo. Those in favour of low-carbon transformation can point to important synergies between energy and climate policies that could be pursued in a cost-effective way.

Many economies are reliant on imports of oil, natural gas, and coal. By adding a more diverse range of (largely domestic) low-carbon sources and drastically increasing energy efficiency, countries can enhance the security of supply and reliability of their energy systems. Alongside boosting employment, this was a major motivation for the European Union's 2008 'Climate and Energy Package' and its 2014 successor.[14] Energy security also had a strong – but not decisive – influence on the climate policy debate in the US.[15]

The potential for synergy with another important aspect of energy security – affordability – is less straightforward. Energy efficiency measures need upfront investment, but often have a relatively short payback time. By contrast, significant investments in relatively novel low-carbon technologies may result in considerably higher energy costs, especially in the short term. The political risks of such strategic energy policy should not to be underestimated. For instance, in the UK, where average household energy bills rose by 75 percent between 2004 and 2014, green levies were responsible for around £100 on top of the average annual

[13] Matthew Paterson, 'Post-Hegemonic Climate Politics?' (2009) 11 *British Journal of Politics and International Relations* 140, 158.
[14] See <http://ec.europa.eu/clima/policies/package/index_en.htm> accessed 04 January 2015.
[15] Guri Bang, 'Energy security and climate change concerns: Triggers for energy policy change in the United States?' (2010) 38 *Energy Policy* 1645, 1653.

household bill. This merely equalled one fifth of average price increases during this period.[16] Nevertheless, rising energy prices stoked serious political controversy over climate policy in 2014, and the long-term cost-benefit ratio of bold climate policies very much depends on future prices of fossil fuels.

This kind of political backlash is not inevitable. Concerns over distributive (in)justice regarding the cost of energy/climate policy could, in principle, be addressed by funding low-carbon measures from the general budget rather than adding the cost to household bills directly. And from a global perspective, even the United Nation's ambitious agenda to provide sustainable energy for everyone around the world by 2030 (SE4ALL) strives to do so in a low-carbon fashion by emphasising energy efficiency and renewable energy.[17]

However, there are also 'false' synergies and potential conflicts between energy and climate policy. For example, incentives for biomass and biofuels in the US and the EU modestly enhanced energy security, but also resulted in a variety of unintended consequences, and had a negligible (or even negative) effect on GHG emissions.[18] In addition, promoting first-generation biofuels (from palm oil, sugar cane or rapeseed oil) often leads to increased deforestation or environmentally harmful agricultural practices.

A related controversy is currently playing out with regard to unconventional shale gas and coalbed methane. Although advertised as *lower-carbon* (than coal and oil) and as a potential 'bridge' to a radically low-carbon future, studies from the US show that the climate benefits may have been overestimated due to significant methane emissions from shale gas operations. An even more important caveat is the danger of 'locking in' a fossil fuel-based energy infrastructure for the coming decades, thus making it harder to move towards a low-carbon energy system in a quick and cost-effective way.[19]

To overcome formidable barriers to system transformation, low-carbon advocates have increasingly sought additional allies from the broader environmental and public health sectors. For instance, emphasising the 'co-benefits' of climate mitigation provides a powerful complementary rationale for upfront investments in low-carbon energy generation and R&D. Effective climate policy would considerably reduce concentrations of ground-level ozone, nitrogen dioxide and particulate matter, thus preventing hundreds of thousands of premature deaths from air pollution each year. Compared to a scenario without climate policy, this would also save significant expenditures on air pollution control. By 2050, the EU could potentially save over €35 billion.[20] In global terms, McCollum et al. estimate that concerted

[16] UK Committee on Climate Change, *Energy prices and bills - impacts of meeting carbon budgets* (2014) < http://www.theccc.org.uk/publication/energy-prices-and-bills-impacts-of-meeting-carbon-budgets-2014/> accessed 04 January 2015.

[17] Joeri Rogelj, David L McCollum and Keywan Riahi, 'The UN's 'Sustainable Energy for All' initiative is compatible with a warming limit of 2°C', (2013) 3 *Nature Climate Change* 545, 551; and see UN SE4ALL website <http://www.se4all.org> accessed 04 January 2015.

[18] Robert Lawrence, *How Good Politics Results in Bad Policy: The Case of Biofuel Mandates*, Environment and Natural Resources Program (Belfer Center 2010) <https://research.hks.harvard.edu/publications/getFile.aspx?Id=611> accessed 04 January 2015; Sonja Van Renssen, 'A biofuel conundrum', 1 *Nature Climate Change* 389.

[19] Albert C Lin, 'A Sustainability Critique of the Obama "All-of-the-Above" Energy Approach', (2014) 5 Geo. Wash. J. Energy & Envtl. L. 17; Christine Shearer, John Bistline, Mason Inman, et al., 'The effect of natural gas supply on US renewable energy and CO_2 emissions', (2014) 9 *Environmental Research Letters* 1, 8.

[20] Peter Rafaj, Wolfgang Schöpp, Peter Russ, et al., 'Co-benefits of Post-2012 Global Climate Mitigation Policies', (2013) 18 *Mitigation and Adaptation Strategies for Global Change* 801, 824.

decarbonisation of energy systems may (by 2030) reduce global expenditures on public health and the diversification of energy sources/imports by $100-600 billion annually.[21]

Conclusion

Energy policy-makers in the US, the EU, and beyond are grappling with the linkages between energy and climate policy. This chapter has argued that there are important reasons – as well as technological and political opportunities – to rebalance energy policy in favour of climate policy. If done intelligently, this could speed up the low-carbon transition and lower its overall costs, while generating significant co-benefits for energy security and public health.

[21] David L McCollum, Volker Krey, Keywan Riahi, et al., 'Climate Policies Can Help Resolve Energy Security and Air Pollution Challenges', (2013) 119 *Climatic Change* 479, 494.