

Accelerating low-carbon innovation: the role for phase-out policies

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Recommendations

1. The Government's plan to phase out unabated coal in electricity generation is a good start, but similar approaches should be applied to decarbonise the heat and transport sectors.
2. The Government's Industrial Strategy should consider how high-carbon practices will be phased out to make space and build investor confidence in low-carbon innovations.
3. Phase-out policies contained in EU Directives must not be "lost" as a result of Brexit.
4. Policy makers should start by mapping the current policy landscape and assessing where there is a need for additional phase-out policies to drive low-carbon innovation and quick decarbonisation.

Summary

The rapid development and deployment of low-carbon innovations requires policies to support new technologies. Alongside these, policies are also needed to phase out carbon-intensive activities.

Policy measures that phase out high-carbon practices facilitate innovations by creating strong market signals about the direction of travel. In addition, by smoothing the transition process, they can help to avoid sudden, unpredictable changes.

Phase-out policies include:

- **Control policies** that reduce emissions from specific technologies or sectors.
- **Changing market rules** that address decarbonisation of a whole market, sector or system.
- **Reduced support** (such as tax breaks or subsidies) for high-carbon technologies.
- **Policies to ensure a balanced debate** that considers both new entrants and incumbents (such as the creation of new committees or networks).

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Successful innovation policy requires phasing out the old as well as supporting the new

The UK has a commitment to reduce carbon emissions by 80% by 2050. It is clear that innovation – whether in the form of new low-carbon technologies or social innovations such as new business models – will have a central role to play in this process. The ongoing global shift towards a low-carbon economy presents an opportunity for the UK to capitalise on new and expanding markets in low-carbon power, heat and mobility. Promoting an innovation-led achievement of carbon budgets is a major task for policy makers. This is both in terms of directing innovation activities towards low- and zero-carbon solutions and in accelerating their rate of deployment.

Policy makers deploy a range of tools aimed at supporting the creation, development and deployment of innovative technologies. These include, for example, R&D funding, deployment subsidies, public procurement and targets for rolling out new technologies. While this type of support is undoubtedly a crucial part of the innovation process, it misses a key part of the picture: the phase out of incumbent technologies and practices that are not compatible with achieving long-term climate goals.

It is necessary to consider how existing high-carbon practices will be phased out. This is needed firstly to create the right market signals for low-carbon innovations to emerge. Secondly this is to ensure that the transition process is managed in a way that avoids stranded assets and leaving people without appropriate alternative employment options.

1. Creating the right market signals

By focusing policy attention on phasing out carbon-intensive technologies and practices, such as the burning of coal for electricity generation or combustion engine automobiles, policy makers can incentivise the creation of a low carbon economy. Such “phase-out” policies create very strong market signals about the direction of travel and make room for new low- and zero-carbon technologies, business models and practices.

2. Ensuring a smooth transition

A low carbon economy requires an accelerated structural change away from business as usual. However, a sudden shift to new low-carbon technologies and practices could leave high-carbon industries with stranded assets and their workforces without the right skills to find employment in a low-carbon world. By signalling the direction of travel and setting out clear and stable longer-term timetables and milestones, the government can ensure that industry has sufficient incentives and time to invest in retraining staff, build alternative competences and become part of the change process. This is instead of trying to block it and continuing to invest along conventional lines.

Pursuing innovation policies alone will lead to some change. However this will take place much more slowly than where policy makers are actively pursuing both the creation of alternatives (through low-carbon innovation) as well as phasing out high carbon technologies, business models and practices.

What are phase-out policies?

There are four different types of phase-out policy:

1. Control policies

This group of policy instruments aim to reduce carbon emissions from specific technologies or sectors. This is either through market mechanisms (in the UK, examples include the carbon floor price and EU Emissions Trading System (ETS)) or regulation (such as mandatory energy efficiency requirements for appliances, vehicle emission standards, zero carbon buildings, and a ban of incandescent light bulbs).

2. Changing market rules

These are rules that are applied at a broader level than control policies and typically address a whole market, sector or system, or even cross several systems. One example is the UK's 80% carbon reduction target, as set out in the Climate Change Act 2008.

3. Reduced support for dominant carbon intensive technologies or practises

High-carbon technologies and practises may receive support in a number of forms. These should be acknowledged and then reduced and removed over time. Examples include subsidies or tax exemptions.

4. Ensuring a balanced debate by developing actors or networks in emerging sectors

Incumbent industries can have a strong influence on policy decisions, whereas emerging innovations are unlikely to have well developed and influential networks. This imbalance can be addressed by creating new committees or networks involving actors mainly supporting low- and zero-carbon innovations in order to ensure incumbents are not given unfair weight in policy making processes.

In order to ensure that these policies are implemented effectively, it is important to consider what changes might be required in the practices and routines of existing organisations and institutions. For example, new minimum energy efficiency requirements remain irrelevant for changing building sector practices if building inspection does not adequately enforce the new standards.

Case study: German nuclear phase out drives innovation in renewables

Germany's Energiewende (energy transition) aims to achieve at least 80% of electricity generation from renewable sources by 2050. By 2016, progress towards this target stood at 33%. This long-term target is supported through instruments that support the development and deployment of renewable technologies, including public funding for R&D and a feed-in tariff and tendering for renewables. In addition to these supportive policies, however, was the introduction of a policy to phase out an incumbent technology; nuclear. Originally adopted in 2002, the policy to phase out nuclear power by 2022 was initially contested by industry and opposition parties, but

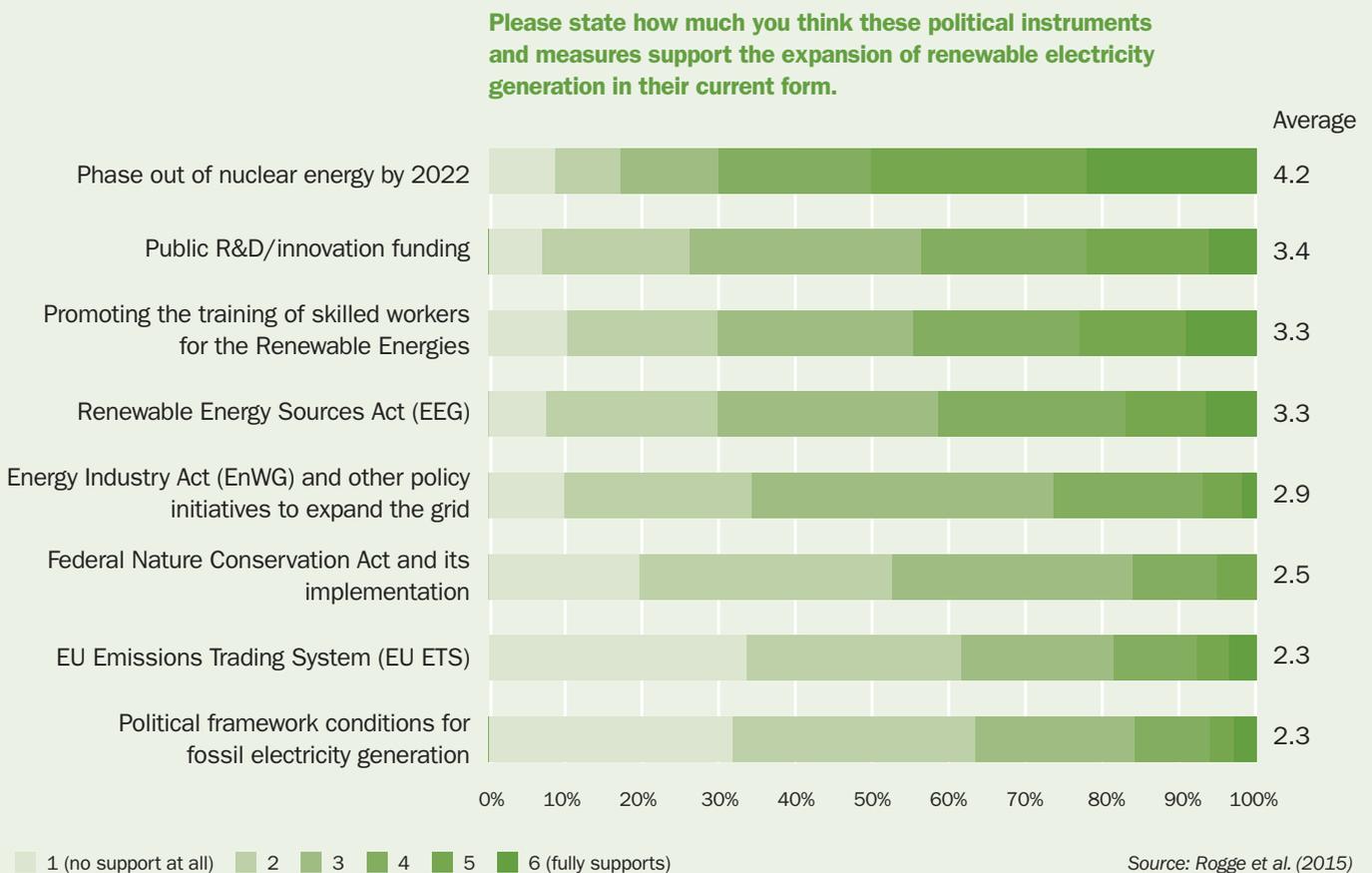
received cross-party support following the Fukushima incident in 2011.

An innovation survey was conducted among 390 German manufacturers and suppliers of renewable electricity generation installations and components. The results showed that the nuclear phase-out policy was considered to be the policy that provided the greatest "support" to the expansion of renewable electricity (see Figure 1).¹ Researchers found that the positive link with innovation comes about because the existence of the phase-out policy for nuclear enhances the credibility of the German government's policy package to support

renewables. This, in turn, contributed to higher investments in corporate R&D in renewable energy.²

The same survey suggested that phase-out policies need to be stringent to have a noticeable effect. The EU ETS – a phase-out policy aimed at fossil power production – is a case in point. The EU ETS has hardly played any role in supporting renewables because the carbon prices have been too low. The lack of a specific phase-out policy for coal at the time of the survey is a second example of a missed opportunity of an accelerated decarbonisation of the German energy system.

FIGURE 1: THE PERCEIVED IMPACT OF DIFFERENT POLICY INSTRUMENTS ON THE EXPANSION OF RENEWABLE ELECTRICITY GENERATION IN GERMANY, 2014

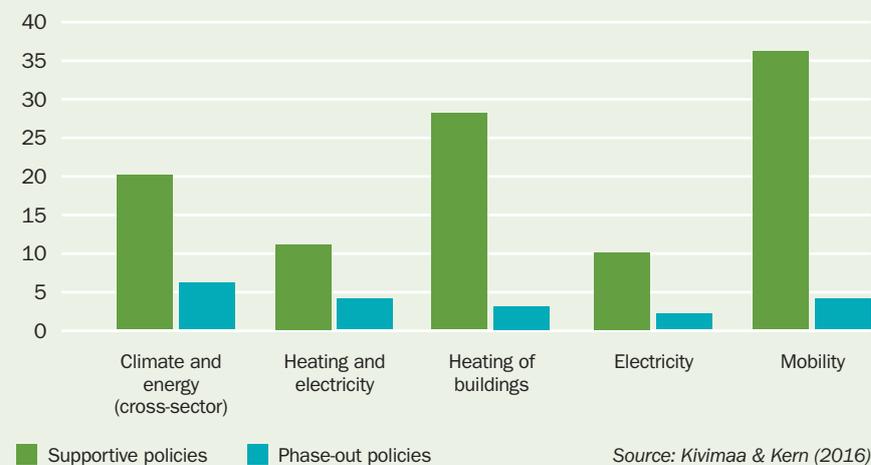


The UK policy landscape

In the UK, policy makers have tended to focus more heavily on policies that support the creation of low-carbon innovations. Less attention has been paid to how existing unsustainable technologies and practices will be phased out.

An analysis of UK policies identified 68 policies that support the creation of low carbon innovations, but only 19 policies aimed at phasing out or disincentivising high-carbon technologies or practices.³ This is depicted in Figure 2.

FIGURE 2: NUMBER OF SUPPORTIVE AND PHASE-OUT POLICIES BY SECTOR IN THE UK, 2014



Recommendations for policy makers

1. Phase-out policies are required across the economy, not just in the power sector

The Government's plans to phase out unabated coal are welcome, but this approach must be applied across other sectors of the economy – such as heating and transport – if we are to deliver the low carbon transformation of the economy set out in the Climate Change Act.

2. The Industrial Strategy should consider how high-carbon technologies and practices will be phased out as well as support low-carbon innovations

As the Government draws up its ideas for a new Industrial Strategy, it needs to consider carefully not just what it wants to support in terms of low- and zero-carbon innovation and industries, but also whether existing arrangements

and policies might act as a barrier to potential areas of growth. It should plan for how high carbon technologies and practices might be phased out in an ambitious but predictable and planned way.

3. Phase-out policies must not be “lost” through the Brexit process

Some of the UK's existing phase-out policies were implemented to meet EU Directives (for example, vehicle emission standards, energy efficiency standards for white goods and appliances and the ban on incandescent light bulbs). It is essential that these policies are retained after the UK has left the Union if we are to maintain a favourable environment for low-carbon innovation.

4. Map the current policy landscape

Policy makers should start by mapping the existing policy landscape and assessing the extent to which it

provides both support for low-carbon and phasing out of high-carbon technologies and practices. From such an analysis plans could be drawn to ensure a more balanced mix of policies across each sector in order to help meet the UK's decarbonisation targets.⁴

References

1. The survey was conducted as part of the GRETCHEN project in 2014 and was answered by 390 companies (a response rate of 36%). For further information, see www.project-gretchen.de.
2. Rogge, K.S., Breitschopf, B., Mattes, K., Cantner, U., Graf, H., Herrmann, J., Kalthaus, M., Lutz, C. and Wiebe, K. (2015): Green change: renewable energies, policy mix and innovation. Karlsruhe: Fraunhofer ISI
3. Kivimaa, P., & Kern, F. (2016). Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions. *Research Policy*, 45(1), 205-217
4. Kern, F., Kivimaa, P., & Martiskainen, M. (2017). Policy packaging or policy patching? The development of complex energy efficiency policy mixes. *Energy Research & Social Science*, 23, 11-25.