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Energy pathways in the UK

The bottom-up approach promoted through the Paris Agreement and signed in 2016 requires the definition of accurate and realistic national pathways to cut emissions. A recent study applied to the UK energy system shows that current UK policy on climate change is incompatible with the most stringent climate objectives.

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The failed attempt to agree on a successor to the Kyoto Protocol at the 15th Conference of the Parties (COP 15) in Copenhagen in 2009 initiated a new bottom-up approach to climate cooperation that culminated with the COP 21 negotiations. The Paris Agreement marks a milestone in the history of climate negotiations. It solidifies the recent move away from the top-down architecture around which the Kyoto protocol was built, towards the loosely coordinated national pledges epitomised by the Nationally Determined Contributions (NDC). NDC, the centrepiece of the recent Paris Agreement, are non-binding national pledges for reducing greenhouse gas emissions in the coming years. While the agreement has been largely welcomed as a success in breaking the negotiation stalemate on how to share equitably the burden of mitigation, the perceived diplomatic breakthrough is in part due to the watering down of its terms. While its predecessors relied on legally binding ‘targets and timetables’, the Paris Agreement relies on voluntary actions, in the hope that they will scale up to the task of “holding the increase in the global average temperature to well below 2 °C above pre-industrial levels” [1]. The voluntary nature of the NDC begs the question of whether the national commitments undertaken in Paris will suffice to achieve such an ambitious target. In light of the above novelties, and given our seemingly insatiable appetite for fuel (Figure 1), which stands in stark contrast to the ambition to reach net-zero emissions in the second half of the century, it is of

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paramount importance that research addresses the recent change in horizon by investigating emission corridors beyond 2050. Yet, owing to the tradition of using 2050 as a long-term target in Europe, and the fact that most NDC are expressed with reference to 2030, virtually no study has assessed the adequacy of national targets to achieve net-zero emissions later in the century. Writing in Nature Energy, Pye and co-authors, from the University College London, fill this gap by exploring different long-term mitigation scenarios for implementing full (rather than partial) decarbonisation, as mandated in the Paris Agreement. Using the UK as case study [2], the researchers apply effort sharing principles of equity and grandfathering (based on current total emissions) to carbon budgets [3].

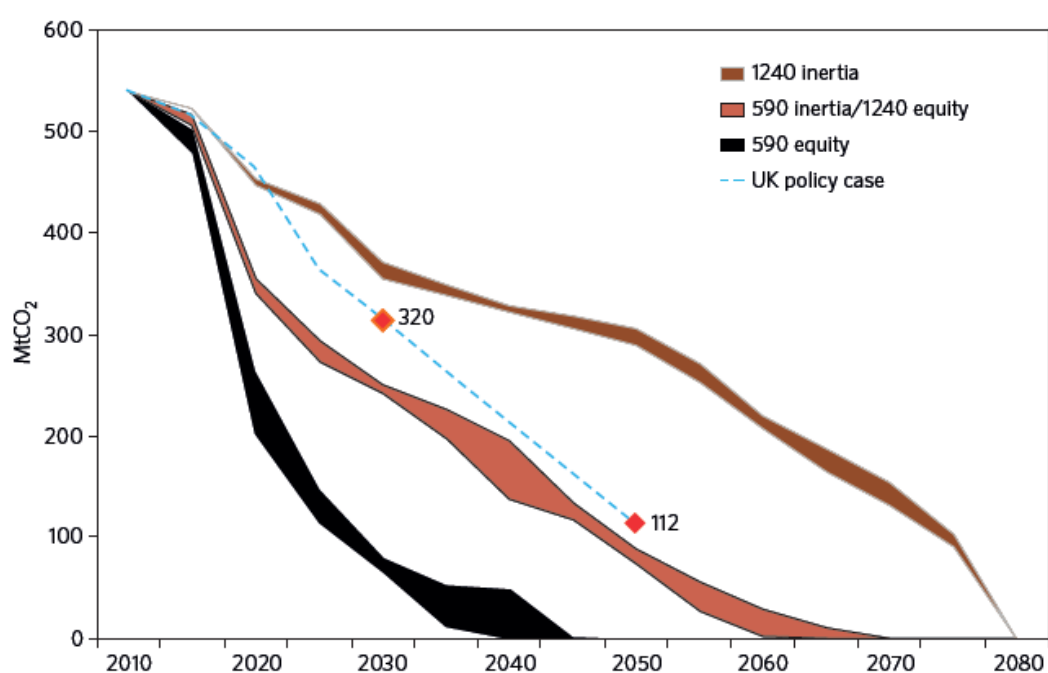


Figure 1 | Emission pathways for the UK energy system under different transition scenarios. The transition pathways (ref. 2) present different levels of stringency (590 or 1240 GtCO₂) and two burden-sharing rules. The equity approach is the more ambitious one, requiring reduction measures that are in line with historical emissions levels, whereas the inertia scenario — which recalls the grandfathering approach in the Paris agreement — allocates a carbon allowance based on current emissions level. Under the equity scenarios the energy system is required to decarbonize more quickly compared to the inertia scenarios. Reproduced with permission from ref. 2, Macmillan Publishers Ltd.

Pye and colleagues explore two levels of stringency (590 GtCO₂ vs 1240 GtCO₂ carbon budget) and two burden sharing rules (equal per-capita basis, “Equity”, and one based on the 2010 share of global emissions, “Inertia”). Given the UK’s high level of development, the equity scenario requires significantly more ambitious mitigation effort, compared to grandfathering.

The researchers define how these four decarbonisation trajectories scale down to the level of the UK energy system, offering a productive way to think about implementation of the Paris treaty, that replaces national targets with a collective decarbonisation objective. In such a bottom-up regime, the easiest way to achieving net-zero emissions, in the absence of costly large scale deployment of negative emissions technologies, is for all parties to fully decarbonise by the end of this century. The main finding of the study is that, as expected, the current UK policy on climate change is incompatible with the most stringent net-zero objectives to achieve zero emissions by 2050 embodied in the Equity 590 scenario. A more optimistic spin on the results of the study is that the current policy is not far off either the 590 Inertia or the 1240 Equity trajectories. Both of these pathways would achieve net-zero emissions well before 2080, an objective which is more realistic than 2050, and is roughly in line with the “net-zero target no later than 2070” advocated by the authors.

While this analysis introduces a welcome methodology and change of horizon, some questions remain unanswered, and call for further investigations. Firstly, it is important to understand that national strategic responses to other parties' mitigation efforts is an important part of the game [4], as ambitious targets abroad may induce free-riders to abate less at home. The accounting methodology employed in the in Pye et al. [2] assumes that, given the allocation framework, a similar effort will be displayed in other countries. In other words, it assumes that there will be tacit agreement on the target and no country deviates from it. However, while desirable, this is unlikely to be a realistic setup, especially in a post-Paris Agreement era characterised by voluntary NDC whose enforcement relies on soft 'naming and shaming'. In addition, the large inequalities in fossil fuel use (Figure 2) call for differentiated responsibilities, which is likely to exacerbate the risk of opportunistic behaviours inducing parties to delay mitigation action [5].

Further real-world complications that are likely to influence the formation and implementation of climate policy include bargaining power and domestic politics. The former has the potential to skew burden-sharing in favour of more powerful actors (towards less stringent commitments), especially if they can exercise levers such as trade restrictions. The latter implies that, when special interests are predominant, domestic politics tends to be distorted in the direction preferred by the lobby groups that stand to gain the most, notwithstanding the global target [6]. The outcome of the recent turn in politics in the U.S., with president Trump's election, represents a powerful reminder of the complex interplay between domestic forces and

international policy. The work by Pye and colleagues provides a helpful baseline on which simulation endeavours accounting for strategic behaviour and political constraints should be performed in future research efforts. Such research holds promise for gaining a better understanding of the policies implemented by individual nations and blocs of countries, as well as to assist policy makers tasked with implementing the Paris Agreement at home.

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