

Policies for decarbonising a liberalised power sector – review comments

Despite nearly two decades of efforts to decarbonise the European power sector, and some notable achievements, full decarbonisation is not yet in sight. Yet, freeing the power sector from its reliance on carbon based fuels is vital in achieving the decarbonisation of the wider economy that the world needs to have a (slim) chance of containing the rise in Global Mean Temperatures below 2C.

The need for further decarbonisation occurs in the specific context of failure of the EU-ETS to provide a durable and credible carbon price and advanced liberalization of the European electricity market, which the paper brilliantly acknowledges.¹ More generally, this paper is an exceptionally interesting read as, in addition to shedding light on the specific market failures that characterise the *liberalised* European power sector and that would need addressing to deliver a CO2-free electricity generation mix, it tackles the more crucial question of how best to incentivize investment in low carbon-intensive technologies to avoid inappropriate carbon lock-in.

I would recommend this paper for publication and have the following comments.

Major comments

1. Central to the contribution of this paper is the discussion of a break-even carbon price. This is an interesting concept, one that is focused on making specific carbon free technologies economically viable. It is therefore slightly unfortunate that its limitations seem to be emphasized more than its potential value as a guide for setting the carbon price. Even if it is sensitive to uncertainties in underlying variables, it feels that more weight could be put on the discussion of its policy relevance (i.e. in which context/for which technology is it more likely to be a useful guide, if at all) and how 'critical' its sensitivity to the said variables is to making it a workable policy tool.
2. The present paper closely relates to the discussion on target-consistent climate policies (of which carbon pricing is one), i.e. policies in line with politically agreed goals (Hepburn, 2017). Section 2.1, third paragraph, hints at it but I believe this link could be made more explicit, especially as the UK approach to valuing carbon emissions is now based on target-consistent valuation (DECC, 2009) and that the international community has agreed on a specific climate target through the Paris Agreement.
3. The paper seems to take for granted the view that the UK (and European?) electricity generation sector is liberalised and will remain so. However, although I agree with the view that it is currently liberalised I am less convinced that it will remain so in the future, especially given that the imperative of tackling climate change has sparked the

¹ Indeed, the deployment of renewable electricity generation capacity took place concomitantly to the liberalisation of the European electricity market (started in 1996 with Directive 96/92/EC and furthered with Directives 2003/54/EC and 2009/72/EC), which created additional challenges for the deployment of renewable energy sources and their integration to national electricity grids. These challenges were not entirely foreseen and still haven't been fully acknowledged nor been addressed in existing wholesale or distribution electricity market design. For a discussion of these challenges and some potential solutions, see IRENA (2017).

temptation to revert to more interventionist (and potentially detrimental) practices. It seems therefore appropriate to briefly recall the case for a liberalised electricity sector and how a change towards less liberalised market organisation might affect the policy recommendations.

Minor comments

- According to some studies, e.g. Pfeiffer et al. (2016), the world has already exceeded its fossil-fuel electricity generation capital stock consistent with a 2C warming target. A short reference to such literature could make the urgency of the problem faced by the power sector clear and provide even more support for the paper.
- p. 2 – “in etting a carbon price” should read “in **setting** a carbon price”
- p. 2 – “[...] as standards are typically criticised for failing to equilibrate marginal damage costs across technologies”; Economic efficiency requires that the marginal abatement cost be equalized across all abatement options/technologies and, all, equal to the Marginal Damage of pollution. Hence the above sentence is not incorrect per se but it seems more intuitive to suggest that “standards are typically criticised for failing to equilibrate marginal **abatement** costs across technologies”.
- p. 18 – “[...] in the ESI will lower the price of carbon facing the remaining sectors in the ESI [...]”; I wonder whether the second ‘ESI’ in this sentence should read “ETS” instead.

References

IRENA (2017). Adapting market design to high shares of variable renewable energy.

Hepburn, C. (2017). Climate change economics: Make carbon pricing a priority. *Nature Climate Change*. Available at: http://www.nature.com/articles/nclimate3302?WT.feed_name=subjects_climate-sciences

Alexander Pfeiffer, Richard Millar, Cameron Hepburn, Eric Beinhocker (2016), *The ‘2°C capital stock’ for electricity generation: Committed cumulative carbon emissions from the electricity generation sector and the transition to a green economy*. Applied Energy.

UK Department for Energy and Climate Change (2009). *Carbon Valuation in UK Policy Appraisal: A Revised Approach*.
